Study Report SR398 [2018]

Prioritising quality

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Preface

This is part of a series of reports prepared as part of the BRANZ research programme entitled ‘Eliminating quality issues’. This programme of work aims to utilise existing knowledge and design new solutions to eliminate common quality issues in the construction industry.

This is the first research report looking to answer the research question: How would we prioritise the most common quality issues? The aim is to determine what the most high-impact and high-frequency defects are and how clients judge quality.

Acknowledgements

We would like to thank the industry experts and builders who took part in the research for this paper. Their insights and experiences are of great value to the researchers and we hope to our wider audience. To the clients who allowed researchers into their homes and spoke openly about their experiences, thank you. We wish you all the best in your new home.

Prioritising quality

BRANZ Study Report SR398

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Reference

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Abstract

Quality issues range from minor problems such as aesthetic issues to those that can have serious long-term impacts. This report identifies those quality issues that should be prioritised based on frequency and impact from the perspectives of industry experts. It also identifies areas of concern from two viewpoints – the initial owner and the long-term durability and functionality of the building. Determining which quality issues should be prioritised will provide an understanding about the implications of these issues.

The highest-priority quality issues found largely related to weathertightness. Problems reported included incompatible materials used together, poor quality materials or workmanship and poor installation practices. These issues have a significant impact on the durability and performance of the building and are likely to be costly to repair.

Builders and clients understand the term ‘quality’ differently. They also have different expectations throughout the building process. This highlights the importance of communication as being key to a smooth construction process.

Keywords

Eliminating quality issues, housing defects, building construction process, housing quality issues.

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Executive summary

Quality issues can range from relatively minor problems to those that are likely to have serious long-term impacts. This paper identifies the quality issues that cause the most concern from the perspectives of experts, building companies and clients. We used a mixed-methods approach to obtain the views of experts, builders and clients. The purpose of this research is to understand the implications of quality issues and identify which quality issues need to be addressed first.

Results from experts' workshops

Industry experts developed a list of technical building quality issues, then ranked them in terms of frequency of occurrence and impact. Those that have the highest impact and occur most frequently are of the highest priority to address. The highest priority issues related to practices that allowed moisture to penetrate the building envelope. Problems were also reported with incompatible materials used together, poor quality materials or workmanship and poor installation practices. A concerning feature of these findings is that the higher priority the issue, the more difficult it is to identify for a layperson or inexperienced builder during the building process. These hidden quality issues have significant impact on the durability and performance of a building and require a lot of money to repair.

Results from a builders' survey and client interviews

While builders conceptualised quality as excellence or expectations that had been exceeded, clients had a different view. Clients who had completed a build within the last 2 years were more likely to report quality representing value for money or getting exactly what they paid for. This indicates a need for builders and clients to review the results against specifications at the end of a build.

Clients interviewed selected their builder based on the quality of a show home and ability to get plans suiting their section and vision. However, builders noted that word of mouth was how they got most work.

Standard terms and conditions were rarely changed, but building specifications were acknowledged by both builders and clients as critical to reaching agreement. Some clients realised the importance of specifications after the build was completed, while others took plenty of time to ensure everything was planned as desired.

Clients reported that support for decision making was appreciated and that it was difficult to make some decisions without understanding the context or implications. In some cases, visualisation or reading plans can be difficult, especially if the client has not had experience in commissioning building work. Visualising progress was also important to clients, while builders had to balance the risk of inexperienced people on site with providing assurance that progress had been made.

Communication throughout the building process strongly influenced clients' perceptions of how well the building process was working. Frequent, accurate and information-rich communication was appreciated, while inaccurate and reactive communication resulted in warning signals for the client.

Builders reported a range of tasks being carried out at handover, including cleaning and tidying, visual inspections with and without the client and celebration of a completed building. Few routinely compared the finished product to agreed

specifications. Some clients reported having to make lists of issues to be addressed and being surprised at the lack of focus given to handover given the importance of this milestone. For some clients, the timing of the handover is critical, as they need to vacate current housing by a certain date. Builders should be aware of time pressures such as this so they can prioritise completion or ensure clients build in appropriate buffers in case of delays due to weather or other factors.

Some clients were unhappy with the time it took for issues remaining at handover to be addressed. Their perception was that remedying defects was low on the priority list for builders who had moved on to their next project, and sometimes responsibility for this follow-up was unclear. However, builders surveyed reported that either the project manager or main contractor were responsible for follow-up.

Almost all of the clients interviewed reported that, overall, they were pleased with the final result of the build. The one who was not happy had many outstanding issues to be fixed and no clear resolution in sight.

Implications of the findings

Weathertightness remains an issue that the construction industry in New Zealand must address. While the Mediterranean-style housing of the leaky homes era is largely out of fashion now, technical issues remain. Inappropriate sealant use was identified as the highest priority issue, with it occurring on most building sites and having a major impact on the quality of a building. Moisture ingress was also caused by inappropriate reliance on H3-treated timber. These issues appear simple, and the solution lies in education. However, they point to an overall lack of skills and education in the workforce – the underlying reason for New Zealand's poor record of quality in building.

Builders and clients understand quality in different ways and have different expectations throughout the building process. Communication between builder and client is absolutely key to a smooth process, including negotiating when a client can come on site. Clients may have trouble making decisions, especially where the context and implications are unclear or they need to visualise the solution. Technology can assist with visualisation, but builders can also take more time to fully explain the context and implications of a decision. Clients who experienced push back on their decisions were often appreciative, as it allowed them to either confirm or make a better decision.

The handover process marks a critical stage in the building process, and a formalised process appears to work best. Clients were surprised to see obvious issues remaining at this stage, indicating that preparing for handover would be time well spent. Along with the formal identification of issues, a detailed plan to address outstanding issues would be appreciated by clients. This would remove anxiety and leave less room for disagreement.

1. Introduction

Quality issues can range from relatively minor problems to those that are likely to have serious long-term impacts. This report identifies the quality issues that cause the most concern from the perspectives of experts, building companies and clients.

The report looks to determine what combination and extent of defects in new residential buildings is cause for concern. The areas of concern are from two viewpoints – the initial owner and the long-term durability and functionality of the building.

For the purpose of the BRANZ 'Eliminating quality issues' programme work, the following definition of quality is adopted (BRANZ, 2018):

> 'Quality' in buildings can be defined around three key parameters:
>
> 1. Functionality: The building meets all of the functional requirements set out in the building contract
> 2. Durability: The ability of building materials, components and construction methods to satisfy performance and functional requirements of the Building Code for the expected life of the building without a reconstruction or major renovation (or repair)
> 3. Performance: Defined through measurable aspects of the building's design – thermal, structural, seismic, acoustic etc. Performance, as built, must be verified during construction and upon completion of the building process.

In New Zealand and internationally, very few houses are built without having some form of compliance or aesthetic issue present. What is not clear is the implication of quality defects for various stakeholders including owners and builders. This research identifies the issues that are of most importance to builders and clients.

This research builds on previous programme work on 'What is quality in buildings?' (Page & Gordon, 2017) and has been produced in conjunction with two literature reviews. It aims to determine what combination and extent of defects in new-build residential buildings is a cause for concern. It identifies types of quality issues and what levels of quality can be expected.

This report is preceded by a literature review (Wardle & Duncan, 2017), the aim of which was to determine the barriers to achieving quality housing in New Zealand. The review found that quality issues are determined by the ability and willingness of builders to communicate, achieve requirements and manage errors rather than deficiencies in the Building Code. Quality issues are also caused by inability to provide effective remediation and to manage errors well.

This report starts with a summary of the quality issues commonly found on New Zealand building sites and which of these have the most impact on the quality of a building. The focus here was on technical rather than aesthetic issues and on the physical processes rather than communication. To develop this section, BRANZ held two workshops with representatives from the building industry in May 2017. The participants were asked to collectively develop a list of building issues, then to rank them in order of frequency and impact. The result is a prioritised series of technical issues found on a building site (section 3). Further information on the methods used in the experts' workshops is included in section 2 and Appendix A.

Section 4 considers the perceptions of builders and clients, including how they manage quality issues. It includes commentary on communication practices and experiences along with how quality issues are identified and managed on a building site. This section was developed as a result of qualitative interviews with clients and a survey of building companies. Clients and builders were both asked to comment on the various stages of the building process and how they managed quality issues. Further information on the methods used to collect information is included in section 2 and Appendices B and C.

Section 5 draws together the previous sections into a discussion of what might change in the building sector to address quality issues. It includes weathertightness, skills and the interactions between builders and clients.

2. Methodology

This research used a mixed-methods approach to ensure a balanced view from building experts, practising builders and clients.

The first method involved two experts' workshops held at the BRANZ premises during May 2017. Builders, architects and designers from the BRANZ mailing database were invited to take part in the workshops. The mailing list comprised people who had been a BRANZ subscriber for over 7 years as a proxy for length of time in the sector. An email invitation (including the incentive of reimbursement for time) was sent to 206 people, of which 15 were able to take part in one of the workshops.

While one or two of the experts had worked together in the past, the general sense was that of strangers brought together to come to a consensus opinion. The first workshop comprised four builders, two designers, one project manager and one architect. The second workshop comprised three designers, two architects and two builders. Experience ranged from 10 years to 50 years in the sector and included people from sole proprietors to medium-sized enterprises. While most experts had experience in residential building, three focused on commercial building work.

The workshops focused on first identifying quality issues that occurred on building sites. These were individually listed then grouped and duplicates removed. Once a comprehensive set of issues were in place, experts were asked to rank them in order of impact (ranging from significant to negligible) and in order of frequency. When combined, the results were a prioritised list of quality issues that appear on building sites in New Zealand. Results from the experts' workshops are found in section 3.

The second method involved hour-long, face-to-face interviews with clients who had recently built a house. A list of people who had completed a new-build stand-alone house within the last 2 years was generated from the Whats On[1] building consent list. Clients from the Wellington region that had not been approached for other BRANZ research purposes were sent a letter inviting them to be part of the research. Of those invited to take part, 11 responded, and 10 agreed to be interviewed. BRANZ offered an incentive of a $50 Prezzy card for those who took part in the interview. Interviews took place in the client's new home (nine interviews) or place of work (one interview) in August and September 2017. Clients' homes ranged in build cost from low to high and in size from less than 100 m^2 to 250 m^2. Buildings were all completed within the last 2 years. Interviewees had different family status including:

- individual living alone
- couple with young children
- couple with older children and extended family
- retired couple.

The aim of the interviews was to obtain a narrative of the building process to explain what is important to clients and why. It is not intended to be representative of the population of people who have recently built in Wellington.

The interviews generated considerable comment on the approach and behaviours of builders. To ensure a balanced view, BRANZ undertook a survey of builders in October/November 2017. A subsample of new-residential builders was selected from

[1] *Whats On report (Monthly).* TF Stevens & Co Ltd, Auckland, New Zealand.

the BRANZ mailing list, and an email invitation to participate in a SurveyMonkey survey was sent out.

Of those invited to take part, 98 responded and took part in the survey. BRANZ offered an incentive of entry into a prize draw for an iPad Mini for all respondents that completed the survey. Respondents ranged from small builders building fewer than 10 homes every year up to very large builders who were responsible for more than 100 homes every year.

Results from the client interviews and builders' survey are found in section 4.

3. Prioritised quality issues

This section draws from the experts' workshops, where industry experts developed a list of technical building quality issues then ranked them in terms of frequency of occurrence and impact. Those that have the highest impact and occur most frequently are of the highest priority to address.

A concerning feature of these findings is that the higher priority the issue, the more difficult it is to identify for a layperson or inexperienced builder during the building process. These hidden quality issues have significant impact on the durability and performance of a building and require a lot of money to repair.

3.1 Moisture risks and general buildability

Experts identified the inappropriate use of sealants as the highest priority issue. The three main errors made in the building process were:

- the use of sealants when mechanical flashings were required
- reliance on sealants in places that were inaccessible to maintain or renew
- sealants installed with no allowance for movement.

