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# Improved snag reporting in new residential buildings in New Zealand

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## Abstract:

Snagging is common practice for new and existing buildings in the housing sector in the UK. However the snag reporting process is yet to be fully developed in New Zealand. Whilst inspections for defects and repairs are mostly carried out for old and existing residential buildings, very little is being done to capture snags in new builds in New Zealand. This paper reports on research which is being undertaken in New Zealand to investigate the magnitude of the snagging problem and to identify means by which snag reporting can be introduced within the house building production process. The primary source of data will be the record of defects collected from well established developers and building inspectors and a semi-structured questionnaire administered to new homeowners. The results from the data analyses will be validated through a verification exercise involving subject matter experts. It is hoped that the result of the research investigations will be beneficial to homeowners, developers and the wider construction industry in New Zealand and thus serve to improve quality performance in residential housing construction.

## Keywords:

defects, New Zealand, quality, residential building snagging

## 1 Introduction

Quality and its achievement continue to generate interest in the building sector and the wider construction industry. This is because the building and construction sector is crucial for economic performance and prosperity. The housing sector is one of the most important sectors in the national development agenda of every country (Mohd and Buang, 2010). In New Zealand, the sector contributes 5% of Gross Domestic Product (Building and Construction Sector Productivity Taskforce, 2009). The residential property sector alone has a total market value of between NZ\$450 and NZ\$500 billion making it the largest asset class in New Zealand (DTZ New Zealand, 2004). Because of the importance of the residential sector and how it supports the economy, the current study is motivated by the belief that improving quality achievement levels in new residential buildings will impact positively on the performance of the overall construction sector. This study hopes to improve quality performance by first capturing the magnitude of snags that occur before or after handover of new buildings and the effect it has on new homeowners. Then an investigation will follow to determine the potential for introducing snag reporting into the New Zealand building production and house buying process.

Snagging items are quality failure items that are identified near the completion stage of a construction project by an individual who could be termed as 'the snag identifier', while the process of identifying and rectifying these quality failures is known as snagging (building inspection) (Sommerville, Craig, and Bowden, 2004). Snagging is a modern term for a quality failure which is not commonly used within the New Zealand construction environment. The common terminology for

'snags' is 'defects' while a 'snag identifier' will mostly likely be referred to as a 'building inspector' in New Zealand. Building inspection appears to be common practice for new and existing buildings in the housing sector in the UK although in New Zealand at present, inspections for defects and repairs are mostly carried out for old and existing buildings and inspection has become almost a standard pre-sale clause for older residential buildings. However this practice is uncommon for new residential buildings, thus capturing defects that occur before or after handover on new residential buildings is rare in New Zealand. This study therefore intends to create awareness for improved snag reporting in new residential buildings in New Zealand.

## **2 Literature Review**

### **2.1 The quality problem in residential buildings**

The design and construction of new housing is today becoming more complex partly due to project owners' increasing demands and expectations. Consequently building products and systems are becoming more innovative (e.g. complicated elevations, cladding types, parapets and balustrades, and innovative resource inputs) to meet the demands of owners. Newer and innovative procurement processes bring about challenges which constructors need to manage effectively while delivering value to the project owner. On another hand, the time taken to build an average house has decreased in spite of these complexities and invariably this may mean that quality achievement could be compromised on construction projects.

