

OPPORTUNITIES FOR DEFECT REPORTING IN NEW RESIDENTIAL BUILDINGS: A CASE FOR NEW ZEALAND

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When new homes are purchased, homeowners expect their new homes to be problem free until such a time that normal wear and tear begins to occur. Unfortunately this is not generally the case, since the majority of new build homes have been found to contain significant numbers of defects. The quality of finished construction products is therefore a main issue for concern to developers, approving authorities, end-users and the construction industry at large. Survey data obtained from recent home purchasers/owners is presented as part of a preliminary investigation into developers' quality performance in New Zealand. The intent is to show that opportunities exist for snagging/defect reporting that will act as a mechanism to measure performance and thus improve the quality of finished construction products in New Zealand. This research is exploratory in nature and uses simple descriptive and interpretive analyses. The study concludes that there are benefits to defect reporting in new build homes in New Zealand which could be embraced as part of a wider best practice initiative. Defect reporting in residential properties before or after handover will enable developers to rectify potential defects before they become burdens for homeowners. Ultimately this research aims to increase the confidence that new homeowners can have in their developers and the quality of their new homes.

Keywords: defects, homeowners, new homes, snagging.

INTRODUCTION

The housing sector is one of the most important sectors in the national development plan of every country. For example in New Zealand, about 59% of the total building consents issued for the month of April 2011 was for residential buildings (Bascand, 2011). The residential sector is under pressure to meet an ever increasing customer expectation of quality improvement and innovation on every development project. Innovative quality management approaches are therefore a necessity for homebuilders (Sommerville *et al.*, 2006), and one such approach is to develop quality management processes that will identify defects in constructed items before or after a new building is handed over to the end user. Once these defects are identified, rectification work can then be carried out to the end-users' satisfaction.

Snagging items are quality failure items that are identified near the completion stage of a construction project by what could be termed as 'the snag identifier', while the process of identifying and rectifying these quality failures is known as snagging (Sommerville *et al.*, 2004). Snagging is a modern term for a quality failure which is not commonly used within the New Zealand construction environment. For the

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purpose of this study the word ‘defects’ will be used because this is the common terminology used in New Zealand. The term defects can be used interchangeably with other construction terminology such as faults, repairs, quality failures, deviations, non-conformance, rework and snagging (Burati *et al.*, 1992; Abdul-Rahman, 1995; Georgiou *et al.*, 1999; Josephson and Hammarlund, 1999; Love *et al.*, 1999; Josephson *et al.*, 2002; Love and Edwards, 2004).

Defects are common features of most new residential buildings. Their occurrence has dire consequences on construction project stakeholders and end-users. The end users (homeowners) of constructed facilities will expect that when new homes are purchased, they will be problem free until such a time that normal wear and tear begins to occur. Unfortunately this is not generally the case, since the majority of newly built homes have been found to contain significant defects (Sommerville *et al.*, 2005). New residential buildings in New Zealand are not an exception with the worst case of quality failure manifesting as leaky buildings from weather-tightness problems. Bates and Kane (2009) suggest that quality failure is attributable to a significant lack of understanding of the fundamentals of good building practices that occur at every stage of the design and build process; from designers, to builders, to inspectors and so on. These inadequate skills are considered highly noteworthy in the general New Zealand construction industry.

Defect reporting as a building production process has not been as widely adopted within the new residential house building sector in New Zealand. A review of relevant literature on the subject matter shows an absence of relevant New Zealand related research on the subject and therefore a knowledge gap exists which the current study hopes to address. The authors believe that there are benefits to defect reporting for new buildings which the New Zealand building production process should embrace for best practice. Defect reporting before or after handover will enable developers to rectify potential defects before they become burdens for homeowners. Ultimately this will increase the confidence that new homeowners can have in their developers and the quality of their new homes.

LITERATURE REVIEW

Quality initiatives

Over the last decade, the private house building sector has witnessed increasing requirements from both customers and central government to improve the quality of its finished products (Sommerville and Craig, 2005). The New Zealand government's intentions to improve the quality of new homes have prompted a number of reports on the quality of buildings but not from a general defects viewpoint. For example Hunn (2002), examined the causes and extent of the weather-tightness problem in New Zealand and suggested ways by which quality failures could be eradicated. Some of the recommendations made by this report resulted in changes to the Building Act.