The impact of inappropriate sealant use was considered high to extreme because it allowed moisture to enter the building, resulting in high-cost significant repairs over time. It is of potential concern that inappropriate sealant use was perceived to occur in most new builds.

Reliance on preprimed H3 timber was also identified a high priority issue. This primer is designed to give limited protection to the timber during the building process and should not be interpreted as giving weatherproof protection. The risk is that damp timber is used in enclosed spaces where the timber may not be able to dry. Experts reported that inappropriate use of preprimed H3 timber is a frequent occurrence.

Finally, and more generally, the buildability of a design was also considered a high-priority issue, as a design that wasn't buildable would have a high impact on the building. Design errors were also found to be a common issue in the literature. Those that remain undetected during the construction phase may, in extreme cases, may lead to injury or death (Wardle & Duncan, 2017).

3.2 Incompatible materials and inadequate specifications

Experts identified three overarching issues that were considered of medium to high priority:

- Incompatibility of materials – insulation and services or fixtures; paint and sealants; window components; flashings and sealants; galvanised steel and timber.
- Specifications that were inadequate or not followed – insufficient detail on drawings for joins and flashings; design inadequate for the environment; installation specifications not followed.
- Materials that are not fit for purpose – coatings; fasteners; cladding flange for aluminium windows; uncovered timber on windows; materials of inadequate quality; framing or cladding that is distorted, not true, wet or dimensionally inaccurate; cladding that is too thin or with insufficient clearance.

Where new materials are specified, there may have been insufficient testing to verify their suitability. Installation guidelines may be lacking or not followed. Project managers may have to trust that licensed specialists do indeed have the skills to install the product alongside other components but can have insufficient knowledge to confirm this. Also, when materials are substituted at late notice (due to unavailability or perceived lower cost), the people on site may have inadequate understanding of any impact on the change.

These issues require greater awareness of how materials should be used, especially in conjunction with other materials. Impacts of incompatible materials or materials that are not fit for purpose generally result in problems for the homeowner in the distant future.

When installation specifications are inadequate or not followed, problems such as moisture ingress can result over time, leading to high-cost repairs for owners.

3.3 Structural components

Medium-priority issues identified in the experts' workshops tended to be more specific to individual materials, components or workmanship, and identified these issues:

- Poor-quality materials – inadequate timber treatment; flashing tapes in wet or cold conditions; doors; windows.
- Poor installation – skillion roofing without cavity, vent or counter batten; MDF architraves used when moisture is present; insulation with gaps or packed too tight; insufficient fixing for framing; excessive spacing between framing; missing bond breakers behind sealant joints; reliance on sealants or tapes for cladding penetrations instead of flashings.
- Missing components – safety glass..

These types of issues are likely to be the result of inadequate skills and knowledge. Most should be identified during building inspections, but there is always a risk that issues are missed.

3.4 Internal components

Most issues that experts considered low to medium priority related to poor workmanship or materials. These quality issues were identified:

- Damage – by other trades; on door reveals prior to final installation; cracking in wall and/or ceiling lining or concrete slabs; bowing due to thermal differential.
- Poor materials – cheap, short life, ineffective.
- Poorly fitting components – doors and windows not fitting due to not being able to measure prior to manufacturing or not being sealed properly; threshold not thermally broken; joints between claddings.
- Poor finish – inappropriate environmental conditions; not as specified or expected.
- Poor installation – inconsistent framing; framing clutter; congestion of cavity; too many layers on a wall; flat roof with single-layer membrane only; scarf joints used inappropriately or incorrectly.
- Conflict between drawing specifications, contracts and regulation – insufficient details in specifications; lack of understanding of product installation requirements; BCA waiving requirement for detailed design.

These issues are the ones most likely to be identified by a client, as they tend to be highly visible.

Experts identified very few issues that had negligible impact and occurred rarely. These were in the form of examples, including:

- door hanging on incorrect side
- unusual aluminium shapes manufactured incorrectly
- cladding colours incorrect.

Again, these issues are most likely to be identified by clients and repaired at or before handover.

3.5 Non-technical issues

Along with the technical issues explicitly sought in the experts' workshops, the authors were told of other issues that had a major impact on the quality of buildings in New Zealand. These include:

- regulatory frameworks that incentivise compliance and stifle innovation
- a lack of education, skill, understanding and supervision in the industry – this issue is supported by the frequency at which high-impact issues occur (and are not remedied) on building sites
- inadequate decision making by clients – clients being insufficiently informed about the impact of design or material decisions.

Experts reported inherent tension between innovation and risk. Regulatory processes involve a range of people, each with different skills and perspectives on plans. When a design is unfamiliar, inconsistent advice may be received at different stages of the consent process. To avoid this, designers may use Acceptable Solutions rather than design based on the best available evidence.

Tension is also evident in the trade-off between value and cost. Often, immediate cost is a key driver, meaning that longer-term value propositions such as the whole-of-life cost, healthy design or materials and other benefits are often not considered. On the other end of the spectrum, aesthetics may drive decisions rather than practicality, leading to inappropriate material choices.

After completion, building quality may be impacted when maintenance requirements are not met. For example, a homeowner may plant a garden in close proximity to cladding, causing a build-up of moisture or ponding at the base of the wall.

Overall, experts attending the workshops identified major concerns with activities and issues on building sites. Many of the issues identified as occurring frequently may not be visible during the inspection process, resulting in significant long-term costs for owners and buildings that do not stand up to the elements. It is disappointing that moisture risks remain a major issue on the building sites of New Zealand, albeit with different causes to those identified in the leaky homes crisis. Education on the use of sealants and how materials interact appears to be of the most urgent priority.

4. Managing building quality

This section considers how builders and clients perceive and manage quality throughout the building process. Information for this section was obtained from an industry survey of builders and client interviews. Builders and clients were recruited independently, and no attempt was made to match any client with their builder.

Survey participants ranged in experience and size from inexperienced through to very experienced and small sole proprietors through to larger group-home builders. For the purpose of analysis, we have defined small-scale builders as those who build 10 or fewer new houses each year. Large-scale builders are those who build 11 or more new houses each year. Of our respondents, 61 are small-scale whereas 12 are large-scale builders (Figure 1). A further 25 responses could not be categorised as no size information was given. These responses are included in the 'overall' category.

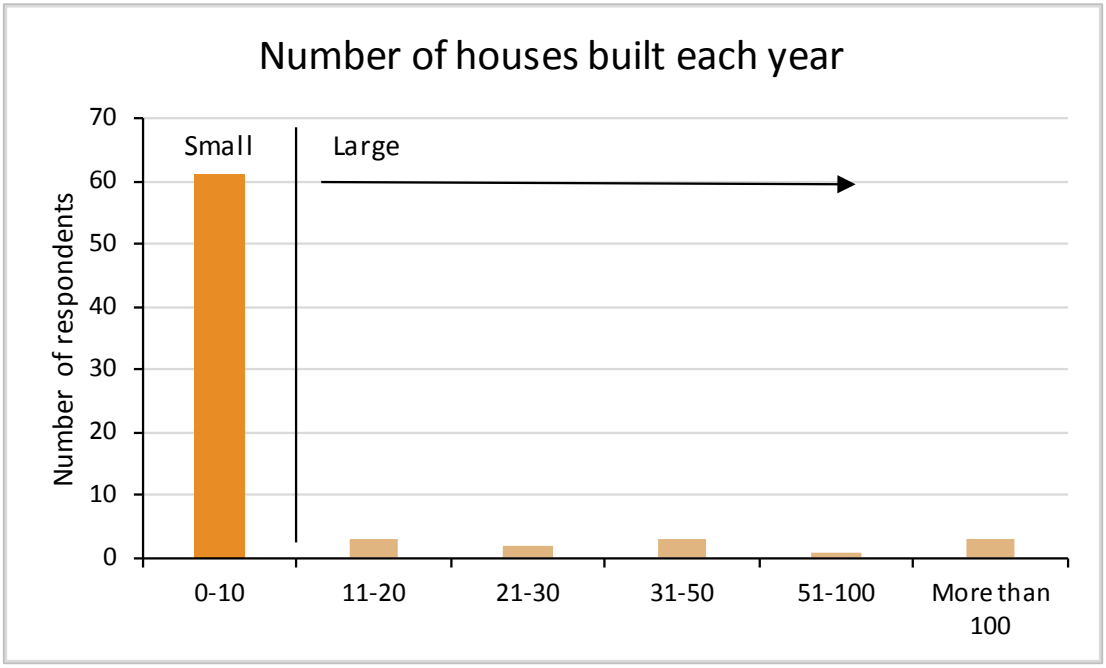

Figure 1. Number of respondents to the industry survey.

As few responses were received from large-scale builders – their data should be used with caution.

Ten interviews were undertaken with clients, all of whom could be considered inexperienced in building houses. Eight had not built a house before, one had purchased a turnkey new build and another had built a house 40 years ago. One of those who had not previously built a new house did have experience in DIY building.

A range of reasons were given for choosing to build a new house. Four indicated that warmth was a factor in their decision, citing experiences of living in "cold New Zealand homes" (Interview 1, 3, 4, 5). One identified the lower deposit requirements from their bank (10% for a new build versus 20% for an existing house) (Interview 10). Another had been "looking for a number of years at self-build and other options" (Interview 9). One had owned the section for a number of years and replaced the old house with a new build (Interview 6). The remaining client had lived in a new house overseas (Interview 7).

4.1 Conceptualising quality

Four main concepts of quality are evident in the literature, and each has been used to define and measure quality in buildings. (Page & Gordon, 2017). As these concepts reflect different ways of thinking about quality, both the industry survey and client interviews included a question to elicit which concept was the best fit for them:

- Quality is about achieving excellence.
- Quality is about surpassing the client's expectations.
- Quality is about the client getting value for money.
- Quality is about the client getting exactly what they paid for.

Quality for builders was largely focused around the end result of the build. Builders tended to see quality as achieving excellence or surpassing the client's expectations (Figure 2). Larger builders were more likely than smaller builders to select that quality is about achieving excellence. The smaller builders were split fairly evenly between achieving excellence and surpassing the client's expectations. Few survey respondents thought that the client getting value for money or the client getting exactly what they paid for matched their view of quality.

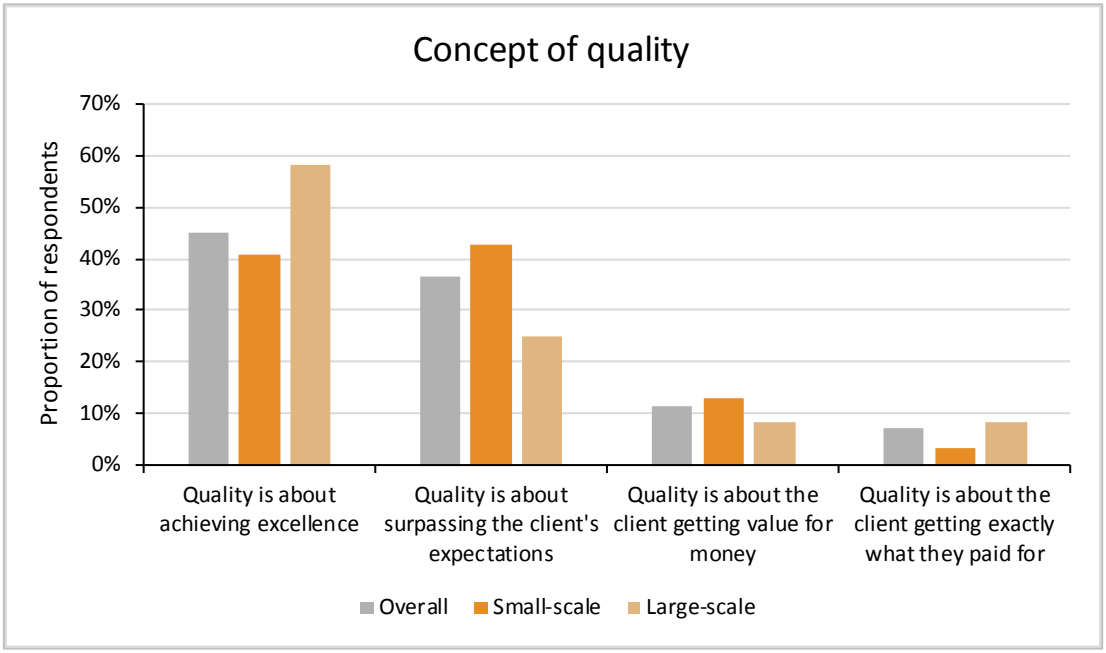

Figure 2. Builders' concept of quality.