Sommerville's (2007) study of the UK construction industry showed that its residential construction sector is continually experiencing low quality performance with a significant record of defects in new builds. Several studies have shown that the quality failure problem exists in other countries as well (Auchterlounie, 2009; Craig, 2008; Ilozor, Okoroh, and Egbu, 2004; Mills, Love, & Williams, 2009; Sommerville and McCosh, 2006). Sommerville and McCosh (2006) studied defects in 1700 new homes in the UK and they found that the scale of snags peaked at 389 for a single property. Their study showed further that there is a direct relationship between the size of properties and the number of snags identified. Another study conducted by Sommerville and Craig (2005) on 2202 new buildings in the UK over a period of four years had observed similar quality failures. The initial analysis of 55,000 out of 130,000 snagging items captured in Sommerville and Craig's study estimated that 68% of the defects were attributable to poor workmanship and 14% due to omission. Sommerville and Craig therefore concluded that there is a gap between a buyer's expectation and what the industry delivers in the way of functional quality. In the same vein, Auchterlounie (2009) confirms that customers' satisfactions do not correlate with technical defects and performance issues. Similar poor quality achievement is reported in the Australian construction industry. An unpublished Masters thesis by Georgiou (2000) analysed 1772 houses constructed between 1988-1996, of which 1002 were houses built by their owners and 770 by registered builders. Georgiou's data was used to determine the severity of defect occurrences and the location of the defects within each house type. The results reveal that a mean of 2.74 defects per house was recorded in houses built by owners while a mean of 2.3 defects per house was recorded for those executed using registered builders. Georgiou's research shows that houses that were less than one year old were found to have a significant proportion of defects. Further, there is no significant difference in the quality of homes built by the two types of builders. Ilozor *et al.*, (2004) conclude that framing and roofing were major defects that complicate other quality problems in new residential buildings, which could be mitigated by focussing on these two major defects. More recently Mills *et al.*, (2009) reveal that one out of eight residential buildings have defects in Australia, and that the estimated cost to rectify these defects was 4% of the construction contract value.

From the foregoing, it would seem that quality failures are rampant in new residential buildings in other countries. Examining the situation in New Zealand is therefore relevant. Particular emphasis is given to the magnitude of defects that are recorded at handover of new residential buildings to their owners.

## **2.2 Current quality situation in New Zealand**

As observed, defects are common features of most new residential buildings, and there is evidence to suggest that New Zealand has similar quality problems. The common quality failure in New Zealand housing sector is the weather tightness problem. This problem is mainly confined to buildings constructed with monolithic external cladding installed over untreated timber framing and without a drainage cavity between the cladding and the external wall (PWC, 2009). Studies that have been carried out on the weather tightness problem in New Zealand are extensive. For example, the overview group that was commissioned in 2002 by the Building Industry Authority, New Zealand, to examine the problem of weather tightness, had amongst its terms of reference, the following: (a) to determine the nature, extent, and effect of the weather tightness problem, (b) to evaluate the potential contributing causes of regulatory systems and (c) to determine if failures could be attributed to deficiencies in the Building Act. The report of the overview group (referred to as the Hunn report) concluded that though the extent of problem is not fully known, urgent, corrective and preventive measures were needed to solve the problem. The Hunn (2002) report came up with a series of recommendations which contributed to the review of the 1991 version of the Building Act. Of note is the mandatory inspection regime for all new buildings at different stages during construction work. The inspection regime varies for different building types but is specified in the development consent that is issued before any building can be constructed.

Conservative estimates for the annual cost of rectifying the weather tightness problem was put at between NZ\$12-24 million by the Hunn report. The report confirms the result obtained by an earlier study by Porteous (1992) that evaluated and classified building failures in New Zealand. Porteous found that about 1% of 25,000 new houses constructed annually fail within the first few years of their commission and these failures are mostly due to water ingress.

The water ingress problem affects between 22,000 to 89,000 dwellings, with a consensus forecast of 42,000 PWC (2009). The repair cost for this consensus forecast of 42,000 buildings is estimated to be NZ\$11.3 billion (in 2008 dollars). New residential buildings are particularly vulnerable with homeowners having to bear the burden of snags and latent defects. The weather tightness problem is not the focus of the current study, nevertheless it is a useful reference point to quality problems in buildings in New Zealand.