Other reports mainly from the UK which are often referred to, in relation to overall performance and productivity improvement in the construction industry are the Latham Report (1994) and the Egan Report (1998). The Latham report for example outlined improvements which emphasises early customer involvement so that customer requirements are established from project outset. The Egan report on the other hand identified the need for a consistent reduction in the level of defects by proposing an annual reduction of 20% in the levels of defects discovered in construction projects. The target set for defect reduction has been conceived as key

indicator of sustained improvements in the construction industry (Craig, 2008). Though Sommerville and McCosh (2006) argue that the two reports largely focused on the commercial sector with little emphasis on the private house building sector. This current study believes that the reports referred to were the eye opener for other countries to look at their own construction industry and to seek similar improvements. In New Zealand the CIC report (2004) was one of the reports prepared to seek improvements within the construction industry. The initiatives developed were based on the UK's 'Achieving Excellence in the Construction Industry'. Though the CIC report has a narrower focus to procurement processes, it made useful suggestions for performance changes in the construction industry. A driving force for these suggestions is the need to meet clients' expectations of quality and consequently improve industry best practice. These align with the current study's key focus, which is to seek improvements to the house building process so that quality assurance becomes a standard process that will help achieve best practice in new builds.

The house buying process in New Zealand

There are three common ways by which new houses can be purchased in New Zealand. The first is to buy a completed building that has been built by a developer or builder who may or may not be professionally registered. The process begins with the customer visiting the new home on a particular site. This is the only indication to a customer of the quality and standard that they may expect to receive. Similar to the UK house buying process, the situation is speculative, since decisions on purchase of land, building design and building production are made without any reference to the homeowner who often is found only after the building has been built (Roy and Cochrane, 1998; Auchterlounie and Hinks, 2001).

Another way by which new houses are purchased is by negotiating and buying a house that is under construction. In this case, the purchaser enters into an agreement to purchase the house upon completion. In this house buying process the potential homeowner could make changes to the building, although this depends on the stage of the construction. Finally the house buying process may be made by purchasing what is referred to as a complete land package from a developer/builder. The designs may be bespoke using the owners own designers or from prototypes offered by the developer/builder. Management of the construction work could be by the designer (on behalf of the owner) or by the developer/builder. Early involvement of the homeowner in this process may allow for performance that meets the owners' quality needs. Whichever of the above processes are used, it is important that the quality needs of homeowners are met. The more the checks on building performance, the more probable the final build will meet the required quality standards. Homeowners have a responsibility in this regard to ensure that their needs are met (Holder, 2002). Holder advocates quality audits (snagging) by homeowners that will enable the identification of defects that may not be visually detectable and for which ordinary reports or inspection may not highlight. Thus checking/inspecting a building before the decision to buy becomes critically important (Cossar, 2003).

Inspection regime in the house building process

In New Zealand it is a requirement that a building consent is granted by an approving authority (Building Consent Authority) before the commencement of construction works. Building consents contain compliance requirements which are necessary for proposed building works. The consent also specifies the inspection requirements for the building project based on the submitted plans and specifications. Building

inspection is usually carried out at specific stages corresponding to building progress. Typically the inspections will cover: foundations, framing and insulation, plumbing, drainage, cladding and flashings, and the finished building. Work cannot proceed until the inspection for each stage is completed. The purpose of the inspection is to ensure that building works comply with consent documentation. If the council inspector finds work that does not comply with the building consent during the inspection regime, a notice will be issued to rectify these defects. The inspection regime concludes with a final inspection of the completed build after which a Code Compliance Certificate (CCC) is issued. The CCC confirms that the work has been done in accordance to plans and specification approved in the building consent. House sales and purchase contracts are often conditional on the issuance of a CCC (Gibson, 2010).

It is common for new house buyers to carry out visual inspection before the purchase of their new homes, although this visual inspection may not identify all defective works due to the homeowners' lack of knowledge. It is therefore reasonable to engage an expert (building inspector) to undertake an in depth inspection on behalf of the homebuyer. This is often suggested but rarely carried out, especially with new builds.