Results from clients contrasted strongly with results from builders.

There was a strong link between quality and cost (Table 1). When prompted with the same choice of statements about quality, five clients selected the statement 'Quality is getting exactly what I paid for' and three more selected 'Quality is getting value for money'.

Of the remaining clients, one selected achieving excellence, and the other felt all statements resonated, although they noted that "I did have a budget to work to" (Interview 8).

Table 1. Clients' concept of quality.

Quality is about ...	Number of clients	Interview number
... achieving excellence	1	5
... getting value for money	3	1, 2, 3
... getting exactly what I paid for	5	4, 6, 7, 9, 10
... getting a better building than I thought I would	0	
All four resonated	1	8
Total	**10**	

The clients who selected 'Quality is getting exactly what I paid for' were focused on ensuring the building was delivered as planned. Four of the five clients identified issues remaining with the house, with two indicating doubt that the issues would ever be resolved to their satisfaction.

In one of these cases, only one item was outstanding and it wasn't considered a significant problem by the client.

> That's probably the only thing they didn't address. (Interview 10)

In the other case, there were multiple issues and no guarantee of a fix.

> Do I just give up? Do I continue to try to convince them to come around to fix it? (Interview 9)

The clients selecting value for money as their concept of quality focused on achieving the house desired within a budget.

> We were looking for a home ... for a price. (Interview 1)

> [It was about] balancing value for money with my budget. (Interview 2)

One interviewee focused on ensuring no surprises, spending more time on planning than it took to complete the build.

> We didn't change anything during the building process because we knew that was bad news and more money. (Interview 3)

The client who selected excellence as their concept of quality focused on achieving the house they desired, including features that were not typically offered by their selected builder.

> [The building company] spent some time talking to local plumbers who knew about them ... They signed up this ... company to give us what we wanted. Cost was a secondary factor in this case ... this cost us an extra $8,000, but it was worth it. (Interview 5)

4.2 Reaching agreement

Before a house can be built, a builder and client need to reach agreement on the scope, timing and price of the building. This stage can take a significant amount of time. In some cases, clients who were interviewed reported that this stage took longer than the build itself.

In this section, we report on builders' approaches to communicating the level of quality they would deliver and clients' descriptions of how they went about selecting a building company.

4.2.1 Engaging with potential clients

Builders responding to the survey were asked to rank the importance of several measures in communicating the level of quality that they will deliver to potential clients. Overall, builders ranked word of mouth as being their most important tool to communicate the level of quality that they are delivering (Figure 3). This was slightly more important for small-scale builders than large-scale builders.

Large-scale builders instead rely on detailed specifications, their contract and the salesperson to communicate their level of quality. At scale, it is easier to justify spending additional time and effort creating detailed specifications and contract documentation to enable a quality comparison with your competitors. They can also carry the overhead of a salesperson to interact with the client. These options may not be available to many smaller-scale builders, particularly for sole proprietors.

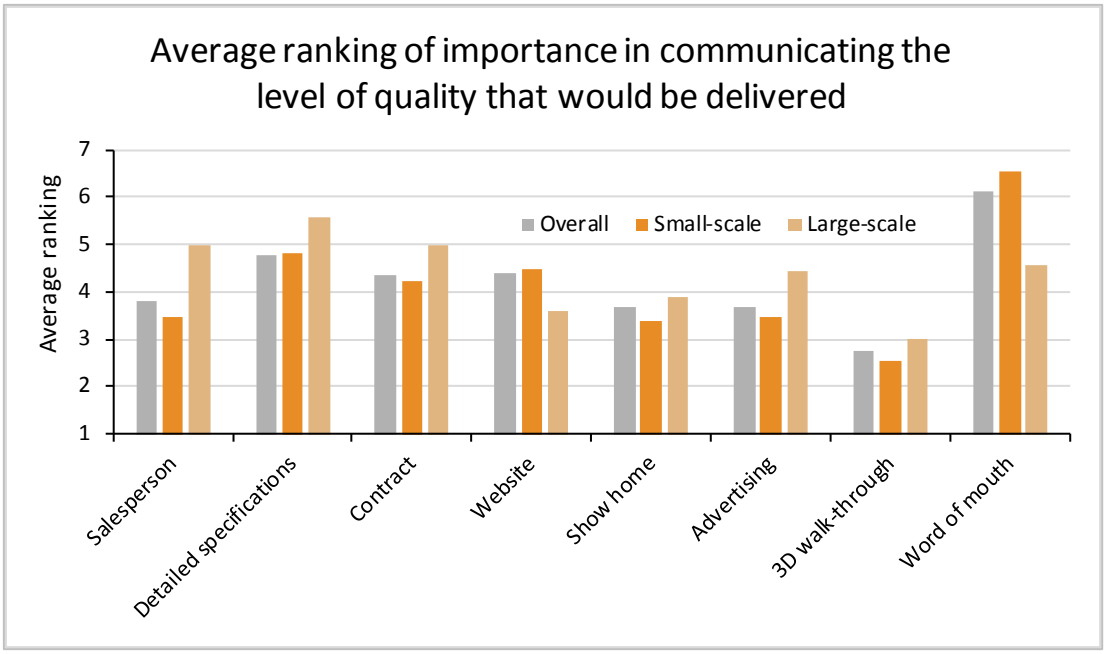

Figure 3. Important measures in communicating quality.

4.2.2 Selecting a builder

All of the clients interviewed described completing research to determine which building company to contract to undertake the work. Research generally included internet searches as well as visits to show homes around New Zealand.

When selecting the building company, clients described taking two factors into account – the product they could get and the reputation of the building company. For the product, quality was an explicit consideration, especially in terms of quality of finish. Selection of the building company meant putting trust into a company to do the right thing.

Type of house, floorplans, quality of finish and cost of the product all played a part in decision making. Show homes were used as a benchmark for quality and an indication

of the type of house that could be built. All but two of those interviewed noted that a visit to the builder's show home helped them to make their decision (Interview 1, 3, 4, 5, 6, 7, 8, 10). Type of build was a key consideration for at least three of those interviewed (Interview 1, 4, 7), while standard floorplans strongly influenced six clients (Interview 3, 4, 6, 8, 9, 10).

> It was the only plan we saw by any builder that fitted onto the section within the council requirements. (Interview 3)

Five of those influenced by the floorplans made only small changes to the design.

> We changed the orientation of the entrance ... the fittings ... but not the plans. (Interview 10)

> Nothing structural was changed. (Interview 8)

The quality of finish in the show home (or the builder's other properties) provided a benchmark for eight of the interviewees (Interview 1, 3, 4, 6, 7, 8, 9, 10).

> We saw the show home and said, oh yeah, this place is quite nice. (Interview 10)

> The finish, the carpets, the brickwork outside, the detail was what we liked. (Interview 9)

> They had really nice fixtures, top quality spec, so we went with that. (Interview 7)

Along with influencing the selection of the building company, one interviewee kept referring back to the show home during the build to confirm that what they were getting was the quality displayed.

> Everything we related back to the show home. (Interview 3)

Cost also featured strongly in decision making.

> It's really hard to know if you get complete value for money if you are going with a group home builder. Because you have to go a long way through the process to get your final price ... you can't go through that level of detail with [say] three [companies]. At some stage, you have to decide who you are going to trust. (Interview 4)

> It was cost that sold it for us ... it wasn't reputation [because the company was new] ... but we went with the show home as well. (Interview 7)

In five of the interviews, interviewees mentioned that a company representative strongly influenced their decision to go with that company (Interview 1, 2, 3, 4, 10). In all of these cases, the company representative appeared to be someone that could be trusted.

> We trusted the woman doing the selling. (Interview 4).

Two interviewees noted that the size of the company indicated they could be trusted (Interview 3, 5).

In one case, the interviewee was new to New Zealand and wanted a reliable building company, feeling that a large company would be more likely to continue operating if anything were to go wrong.

> We wanted a company rather than a sole trader because we wanted that protection. (Interview 5)

Nine of those interviewed indicated that a benefit of a group home build was access to standard floorplans and a range of fittings.

> We found it much easier to start like that than start from scratch and work everything out. (Interview 4)

However, two found the standard floorplans did not meet their needs.

> They don't want what you want, I want what I want. (Interview 2)

> I wanted a separate lounge ... it wasn't a big deal, but there weren't that many plans that I saw that had a separate lounge. (Interview 8)

4.3 Contract documentation

Once the building company was selected, clients and builders turned their minds to agreeing a contract and specifications, including the design of the house. In this process, avoiding risk and making good decisions about design and the quality of fixtures and fittings were top of mind for clients.

4.3.1 Terms and conditions

Builders reported that the majority of contracts specified the level of quality to the client. Contracts that specify the level of quality were more common for large-scale builders than small-scale builders (Figure 4), which aligns with the findings of the previous section.

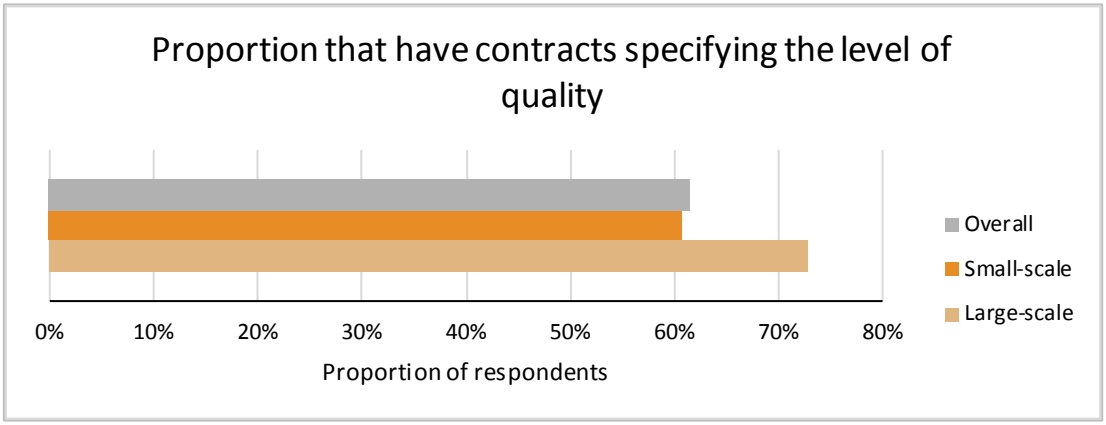

Figure 4. Contracts that specify the level of quality.

It was rare for our responding builders to change from their standard terms and conditions in response to a request from a potential client (Figure 5). About 15% of small-scale respondents stated they never changed from their standard terms and conditions. A further 33% of small-scale respondents stated they would rarely change.

Large-scale respondents appeared to be more open to changing from their standard terms and conditions. Just over 40% of large-scale respondents stated they rarely

changed from their standard terms and conditions, and a further 33% stated they would sometimes change.

Just over 6.5% of respondents stated they always changed their terms and conditions in response to a request from a potential client. This suggests that, for the majority of new-residential construction firms, the contracts are relatively set, particularly where standard contracts from the trade associations are used.