Page (2011) in a more recent survey, found that 60% of new homeowners have had to call their developers back for defects rectification in New Zealand. This is the most recent evidence that new homeowners are still faced with quality failures in their new homes. These abysmal quality performances continue to bring disrepute to the construction industry, particularly its residential building sector. One would expect that, when a new home is purchased, it will be of the highest quality, considering the inspection regime introduced by the Building Act in 2004. Thus an effective and efficient quality management process that will identify and rectify defects is required to improve quality achievement levels in new residential buildings in New Zealand. The quality management process will impact building production and the house buying process. Snag reporting (building inspection) is proposed as a quality improvement system in the current research programme.

This research will provide an insight into the problem of defects in new builds in New Zealand with a view to suggesting means by which the problem can be minimised or eradicated. It is anticipated that the research would provide data that could be compared to trends in related construction industries such as the UK and Australia (highlighted previously). Advanced knowledge on defects identification and rectification held by the UK residential sector could become a benchmark for quality improvements in New Zealand. Similar improvements in the New Zealand house construction sector will be encouraged; and may well be a solution to the weather tightness problem that pervades this local industry.

## **2.3 Protection mechanisms for homeowners in New Zealand**

To purchase a home has always been at the heart of the New Zealander's dream and it is often the largest investment in their lifetime. Unfortunately these dreams are not completely fulfilled when their quality expectations are not met. Quality assurance should be the top priority considering the scale of investment and personal commitment involved in home ownership (Pfahlert, 2002). Because

the ordinary homeowners are not so well informed, they rely on the provisions of the building code and the diligence of the Building Act (BA) when defects arise (CIC, 2009). This has traditionally led to claims against the BA when defects are evident. But homeowners find the state system restrictive, bureaucratic, flawed and under-resourced while the court system is perceived as being too expensive, benefiting lawyers mainly and resulting in little money being left for rectification works (Gibson, 2010). Homeowners are therefore not fully protected.

There are initiatives in the Building Act 2004 to support homeowners' quality expectations through the provision of statutory warranties that are implied in all building contracts for household units (Section 396-399). These warranties cover technical items that could affect the structural integrity of buildings. However the warranties are only useful where there is someone who is responsible to make good any breaches and is prepared to rectify the building work to the quality levels originally anticipated (Kaye, 2011).

The Consumer Guarantee Act 1993, the Fair Trading Act 1986, the Sales of Good Act 1903, and the Companies Act 1993 also provide some form of protection to new homeowners. However these Acts have limited application in the house building sector. For example the Consumer Guarantee Act 1993 does not apply to a contract for the sale of a whole building attached to land which is designed for residential purposes, while the Fair Trading Act does not offer much protection in the case of a newly built home (Laxon, 2002). The Sale of Goods Act is also limited to consumers who had particular contractual agreement with builders and subcontractors.

There are other protections available to new homeowners in New Zealand. For example those provided by registered Master Builders. This is in the form of guaranties to cover residential building work with a contract price of above NZ\$25,000. The three types of guarantees provided by the registered Master Builder in New Zealand are the 10 years premium guarantee, 10 years classic guarantee and 7 years guarantee. It is worth mentioning that these guaranties only take effect when the correct documentation is completed and that the guarantees are not automatic upon hiring a Registered Master Builder. The Master builder guarantees are limited to defects occurring within 2 years of construction (and 5 years for structural elements) and are capped to a maximum of \$100,000 (Kaye, 2011).

Some further amendments are being proposed to the Building Act 2004, which could provide more incentives for builders to 'build right, first time'. For example it is suggested that homeowners commissioning building works of NZ\$20,000 or more are to have a written contract with their builders, which will specify performance expectations, warranties, and remedial measures. Builders would be expected to rectify any defect reported by the homeowners within 12 months of commission on top of existing obligations to put things right for up to 10 years (Williamson, 2010). These amendments will help homeowners to be able to hold their builders to account and get defects to be rectified more quickly and cheaply though defect warranty periods may be ineffective if the developer/builder goes bankrupt. Homeowners may still have to fix the defects themselves, except if the developer/builders are members of a professional body (Ong, 1997).