Craig (2008) asserts that high quality builds cannot always be achieved by relying on the performance of construction parties. Sommerville *et al.*, (2004) explains that invariably the representatives that are responsible for controlling the defects process belong to the same bodies with the project manager that acts as the controller of the overall quality process. Detection of quality failure may be compromised, thus an independent inspector is encouraged. Furthermore, seeking redress and identifying accountability is difficult when quality problems arise (Cossar, 2003). Therefore measures and processes need to be put in place that encourage not only best practice but identify opportunities where improvements could be made to the house building process in New Zealand.

Defects and homeowner requirements

There are two types of defects, the absorbed and visible (Craig, 2008). Absorbed defects are the items that are mostly noticed by either the developer or inspector during the actual construction process. While the visible defects are those which are usually detected by the homeowners after the built facility has been purchased and occupied. It is possible for the absorbed defects to be corrected during construction before practical completion, while visible defects may not be corrected once the developer is gone due in part to a lack of legislation which covers the homebuyer (Craig, 2008). Purchasers of new homes that are defective in the UK cannot just 'give it back' and are unable to request a refund, they have to put up with the stress and inconvenience of living in a poorly built property (Sommerville, *et al.*, 2006).

Emphasis in this study is placed on visible defects which arise after the issuance of a CCC. The occurrence of these defects is an indication that the desired quality of a completed building has not been achieved.

Defects could be viewed from three different aspects: technical, functional and aesthetic (Georgiou, 2000). The technical aspect relates to workmanship, material or design of an element of a building, the functional aspect relates to omitted parts or features, and the aesthetic aspects relate to the appearance of the completed building. These distinctions of defects are important because it provides an understanding of homeowners' needs and focus that are required to be met. It is clear from these aspects and potential combinations that defects occur either during the building process or after the building has been completed. Identifying and rectifying these defects would

allow developers to track improvements that will provide quality products and services for the end user. Erroneously house builders believe that once they have built to the initially set requirements, they have conformed to homeowners' entire requirements (Sommerville, 2007). Sommerville and Craig (2005) demonstrate that this is rarely the case and that there is a gap between buyer's expectations and what the industry delivers in the way of functional quality (aesthetic). Similarly a study by Auchterlounie (2009) on 300 new homeowners in the UK concluded that customer's satisfaction does not correlate with technical defects and performance issues. These findings seem to suggest that aesthetics and the finishing aspects of buildings are of greater importance to homeowners. A recent survey by Page (2011) on defects in new houses in New Zealand demonstrates that 60% of new homeowners required their homebuilders to return to site for defect rectification. The common defects identified by Page (2011) relate to finishes, doors, plumbing and hardware, which could conveniently fall into the aesthetics category. Craig (2008) suggests that because of the technical inexperience of most homeowners, they are more likely to have a strong emotional attachment with the quality of the product itself and the softer issues of quality such as aesthetics. Craig (2008) also believes that homeowners in the UK view the technical aspects has a 'given' as they are covered under the various regulations and building standards.

THE RESEARCH

The objective of this research is to increase the confidence that new homeowners have in their developers and to ascertain the quality levels of their new residential homes in New Zealand. An initial pilot questionnaire survey was administered to homeowners as part of preliminary investigations to a larger study programme. The data for the survey (n=35) was collected from new residential homeowners within two suburban areas in Auckland, New Zealand. The semi-structured questionnaire contained five key sections which included demographic information and areas based around defect reporting. Other issues covered by the questionnaire are outside the scope of the current paper. Some of the questions were multiple choice types, Likert scale and open-ended. A total of 42 questionnaires were administered but only 35 were useable, corresponding to an 83% response rate. The data obtained from the questionnaire will be presented using simple interpretive and descriptive methods so that the findings are understandable to the wider house building industry. Some cross tabulation of the results was carried out in order to explain some relationships and to give clarity to the responses.

DATA ANALYSIS AND RESULT DISCUSSION

Demographic information

Table 1 provides a summary of the main category of respondents that the questionnaires were administered to. Table 1 shows that majority of the participants own their homes (86%) with few (14%) under a rental agreement. In response to the question on how long homeowners have owned their homes, the result shows that 57% of the participants have owned their home for about one year, followed by one to two years (29%) and 14% of less than six months ownership. The intent of the study was to target recent homeowners so that their comments on quality failures refer to visible defects as opposed to absorbed and maintenance related defects.