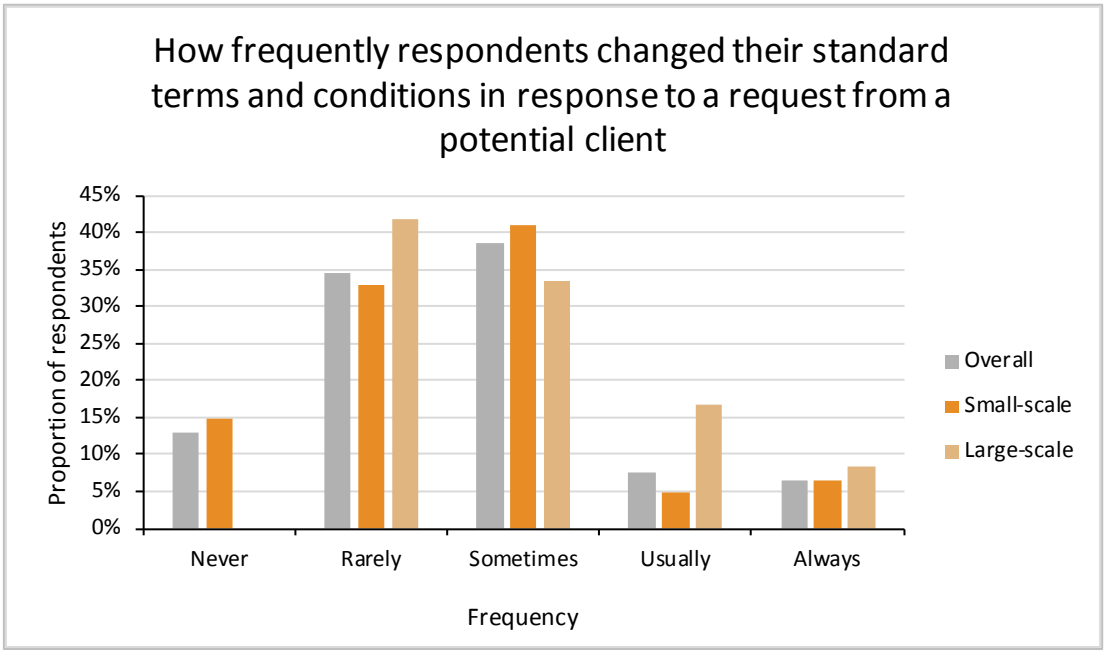

Figure 5. Changing from standard terms and conditions.

Clients interviewed confirmed this approach, with three making changes to the builder's standard terms and conditions mainly to control for risk (Interview 2, 3, 7). For one, it was about making sure liability sat in the right place (Interview 7). For another, it was to ensure the final payment fell after the Code Compliance Certificate had been issued (Interview 3). In only one case the client didn't see the need for a lawyer to review the contract at all (Interview 6).

In two cases (Interview 4, 8), the client arranged for their own tradesperson to complete a part of the building process. In both cases, the building company agreed and incorporated this into the contract.

4.3.2 Specifications

For clients, contracts were generally viewed as a mechanism to reach agreement on specifications. All those interviewed described taking time to ensure all decisions were made and recorded in the contract.

> When you go through the build contract, you've got to be very particular about what you want. (Interview 10)

Two of those interviewed commented on the need to ensure everything is specified in the contract. In one case, "mirrors, toilet roll holders" (Interview 8) had not been supplied, and the interviewee did not notice that they were not in the specifications. In another case, the lighting specified was minimal, requiring a later change once the interviewee realised (Interview 10).

Overall, when decisions on specifications were sought without options or context, clients found it difficult. In some cases, decisions made without context resulted in dissatisfaction with the resulting decision.

Six clients (Interview 2, 3, 4, 6, 8, 10) noted that more guidance would have been helpful in making decisions.

> If it is the first time you are doing it, you've got nothing to compare it to. (Interview 2)
>
> We are more informed now ... fittings are important. (Interview 10)
>
> We just accepted they would put in the standard [higher grade insulation] that is expected in this area. We thought that would be good enough ... but it could be better. (Interview 3)
>
> There was no pushback about are you sure that's the right decision? ... maybe they didn't see that as their job. (Interview 4)

Two clients (Interview 2, 10) commented on how difficult it was to make decisions when it required visualisation.

> If you have a ranchslider there, where do you put your furniture? (Interview 2)

They would have liked software that could show the impact of their decisions. One noted the value of building to the same floorplan as the show home.

> ... being able to physically walk into and around the house. (Interview 3)

Choosing bricks and aluminium was also a challenge for one interviewee.

> You go into this reasonably small, dark room with all the samples. (Interview 8)

Another was shown one brick as a sample and then given addresses of houses that had been built using those bricks, so they "did a lot of drive-bys" (Interview 10).

Three clients commented positively on guidance they received during the process of determining specifications.

> ... how the cut in the slope could be made, how the drive could go up to the house. (Interview 5)
>
> He designed it for us, he listened to all our needs ... he also gave excellent advice, the positioning of this sitting room. (Interview 7)
>
> The kitchen guy was fantastic ... he gave me lots of advice on things I hadn't even thought of. (Interview 2)

Eight of those interviewed mentioned insulation and warmth as an important consideration (Interview 1, 2, 3, 4, 5, 6, 9, 10).

> We were going to have a warm house come hell or high water. (Interview 1)

Two described selecting insulation and heating packages that were of a higher quality than that typically offered by the builder (Interview 1, 2).

> I want the highest type of insulation you can find. (Interview 2)

Two would have selected a higher level of insulation if it had been offered.

> If I was building again, I would have asked the question "What's the other grades and what's the cost?". (Interview 3)

Six of the clients interviewed (Interview 1, 2, 3, 4, 6, 9) had integrated some form of accessibility or future proofing into their designs.

> [We designed] the whole house ... to meet disability needs, with level entry into the house, non-slip surfaces in the showers – the shower is open access and grab rails are in the shower and bathroom. The hall is wide enough for a wheelchair if needed. (Interview 1)

In most of these cases, accessibility features or future proofing were outside the builder's standard specifications.

4.4 Communication throughout the build process

Once the design, specifications and contract had been agreed, focus turned to the building process. Communication and access to the building site were key factors that impacted clients' perceptions of quality, and all of those interviewed noted the importance of communication throughout the building process. This section considers builders' and clients' views of communication throughout the build process.

4.4.1 Frequency of communication

Builders reported that the most common approach to communication with clients is through regular communication either weekly, fortnightly or monthly (Figure 6). This was more common as an approach for large-scale builders, with all large-scale respondents identifying this as their approach. Just over 50% of small-scale builders identified regular communication as being their approach. About a third of small-scale respondents communicated as necessary, which was typically tied to payment reminders or decisions needing to be made. A further 15% of respondents communicated with the client as and when they approached them.

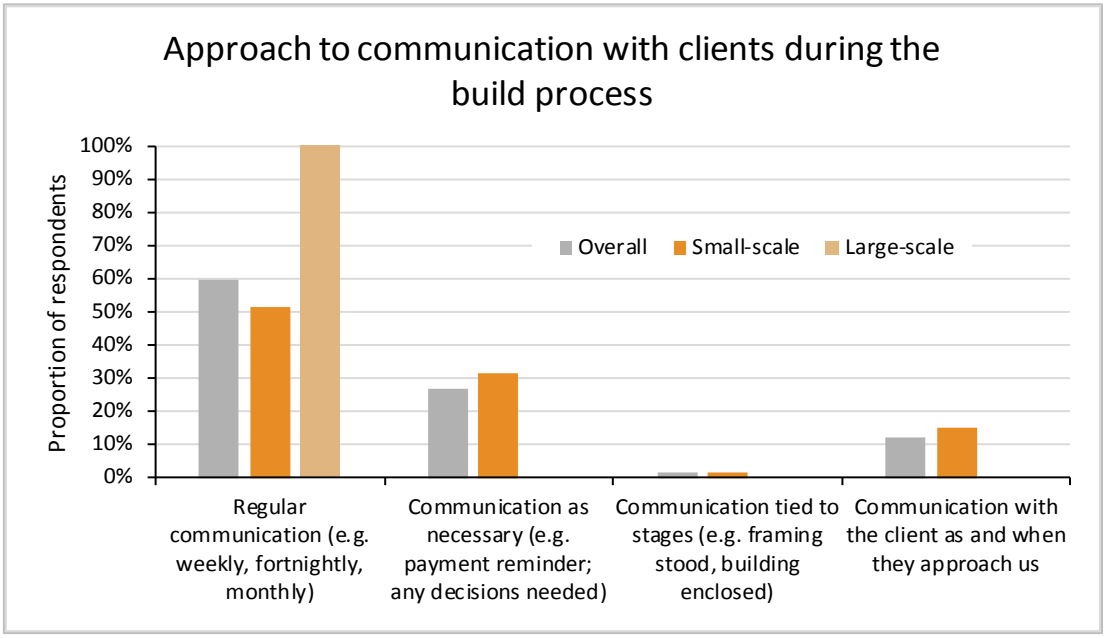

Figure 6. Builders' approach to communication.

The most common frequency for communication with the client was weekly (Figure 7). This was even more common for large-scale respondents than small-scale respondents, with 83% of respondents stating they communicated weekly and 17% stating they communicated monthly. The small-scale respondents had a larger range in their responses. Almost 40% of respondents stated they communicated daily with the client, 54% stated they communicated weekly, and 5% communicated monthly.

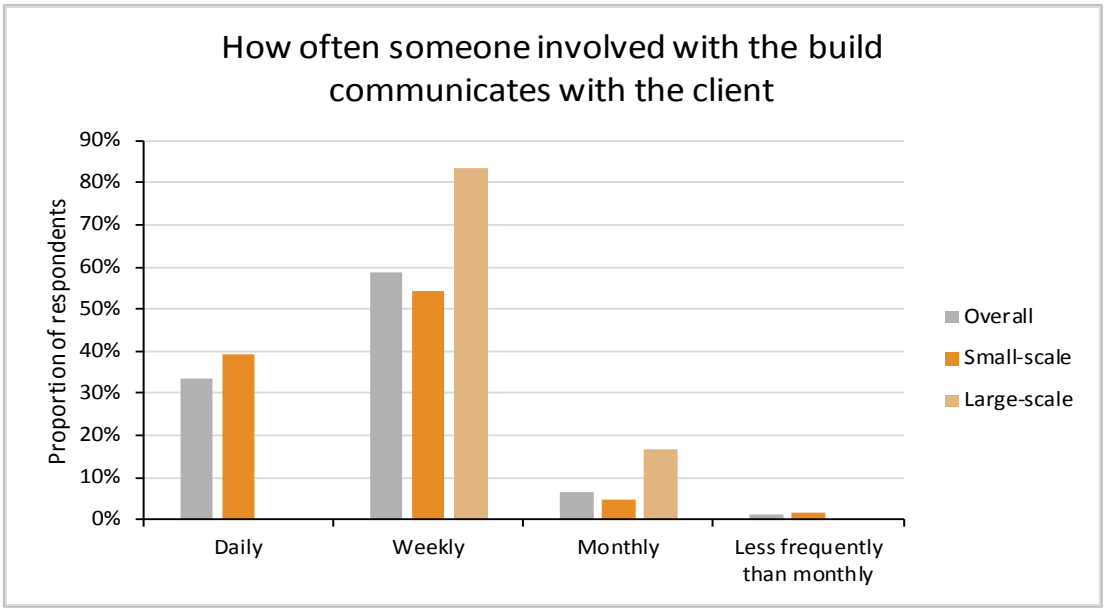

Figure 7. Frequency of communication.

Builders reported the person who was mainly responsible for communication with the client was typically the project manager (Figure 8). All of the large-scale respondents stated the project manager was responsible. However, just under 90% of small-scale respondents selected the project manager. Those small-scale respondents that did not select the project manager chose the main contractor instead. This is likely because there would be no dedicated project manager for sole proprietors or smaller firms, and it would fall to the main contractor on site to undertake communication activities.

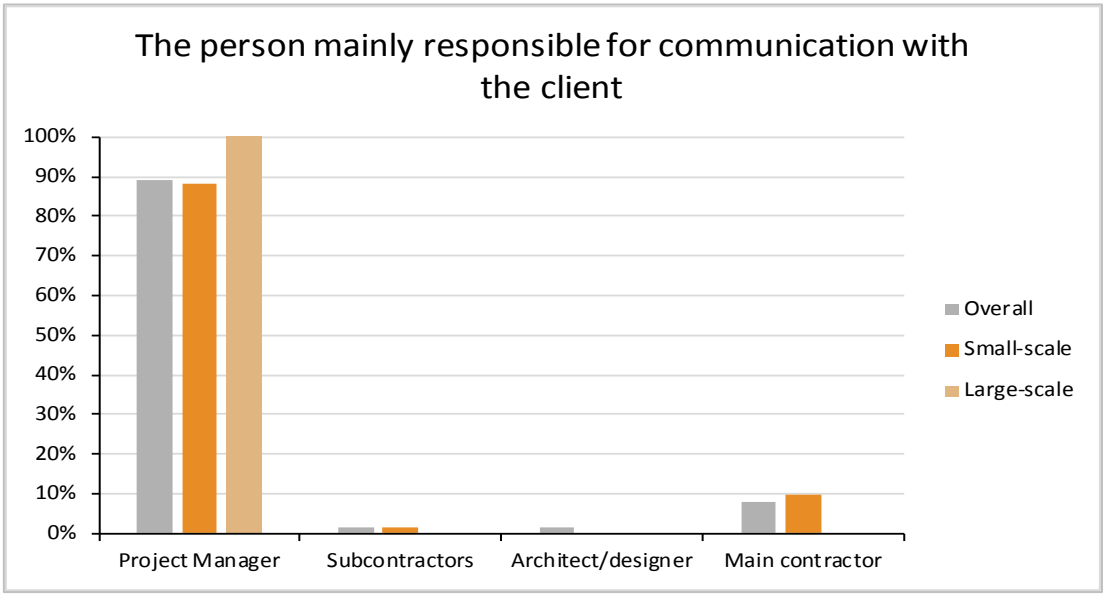

Figure 8. Person responsible for communication.

In most cases, the person primarily responsible for communicating with the client is on site regularly (Figure 9). For small-scale respondents, the person responsible tended to be on site more regularly than for large-scale respondents. About 51% of small-scale respondents reported being on site 2–4 days per week. Just under 38% of respondents were on site 5 days or more per week.

For large-scale respondents, responses were evenly split between 1 day per week, 2–4 days per week and 5 days or more per week. They were also more likely than small-scale respondents to report only being on site as required or twice per month.

Where a project manager or architect/designer was responsible for communication, they were typically on site less frequently than the subcontractors or builder. Small-scale builders were less likely to have a conduit between themselves and the client, and therefore would communicate directly with the client. This means it is more likely the person responsible for communication is going to be on site regularly.

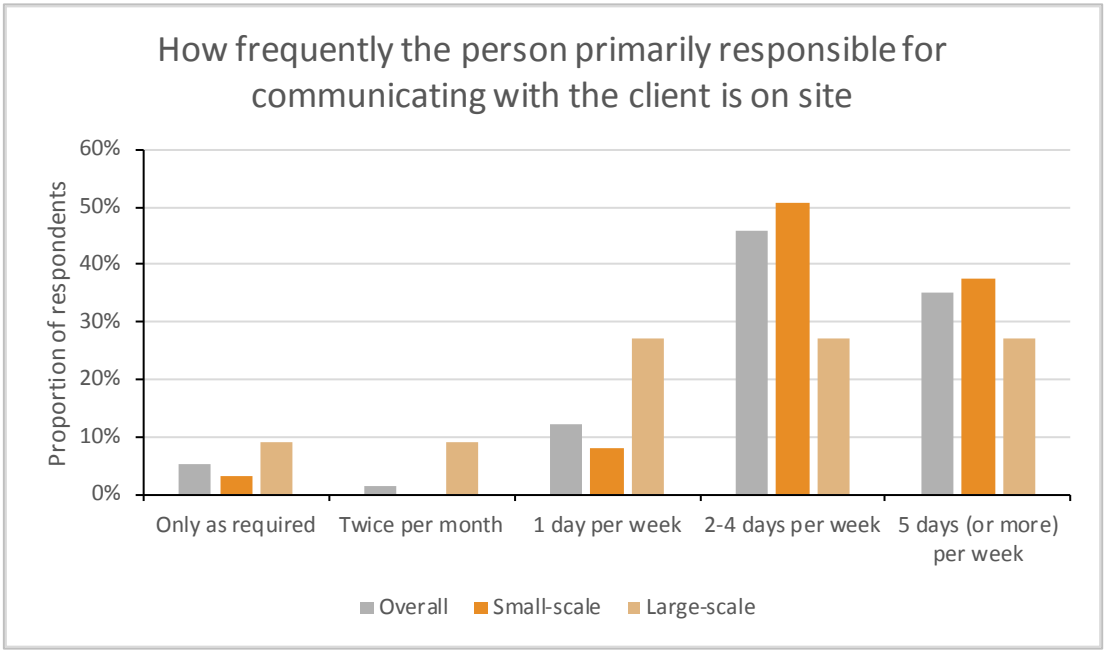

Figure 9. How frequently the person responsible for communication is on site.

Clients reported that different methods of communication were used, with one company providing an online tool to check progress (Interview 10). Another delivered a weekly report via email (Interview 5). Other companies appeared to communicate as they felt was necessary (Interview 1, 2, 3, 4, 6, 7, 8, 9). Two interviewees (Interview 9, 10) noted their desire to know more about what was coming up rather than simply receiving progress reports.

One found that progress reports were inaccurate, resulting in invoices for work that had not been completed.

> They sent us a bill for the roof, [but the] roof's not up yet. (Interview 9)

When communication was poor, three interviewees expressed a lack of confidence in the building process (Interview 1, 4, 9).

> It was wrong several times ... they just seemed incapable of getting the sizes right. It wasn't the builder, it was all a communication thing. The messages never seemed to get through to the right person. (Interview 4)

When communication worked well, the building process was perceived to run well.

> Every Friday, I had a weekly report saying what had been done that week and what was to be done the next week. Once the build started, it ran really smoothly. (Interview 5)

> [The staff] were great to deal with, and it was a good process getting through to consent. (Interview 1)

The project manager was also a key influencer in how clients measured the success of the process.

> We had the most fantastic project manager. He made the project a success. (Interview 3)

In contrast, another interviewee found the project manager was almost never on site, and communication was poor.

> They didn't have enough pride in their work. (Interview 9)

4.4.2 Client access to the building site

Clients reported that access to the building site and subcontractors enabled quality concerns to be identified early. There were differing arrangements for clients to go on site.

> I would call in often, and they were very welcoming. (Interview 6)

In another case (Interview 1), the builder was unwilling to host the client on site.

In at least six cases (Interview 2, 4, 5, 6, 8, 10), the clients discovered quality concerns during the building process. One was significant, resulting in significant rework after a room had been largely completed (Interview 4).

Other issues were smaller, including the wrong door handle being delivered, vanities placed in the wrong bathrooms, faulty wallpaper, holes drilled in brick and non-opening skylights installed instead of opening ones. In one case, a continuing issue was that items supplied were different to those specified in the contract, with multiple "supply problems" given as the reason (Interview 9).

For small-scale builders, clients were typically allowed to at least make regular, unplanned visits. Over a quarter of small-scale respondents stated the client was allowed to make regular, unplanned visits, and a further 46% stated the client was allowed on site at any time.

Access to site was not as open for clients of large-scale builders. The majority of these respondents stated that clients were only allowed if prior arrangements had been made (Figure 10). However, 17% of respondents stated the client was allowed on site at any time. This indicates that, even at scale, there are still large differences in the way these builders operate.

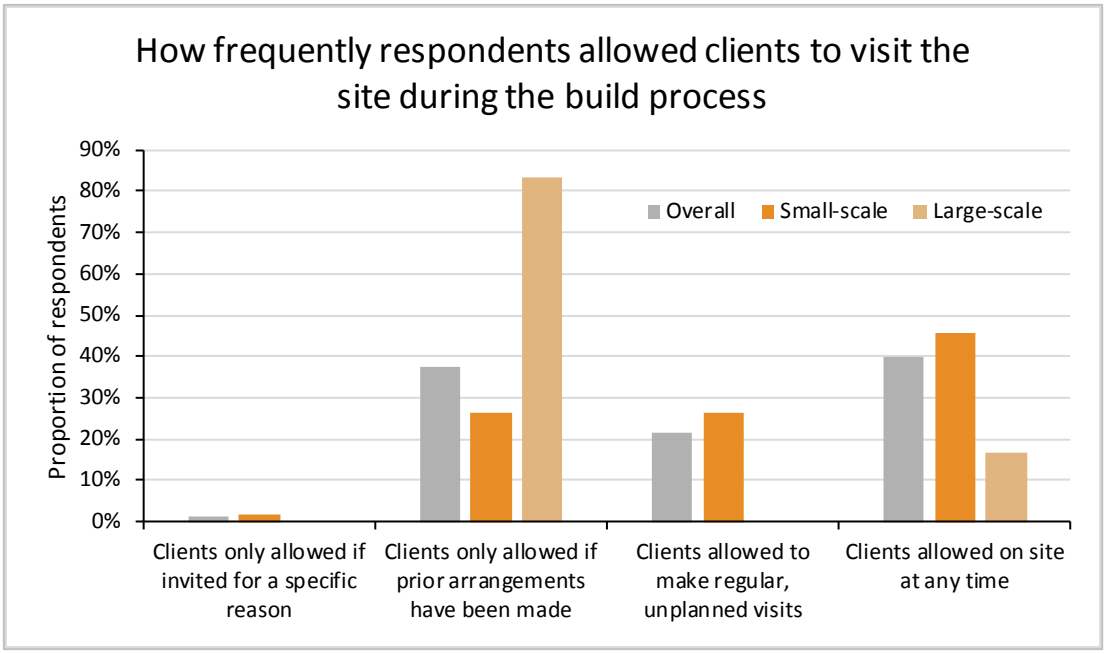

Figure 10. Visiting the site during the build process.

4.4.3 The impact of deadlines

There was little evidence that quality was traded off to meet timeframes. In five cases, the timeframes were extended.

> It was quite stressful ... we had to be out of the rental property at a certain time. (Interview 1)

> What can you do? There is no point in having a tantrum. (Interview 2)

Three interviewees were relaxed about the extended timeframes as all had alternative accommodation organised (Interview 4, 7, 10).

In one case, the build came in on time, exceeding the client's expectations.

> It was amazing, the people just kept turning up and it kept happening. (Interview 3)

In two cases, meeting extended timeframes resulted in quality concerns (Interview 1, 4).

> We knew in the end they were struggling to meet a timeframe ... there were issues that had to be attended to later. (Interview 1)

4.5 Handover

Once a building is complete, it is handed over from the builder to the client. This is an important stage, as it is when responsibility for the building transfers from the builder to the client. As such, it is a critical time for clients and builders to confirm that the house has been delivered to the quality expected.

4.5.1 The handover process

Builders were asked whether or not certain tasks were performed before or at handover. Where something is not performed during the handover process, it does not mean that it has not been done at all. For example, it is unlikely that no cleaning has been done at all on those sites where the premises have not been cleaned and tidied before or at handover.

For the majority of tasks, large-scale respondents were more likely to report doing them than their small-scale counterparts (Figure 11). This was particularly prevalent for a visual inspection of the premises without the client, creating a list of any outstanding issues, asking the client to list outstanding issues and marking the handover with a celebration.