Table 1: Participants' demographic information

Profile of Respondents		Frequency	Percentages
Types of Ownership	Homeowner	30	86

	Renting	5	14
Period of Ownership	> 4 wks	0	0
	1 - 6 months	5	14
	6 - 1 year	20	57
	1 - 2 years	10	29
	Over two years	0	0
Building Category	House	35	100
	Townhouse	0	0
	Apartment	0	0
	Unit	0	0
	Retirement Village	0	0
Who Built the House	Developer (Master Builder)	0	0
	Developer (Certified Builder)	0	0
	Yourself	0	0
	Private Developer	30	86
	Don't Know	5	14

The survey results indicated that all the participants (100%) occupy single family dwellings. Majority of the houses were built by private developers (86%), while the remaining 14% do not know who and how their houses were built. On closer observation of the responses, it was noted that participants who did not know who built their houses were the same 14% who indicated that they were renting.

Defects and defects reporting

One of the objectives of this exploratory research was to determine the opportunities for defect reporting by establishing the quality aspects that are lacking within the current house buying process. A summary of the questions asked and the corresponding responses (frequency and percentages) is provided in table 2.

The first question required participants to indicate when they became involved in the buying process of their homes. The result shows that a significant number (57%) of the participants were involved during the construction stage, followed by 29% of when the buildings had been completed. The least percentage (14%) had been involved since the design stages. From the result it can be ascertained that most homeowners questioned were involved during the design and construction of their new homes. It could be argued therefore that these homeowners have the potential to influence the developers' quality performance. For the few who became involved after completion, it can be argued that they little or no influence on quality performance.

The second question required participants to indicate the number of defects they discovered when they took possession of their new homes. The result show that an equal number of participants (43%) indicated: 5 to 10 and 10 to 20 defects. Another 14% noticed more than 20 defects. Therefore all the participants within this research had identified some defects or quality failures which needed to be rectified.

Further, the participants were asked if they informed their developers of these defects and if at all the defects were rectified. All the participants (100%) said that their developers were informed of the defects they noticed, but only 14% of the participants said the defects were rectified. 86% of the participants could not get their developers to rectify the defects which suggests there is not a process in place which requires homebuilders to rectify defects once the buildings have been handed over. Of the 14% whose developers responded to their requests, none have had their defects completely rectified. Only 57% of the defects were partly rectified. This preliminary investigation

supports the research by Page (2011), which shows that a significant number of new homeowners have to ‘call back’ their developers to rectify defects.

Table 2: Summary of responses to survey questions

Questions asked	Response options	Frequency	Percentages
1 Stage at which participants’ became involved in construction	Beginning of construction	5	14
	During construction	20	57
	After completion	10	29
2 Defects noticed after possession	Less than 5 defects	0	0
	5 – 10 defects	15	43
	11 – 20 defects	15	43
	More than 20 defects	5	14
	No defects	0	0
3 Was developer notified of defects?	Yes	100	100
	No	0	0
4 Have defects been rectified?	Yes	5	14
	No	30	86
5 How much of defect was rectified?	Totally	0	0
	Partly	20	57
	None	15	43
6 Was Lawyer involved before defect could be rectified?	Yes	25	71
	No	10	29
7 Was any building inspection done (snag reporting)?	Yes	5	14
	No	30	86
8 Willingness to engage building inspectors	Yes	25	71
	No	10	29
9 At what situation will a building inspector be engaged?	New buildings	5	14
	Existing (old) buildings	25	72
	Both	5	14
	None	0	0

A confirmation of the difficulties being experienced by the new homeowners in defect rectification is their response to the question requiring them to indicate if they had to contact their lawyers when they noticed defects. 71% confirmed that they had to contact their lawyers before they could get their developers to rectify defects. The result implies that even the small percentage of participants who had their defects rectified had to go through their lawyers. One of the respondents suggested that building inspection be made mandatory for new house purchases and to compel developers to rectify any defects noticed by the homeowner.

Participants were then required to indicate if they had their buildings checked by building inspectors (defect reporters) prior to possession. The objective of this question is to determine whether homeowners saw the need for defect reporting of new homes. It is evident from the result that majority of the participants (86%) did not engage the service of a building inspector when they purchased their new homes. Only 14% had a building inspection carried out. From the result presented in Table 1, the majority of the participants (86%) had their homes built by a private developer. It can be assumed that these owners would see the need for building inspection considering that the houses were built by private developers. These categories of developers are not certified builders and are therefore unable to provide building warranties as a protection against quality failure.