Overall, the majority of respondents reported cleaning and tidying the premises, and performing a visual inspection of the property with the client. However, few respondents reported comparing the results to the plans/specification.

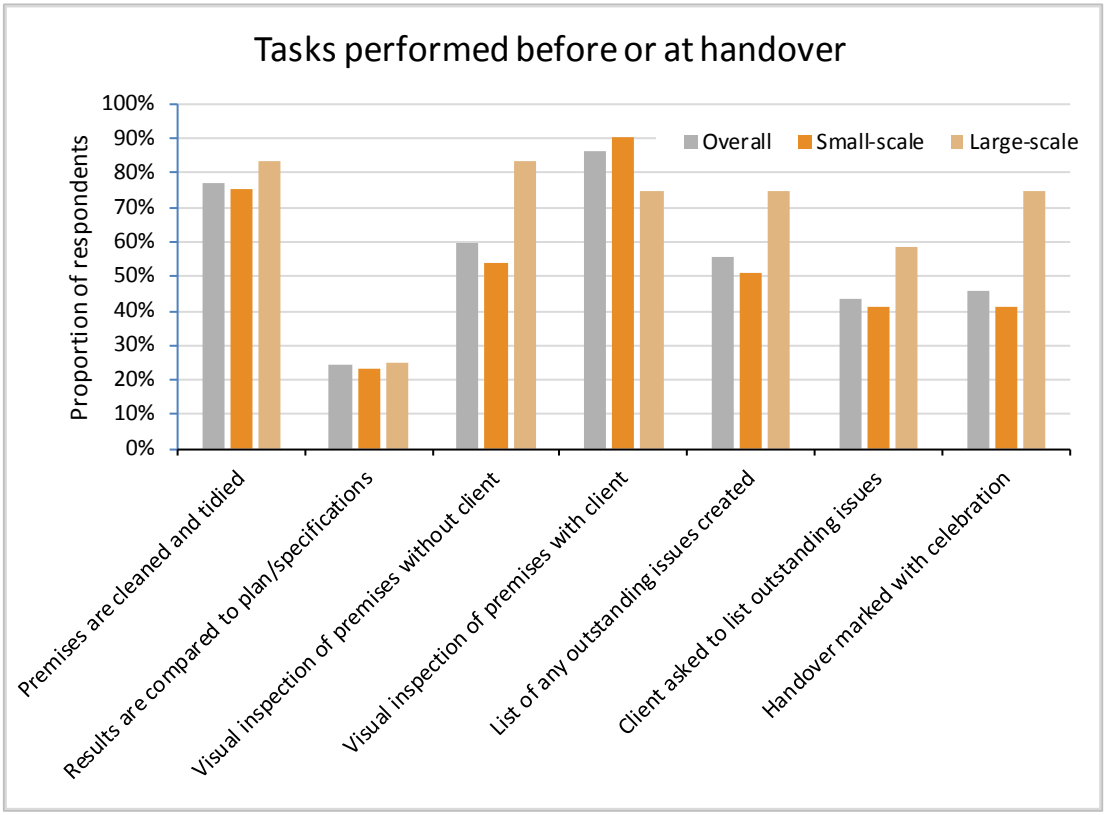

Figure 11. Tasks performed before or at handover.

Some clients reported a very informal handover process.

> They did a quick look around, but it was hardly an inspection. [It was] a social occasion. (Interview 6)

Others had a formal process.

> The director and project manager walked through the house, creating a snagging list along the way. (Interview 5)

In two cases, the clients had to create their own list of issues to be fixed. The first (Interview 4) had walked around the property with the project manager but noted that he "took no notes of the things to be fixed". In the other case, the client was provided with a 60-day maintenance sheet with the instructions that "anything you find wrong, just write it onto the sheet" (Interview 10). One person interviewed had identified issues prior to the handover and placed sticky notes "all over the place". When the project manager came for the handover, it was evident what needed to be fixed (Interview 8).

4.5.2 Responsibility for identification of quality issues

As with communication, the identification of quality issues, particularly in the case of the large-scale builders, tends to fall on the project manager (Figure 12). About 83% of large-scale respondents stated their project manager was primarily responsible, and just 17% stated the main contractor was primarily responsible.

In contrast, for small-scale respondents, the main contractor was typically responsible, with 56% of respondents selecting this option. A further 42% stated their project manager was primarily responsible, with the final 2% stating it was the architect/designer's responsibility.

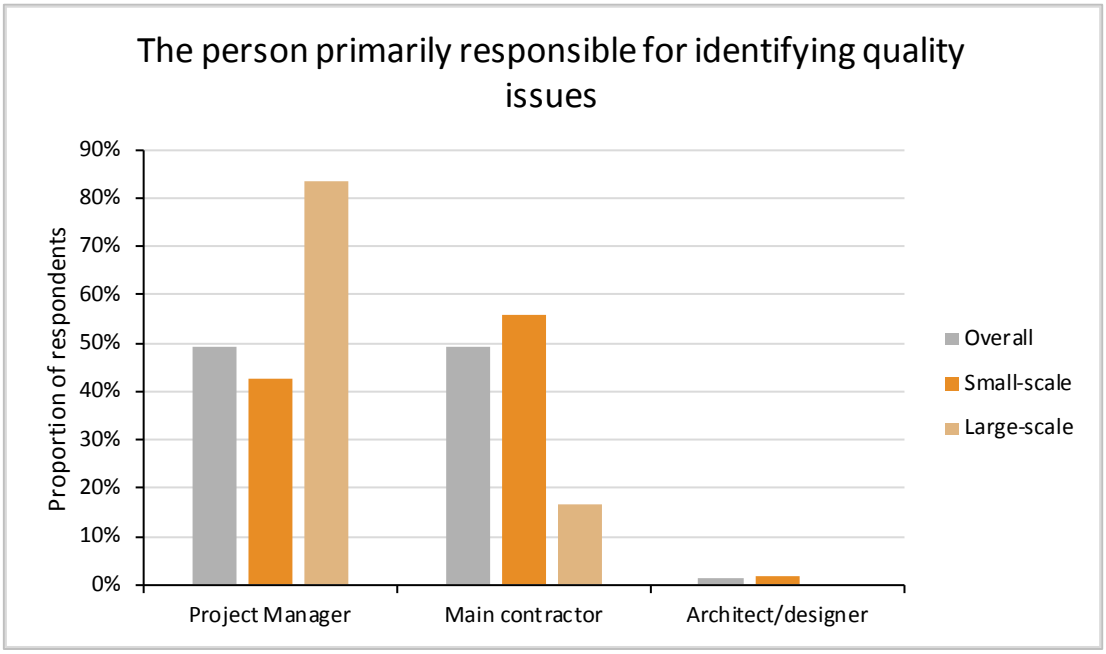

Figure 12. Person responsible for identifying quality issues.

About 88% of respondents stated the person responsible for identifying quality issues was also responsible for ensuring quality issues were fixed (Figure 13). For small-scale respondents, this means the main contractor was primarily responsible for ensuring quality issues were fixed. However, in some cases, the client was responsible for ensuring quality issues were fixed.

For large-scale respondents, the project manager was still primarily responsible for ensuring quality issues were fixed. However, in some cases where it was the project manager's responsibility to identify quality issues, it became the main contractor's responsibility to ensure they were fixed.

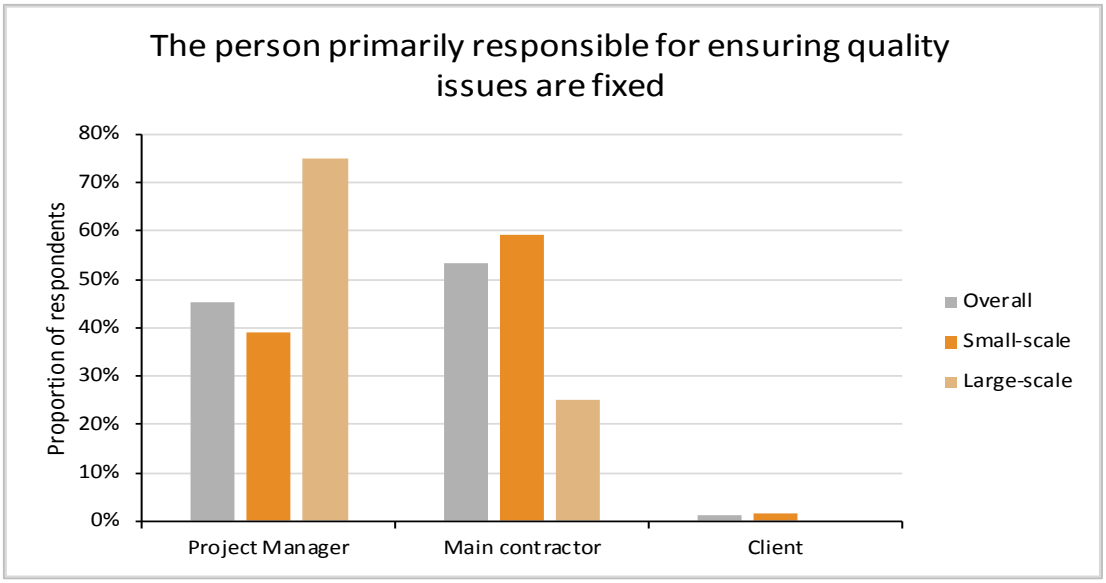

Figure 13. Person responsible for ensuring quality issues were fixed.

Builders reported the project manager was typically responsible for identifying outstanding issues/defects at handover (Figure 14). However, the main contractor was commonly responsible for small-scale respondents, with 44% of respondents stating the main contractor and a further 44% stating the project manager.

For large-scale respondents, the project manager was the most common person responsible. About 67% of respondents stated the project manager was responsible, compared to about 17% who stated it was the main contractor's responsibility.

The client was stated to be responsible by about 8% of respondents, and the architect/designer was responsible for 4.5% of respondents.

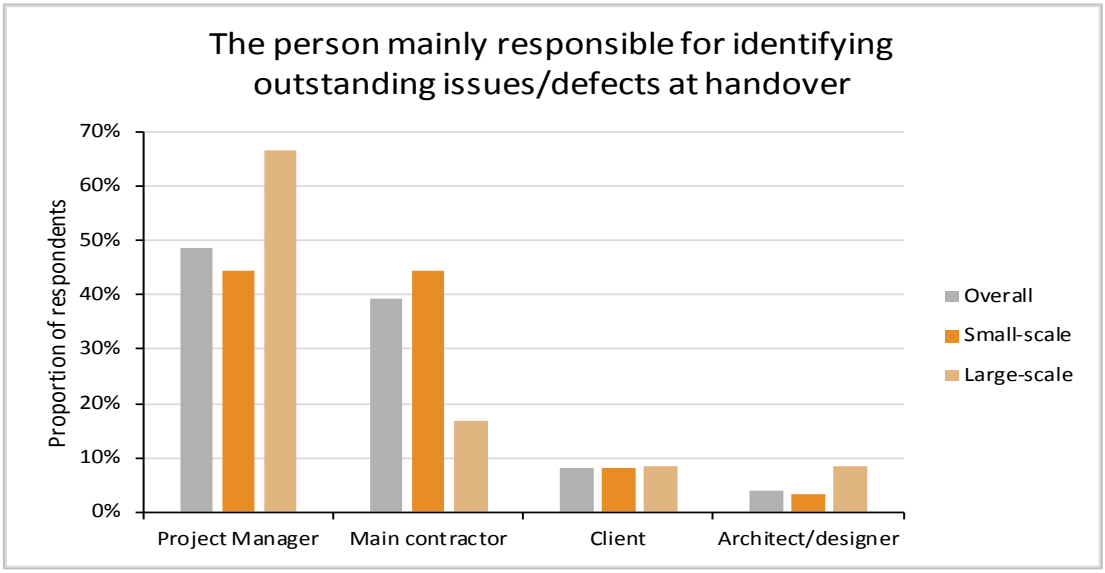

Figure 14. Person responsible for identifying issues/defects at handover.

From the clients' perspective, quality concerns post-completion ranged from minor to major. These included a window catch falling off, doors jamming, a gap between the oven and shelf, incorrect paint used in the bathroom, concrete discolouration, water leaking doors bowing and roof damage.

Three clients expected some of the issues identified at handover would have already been addressed (Interview 1, 8, 9), especially when they were obvious. Two interviewees had a large number of issues outstanding at handover. One had "40–50 outstanding issues … including that no wardrobes were in" (Interview 1), and the other reported dozens of problems, ranging from minor to major (Interview 9).

4.5.3 Addressing quality issues

For small-scale respondents, the main contractor was typically responsible for ensuring outstanding issues/defects at handover were fixed (Figure 15). About 60% of respondents stated it was the main contractor's responsibility, despite the main contractor only being responsible for identifying these issues for 44% of respondents. The project manager was responsible for 39% of small-scale respondents.

Large-scale respondents typically assigned responsibility to the project manager. There was little change in the proportion of respondents from above who stated their main contractor was responsible. However, where the client or architect/designer may have been responsible for identifying defects at handover, the project manager was assigned responsibility for ensuring defects were fixed.

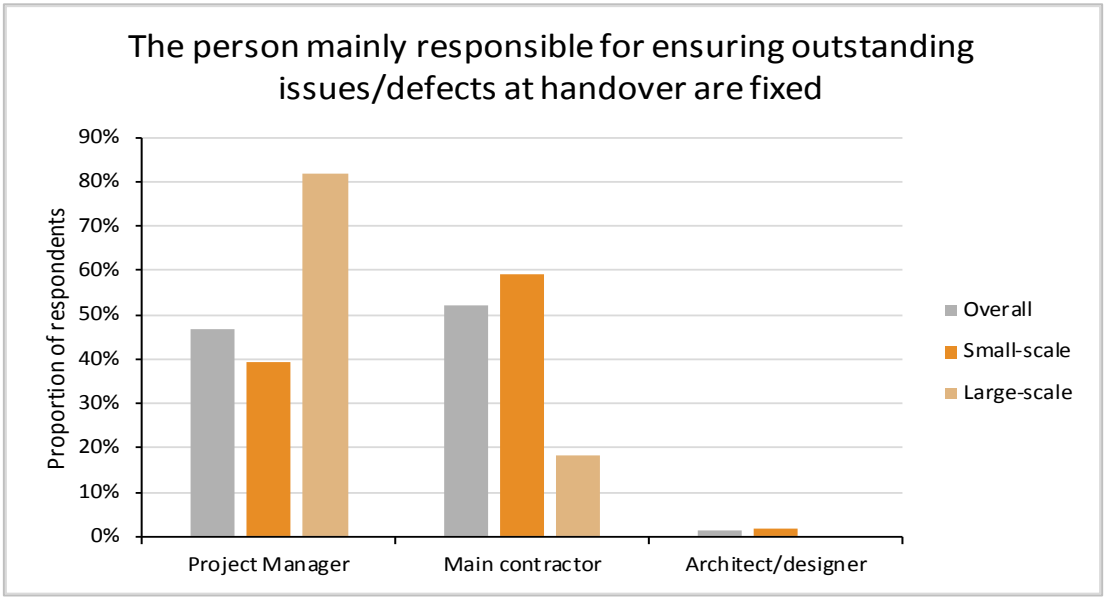

Figure 15. Person responsible for ensuring issues/defects at handover were fixed.

Once the issues were identified, five clients were pleased at the response, with the building company fixing the issues within a reasonable amount of time (Interview 1, 2, 5, 6, 10).

> Once the issues were put to him … [he] was excellent in ensuring all issues were settled within 3 months. (Interview 1)

Two clients are still in the process of having issues addressed. One has confidence that all will be addressed in a timely manner (Interview 7), while the other has had multiple problems with getting issues addressed.

> Every 6 months, someone comes out, says they are going to do the fix. Then they go away … they just don't come back. (Interview 9)

One client was still noting issues to fix, but "when I spoke to the builder, he said you're outside the 12-month warranty" (Interview 3). In two cases (Interview 4, 8), "the making good was a long and protracted process". One client (Interview 8) did not take possession or make the final payment until one issue was fixed and is still waiting for the final fix to be completed. The other found "a real bonus when … the house was entered into the House of the Year competition – it really sped things up. (Interview 4)

4.6 End result for clients

All clients interviewed were living in the house they had built, and all but two were outside the 12-month warranty period. Nine reported they were happy with the end result, rating building quality at least 8 out of 10. Only one client was unhappy with the end result, although noted "we've got a roof over our heads" (Interview 9). Table 2 summarises the nature of each stage of the building process for each interview.

Table 2. Interview summary.

Interview	Pre-build	During building	Post-completion	End result
1	A good process getting through to consent.	Issues with accessing the site.	A lot of issues to follow up.	Delighted with the warm and light house.
2	Assumed the contract would ensure they got what they wanted.	Communication was a problem, with some exceptions.	Not many problems.	I am pleased with it.
3	Preparation beforehand was critical to the success of the build.	A fast, smooth building process.	A few issues.	Happy with the end result.
4	Not a difficult process.	Major issue resulting in rework.	A long process of follow-up.	The end result is great.
5	Responsive company; push back on one request.	Proactive, weekly communications.	Two weeks to work through the snagging list.	We are thrilled with it.
6	Good advice and a responsive [building company] owner.	Welcomed on site. Confident with the builder.	Everything completed within 12 months.	The reality is better than expected.
7	The architect listened and gave good advice.	Good communication.	A few issues to be fixed.	Exactly what we designed.
8	There wasn't much in [the contract] that needed changing.	Some challenges with samples not reflecting reality.	Some items missing that were in the show home but on review weren't in the contract specifications.	Once the painting is complete, it will be good.
9	Early issues.	Communication issues.	Follow-up issues.	We've got the house. We've got the roof over our heads.
10	Accepted the basic build as offered.	No issues.	Quite good with sorting things out.	We got what we paid for.

5. Discussion

5.1 Weathertightness remains our highest priority

Experts identified that, despite weathertightness being a significant issue for the New Zealand building industry, it remains a significant problem on building sites. Although significant, it is also one of the issues that is unlikely to be identified by clients or inexperienced builders. Similarly, the next most pressing issue – that of incompatible materials and inadequate specifications – is unlikely to be identified by a client or at handover.

The cause of these quality issues appears to be a lack of knowledge and understanding. Therefore, easily accessible education about the use of sealants and compatibility of different materials could go some way to addressing this most pressing issue.

5.2 The underlying issue is a skills shortage

Wardle and Duncan (2017) found evidence of a skills shortage in New Zealand within the construction industry. Key shortfalls included an inability to read plans, an inability to understand and implement manufacturer correspondence, poor work supervision and an inability to use equipment. These issues underlie the quality issues reported by experts.

This underlying issue indicates that easily accessible education may go some way to alleviating the technical issues.

5.3 Clients need support to make good decisions

For many clients, building a house is a once-in-a-lifetime opportunity. The size of the investment leaves little room for trial and error, and they are at the mercy of the polished salesperson. Even when the building is supplied, they are unable to identify the most significant issues, as they are hidden or require specialist knowledge. Their focus turns to the insignificant – whether the colours are correct, the materials are as chosen – and the look of the house against what they imagined. It is only after the house has been standing for some years will any insidious problems such as inappropriate use of sealant come to light.

While word of mouth was ranked by builders as the most important way to communicate quality, none of the clients interviewed agreed with this. Their decision on the product was largely based on the look of the show home. Their decision on the builder tended to be based on how well a builder's representative connected with them. In some cases, clients felt constrained by the plans available, meaning they selected the builder who had the plans that best reflected their vision.

The difference between the promises made before the contract was signed, during the building process and after completion in some cases was stark. In only one case was anything but a smooth process reported in that first stage. Once building commenced, however, clients reported a varying experience. Half of the clients reported difficulties, whether in communication alone or with quality issues becoming evident. Once the building was finished, quality issues took some time to fix for four of our interviewed clients. In many of the cases where clients reported problems, communication – or a lack of thereof – was the major issue.

Advice on how to select a builder may have been a useful addition for these clients, along with some form of feedback. Guides are readily available on the internet. For example, Consumer NZ published such a guide in March 2015, and Building Guide – a New Zealand building magazine/directory for homeowners – has also published a web page on this topic. These guides focus more on the small-scale builder rather than group home builders. Although internet research was mentioned in interviews, clients were more focused on identifying the look and plans for their house, and all but one went with large-scale builders.

Building a house comes with the requirement to make a large number of decisions, and some clients reported difficulty in making these decisions. Problems included a lack of understanding of implications of decisions and a lack of ability to visualise results. It is likely, too, that some clients will be unable to fully comprehend plans. Where context and advice were given, clients felt more comfortable that they were able to make a good decision. When builders pushed back on what they thought were poor decisions, clients, in the main, appreciated this.

5.4 Communication with clients is critical

While builders may work on many houses in their lifetime and another house is just another building, the decision to invest in a new build often represents a life change for clients. They may be hoping for a much warmer house or one that is more suited to their needs, and it may represent a move to a new community. Their investment in the build may also represent the largest amount of money they have spent on a single item. Interviews suggest that, where communication is frequent, accurate and informative, clients will worry less.

Seeing progress in person is much more reassuring than being told that the framing is up, the roof is on or some other key milestone is met. Clients who were able to walk past or access the building site during construction reported much more confidence in understanding the status of the build. Having spent the money to purchase a section and a deposit on the build, clients have an ownership stake in both the location and the building work as well as a keen interest in progress. This can lead to opportunistic visits to the site.

On the other hand, builders have a responsibility for the building site and must ensure the safety of all workers and visitors. Builders may also feel pressure to complete work on site as quickly as possible, which can be interrupted by the ad hoc appearance of a client. Conflict on a site between client and builder is likely to take a builder's attention away from the job at hand, leading to a higher risk of quality issues. A clear understanding of the builder's obligations on a building site and explicit agreement on client access that takes into account their circumstances would go a long way to avoiding potential conflicts in this area.

5.5 Time spent preparing for handover is time well spent

The handover process should be one of celebration of a job well done and acknowledgement of a vision brought to fruition. However, varying approaches to handover indicate room for improvement.

Clients would like to see a clean and tidy site and have a sense that they got exactly what they paid for. The focus will be on the readily visible, with paintwork, wallpaper

and finishing high on their priority list. Clear and open communication at this point is even more critical, as once the final payment is made, clients feel they have no lever to pull to get problems fixed.

Very few builders or clients reported comparing the finished product with the plans or specifications, although when problems occur, these are the documents that will preside. In two cases, clients spoke of reviewing the specifications after they identified issues – although in one of those cases, they discovered that the missing components had not been included.

If word of mouth is a prevailing way to get work in the building sector, the last stage of the process – addressing any quality issues that remain post-completion – must be one that causes little pain or anxiety to the client.

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Appendix A: Experts' workshops

Preparation for the workshops included determining three frameworks – scale of impact, scale of frequency and how issues would be organised. This comprised the building components shown in Figure 16.