Participants were asked to indicate if they were willing to engage the service of a building inspector to help collect information on the condition of future homes. 71% indicated that they would have their buildings checked by an independent building inspector, while 29% did not see a need for this. The high number of participants

willing to have their future buildings checked and inspected could have responded positively because of their previous experiences with defect rectification with their developers on their current properties.

To determine whether homeowners have seen the need for inspecting new homes, the participants were required to indicate in which situation they would engage the service of a building inspector. Only 14% said they would engage the service of a building inspector when buying a new house, and another 14% when buying either a new or old house. However 72% of the participant said they would engage a building inspector when buying an old house. The possibility of ignorance to the benefits of building inspection (defect reporting) for new homes cannot be discounted, hence the need for creating awareness to this fact.

As a further analyses, cross tabulation of some of the results in table 2 were undertaken to show the relationship between some of the responses. Cross tabulation of the responses to question 1 and 2 was meant to show the relationship between the stages at which homeowners were involved in their new homes and the number of defects they noticed. This will provide some confirmation of the influence that homeowners could have on quality performance of developers at stages within the building production. The result shows that homeowners who were involved from the beginning of their buildings (A) appear to find the least total number of defects (14.3%, ranging from 5 – 10 defects). It could be suggested that the least defects recorded was because of their very early involvement. However those who became involved during the construction of their homes (B) realised the most defects (57.1%, ranging from 5 to over 20 defects). One would expect this category to have the most influence on quality performance as most defects could have been identified and corrected during building construction. Finally participants who became involved after the building was completed (C) realised defects ranging from 5 – 20 with a total defect of 28.6%. The cross tabulation is presented in table 3.

Table 3: Stage at which homeowners were involved in the building construction and the number of defects noticed as a percentage of n=35

	< 5 defects (%)	5 - 10 defects (%)	11 - 20 defects (%)	>20 defects (%)	No defects (%)	Total (%)
A	-	14.3	-	-	-	14.3
B	-	14.3	28.6	14.3	-	57.1
C	-	14.3	14.3	-	-	28.6
Total	0	42.9	42.9	14.3	0	100

Another cross tabulation of the responses to question 7 and 2 gave the relationship between participants’ engagement of the service of a building inspector and the number of defects noticed in their new homes. The result shows that all the participants who engaged the service of building inspectors (14.3%) found over 20 defects. Whereas those participants that did not engage the service of a building inspector found defects ranging from 5 to over 20, but with a greater percentage (42.9) identifying only 5 to 10 defects. It would seem that the high number of defects recorded by the participants that engaged building inspectors was as a result of the professional services rendered by the inspectors which detected defects the homeowners could not have detected. Homeowners may not have sufficient expertise to identify defects as they rely on visual inspections as opposed to thorough checks that could be carried out by a professional.

CONCLUSIONS

Homeowners are at a disadvantage when quality problems arise and in New Zealand it has been discovered that they are unable to get their developers to put these problems right. The house buying process seems to favour building inspection for old and existing buildings as against newer builds. Unfortunately the numbers of defects in new homes in New Zealand are significant and cannot be overlooked, a situation which also exists within the UK private house building sector. This study has shown that seeking rectification of defects from developers is rarely successful especially when the homebuilder is not registered with a professional body.

The preliminary investigation presented in this paper shows that new homeowners have not realised the benefits of the use of independent building inspectors on their new purchases. Despite the relatively small sample size in this study, the survey provides invaluable insight into this obvious lack of awareness, thus opportunities exist for defect reporting (building inspection) in New Zealand. Inspecting new houses for defects before or after handover will enable developers to rectify potential defects before they become burdens to homeowners. No matter the stage at which homeowners become involved in the building process within New Zealand, it is important that inspection and quality control be carried on their new homes which will aid the overall quality process.

This research is part of a larger research programme the intention of which is to evaluate defects in new residential buildings for their causes, effects and remedies. More conclusive results will emerge from this research within the coming years, specifically looking at wider issues such as the number of defects discovered in new build homes in New Zealand compared to the UK, defect types (technical, aesthetic, functional), and the potential cost of rectifying these defects from both a homeowners and homebuilders viewpoint.

ACKNOWLEDGEMENT

The authors wish to acknowledge Building Research Levy, New Zealand who provided funding for this research programme.

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