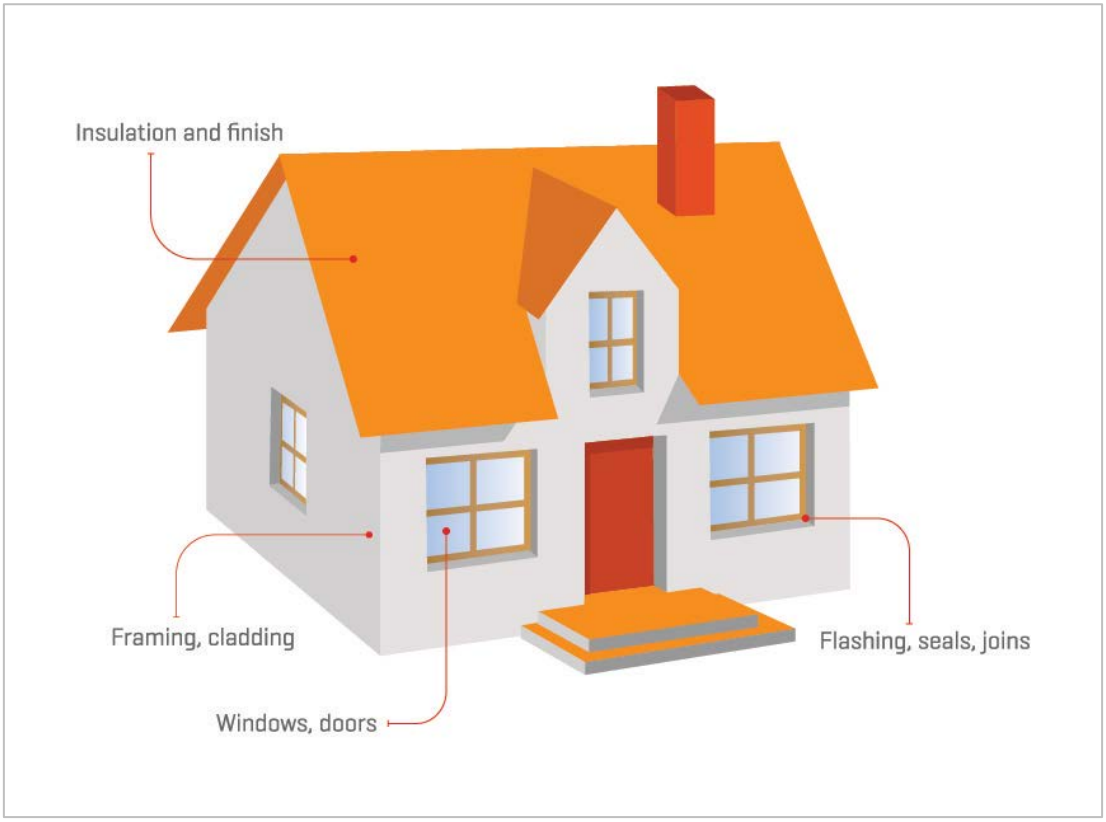

Figure 16. Building components

Experts were asked to consider each of the components in turn and to individually identify the issues that occurred in relation to these components. This part of the exercise took approximately 20 minutes and included various prompts – for example, "What is always a problem on a building site?" and "What is challenging to get right?"

Each issue was written on a Post-it note and placed on a large sheet of paper representing the component. Experts were encouraged to look at others' comments to prompt further thoughts. Once there was general agreement that the experts had noted everything that was common in their experience, the experts were split into two groups. The groups were provided with the material relating to two of the components.

The next phase of the workshops involved removing duplicate issues, then considering the size of the impact of each issue. The size of impact was described as on a continuum, with extreme impact at one end and negligible impact on the other (Figure 17). While a written description was not given, experts were asked to think in terms of health and safety risk as well as time and cost to fix to determine the impact. The extreme category was set as being a major risk to health and safety with a significant cost to fix.

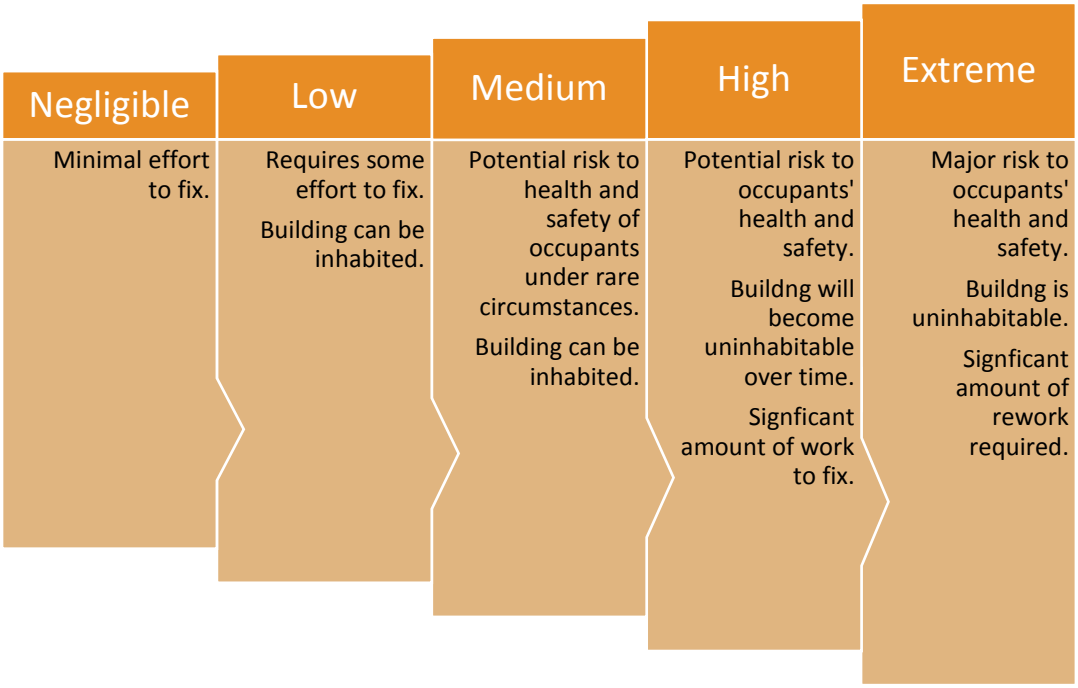

Figure 17. Impact continuum.

In both workshops, the time dimension was queried. For example, leaky buildings may be able to be occupied, but over the longer term (often around 10 years), the building can cause a risk to health and the repairs are extremely costly. Participants were advised to consider whether the issue would fall into the high or extreme categories.

Once issues were ranked in order of impact, and experts were then asked to consider the frequency of each issue occurring. The scale of frequency was also described as a continuum, with the scale itself providing the guide to categories (Figure 18). Further guidance was provided on request, with an alternative view being the percentage of time the issues occurred. Participants were asked to think in terms of how many building sites the issue was present in rather than the total number of times the issue occurred ("Do you see this on every site?").

Figure 18. Frequency continuum.

The workshops resulted in a prioritisation matrix for building issues (Figure 19).

Impact

Frequency

	Negligible	Low	Medium	High	Extreme
Always	Low-Med	Medium	Med-High	High	High
Most times	Low	Low-Med	Medium	Med-High	High
Sometimes	Low	Low-Med	Medium	Med-High	Med-High
Rarely	Low	Low-Med	Low-Med	Medium	Med-High
Almost never	Low	Low	Low-Med	Medium	Medium

Figure 19. Prioritisation matrix for building issues.

Appendix B: Interview guide

1. Conceptualising quality

What statement best fits your concept of building quality?

a) Quality is about achieving excellence
b) Quality is about getting value for money
c) Quality is about getting exactly what I paid for
d) Quality is about getting a better building than I thought I would

2. End result

Are you happy with the building? Is it to the quality you expected? What is the best thing about the building? What is the worst thing? Are there any issues you would describe as quality issues?

3. Process

How did you feel about the building process overall? What worried you most along the way? How did you reassure yourself you were getting what you wanted? Did you need to call the builder back to fix anything? If yes, what needed fixing? Was that process straightforward?

4. Contract

Were quality levels specified in the contract? Who wrote the contract? Did you know what to expect from the contract in terms of quality?

5. Initial expectations

Did you think about quality at the beginning of the project? Were you worried about getting the level of quality you wanted? Was quality a part of your decision making when you chose your builder/architect/project manager?

6. Final comments

Do you have any other comments you would like to make about quality and buildings?

Appendix C: Interview method

Interviews took between 30 and 90 minutes and were based on a semi-structured questionnaire. The interviewer asked interviewees to describe the building process, including initial expectations, contract, process and end result. Where necessary, probing was used to elicit detailed information on why the particular builder was selected, the quality of communication and details of handover and post-completion. Accessibility and environmental considerations were also probed for. The interview was completed with an invitation for any other comments relating to quality and buildings.

Notes were taken by hand during the interview, and the interview was audiotaped. Following the interviews, the resulting notes were written up, the audio reviewed and verbatim quotes added to the notes. The resulting documents were imported into NVIVO and coded against the nodes shown in Table 3.

Table 3. Interview coding.

Conceptualisation of quality	Process	Product	Roles
Excellence	Communication	Accessibility	Architect
Value for money	Contract	Cost	Client
Exactly what paid for	Decision making	Design	Council
Better building	Handover	Environmental considerations	Main contractor
	Monitoring	Result	Subcontractors
	Post-completion	Section	Project manager
	Selection		Salesperson
	Timeframe		

Analysis of the themes was then completed.

Appendix D: Industry survey

1. Which statement best fits your concept of building quality?

a) Quality is about achieving excellence
b) Quality is about the client getting value for money
c) Quality is about the client getting exactly what they paid for
d) Quality is about surpassing the client's expectations

2. Which methods are important in communicating the level of quality you will deliver?

Salesperson
Detailed specifications
Contract
Website
Show home
Advertising
3D walk-through
Word of mouth

3. Does you contract specify the level of quality to be delivered?

4. How often do you agree to change your standard terms and conditions in response to a request from a potential client?

a) Never
b) Rarely
c) Sometimes
d) Usually
e) Always

5. Which of the below best describes your approach to clients visiting the site during the build process?

a) Clients only allowed if invited for a specific reason
b) Clients only allowed if prior arrangements have been made
c) Clients allowed to make regular, unplanned visits
d) Clients allowed on site at any time

6. Which of the below best reflects your approach to communication with clients during the build process?

a) Communication as necessary (e.g. payment reminder, any decisions needed)
b) Regular communication (e.g. weekly, fortnightly, monthly)
c) Communication tied to stages (e.g. framing stood, building enclosed)
d) Communication with the client as and when they approach us

7. On average, how often do you or someone else involved with the build, communicate with clients during the build process?

a) Daily
b) Weekly
c) Monthly
d) Less frequently than monthly

8. Who is MAINLY responsible for communicating with clients during the build process?

a) Subcontractors
b) Architect/designer
c) Project manager
d) Office staff
e) Other

9. How often is the person responsible for client communication on site during the build process?

a) 5 days (or more) per week
b) 2–4 days per week
c) 1 day per week
d) Twice per month
e) Once per month
f) Only as required
g) Never

10. Who is primarily responsible for identifying quality issues during the building process?

a) Main contractor
b) Subcontractor(s)
c) Client
d) Architect/designer
e) Project manager
f) Other

11. Who is primarily responsible for ensuring issues are fixed during the building process?

a) Main contractor
b) Subcontractor(s)
c) Client
d) Architect/designer
e) Project manager
f) Other

12. Which of the following do you ensure happens just before or at handover to the client?

a) Premises are cleaned and tidied
b) Results are compared to plan/specifications
c) Visual inspection of premises without client
d) Visual inspection of premises with client
e) List of any outstanding issues created
f) Client asked to list outstanding issues
g) Handover marked with celebration (e.g. gifts given)

13. Who is primarily responsible for identifying outstanding issues/defects at handover?

a) Main contractor
b) Subcontractor(s)
c) Client
d) Architect/designer
e) Project manager
f) Other

14. Who is primarily responsible for ensuring outstanding issues/defects identified at handover are fixed?

a) Main contractor
b) Subcontractor(s)
c) Client
d) Architect/designer
e) Project manager
f) Other

15. How many houses do you build per year?

a) 0–10
b) 11–20
c) 21–30
d) 31–50
e) 51–100
f) More than 100