The fundamental issues, as the authors see it, is being able to get the builders back to rectify defects and for the buildings to have been checked by qualified building inspectors at handover, so that any rectification can be done within these guarantee periods. Although the proposed revisions to legislation and policy documents could encourage quality achievement in house building production, engaging the service of building inspectors to identify defects could ensure that owners' expectations are met and consequently enhancements to their satisfaction levels.

#### **2.4 The house buying process and inspection regime 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. 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 its completion. In this house buying process the potential homeowner could influence the design and construction, depending on the construction stage reached. Thirdly houses could be purchased as what is referred to as a complete package (land and house) 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 building production 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 and expectations of the homeowner's are met. The more the checks and inspection on building performance, the more probable the final build will meet the required quality standards. More so with the growing number of new residential buildings in New Zealand, a good quality management system is required to cope with these demands. Performance improvement schemes are needed within the residential sector to ensure that the sector maintains its capability to build better quality homes. In this light the building consents granted by an approving authority (Building Consent Authority), before the commencement of construction works, contain compliance requirements which are necessary for the proposed building work.

Building consents specify the inspection requirements for building works based on the submitted plans and specification. 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 all 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 specifications approved in the building consent. Sales and purchase contracts are often conditional on the issuance of a CCC (Gibson, 2010). Building inspection is usually carried out at specific stages corresponding to building progress but typically, council inspectors' inspect residential buildings at six 'key stages' of construction. Council inspectors may not visit the construction site for a number of weeks between stages and random spot checks during the building process are rare.

It is common for new homeowners to carryout visual inspection before finalising the purchase of their new homes, although this visual inspection may not identify all defective works because of the homeowners' lack of construction knowledge. It is therefore reasonable to engage an expert (building inspector) to undertake in depth inspection on behalf of the homebuyer. Holder (2002) advocates quality audits (snagging) by homeowners that will enable the identification of defects that may not be visually detectable and for which ordinary council inspections may not highlight. Similarly Cossar (2003) encourages checking and inspecting buildings before any decision to buy. Craig (2008) asserts that high quality builds cannot always be achieved by relying on the performance of construction parties. Although inspection is variously suggested, it is rarely carried out, especially with new builds in New Zealand.

### **3 The Research**

#### **3.1 The research questions**

From the literature reviewed it is clear that there is a current and indeed pressing need to examine quality performance of new builds in the residential building sector in New Zealand. It is in this light, that the research on which this paper is based asks the important question: *How could zero snags and defects be achieved so that the quality of new residential buildings is enhanced in New Zealand?* Addressing this research question will help to improve the quality of new residential buildings in New Zealand, and subsequently improve the confidence that new homeowners can have in their developers.

Some of the research sub-questions that relate to snag reporting are listed below. These sub-questions were formulated in order to achieve the main research objectives which are outlined in the next section.

What is the magnitude of snags/defects in new residential buildings?

What are homeowners' views on snagging as a means of ensuring quality achievement in new residential buildings?

Can snagging be encouraged for quality achievement in residential construction?

### **3.2 The research objectives**

Specific objectives which relate to the itemised research questions above, to be pursued include the following:

- a) To identify and categorise snagging problems in residential buildings in New Zealand through an analyses of developer's and building inspector's defect records.
- b) To determine the importance of snag reporting from a homeowner perspective. This will be achieved through an opinion survey administered to new homeowners within three major cities in New Zealand.
- c) To suggest improved quality achievement processes that will be beneficial to residential homeowners, developers and the wider construction industry.

### **3.3 The research design and methodology**

The methodology for data collection and analyses that will lead to suggestions for improving existing house building practice in New Zealand is explained in the research framework presented in Figure 1. The research framework contains four key phases. The first phase covers problem recognition and research scoping. This is achieved by an extensive review of relevant literature and the researchers' interaction with external faculty (located in the UK) to gain knowledge on the research area. Clearer research objectives will be formulated based on new levels of understanding in the subject area



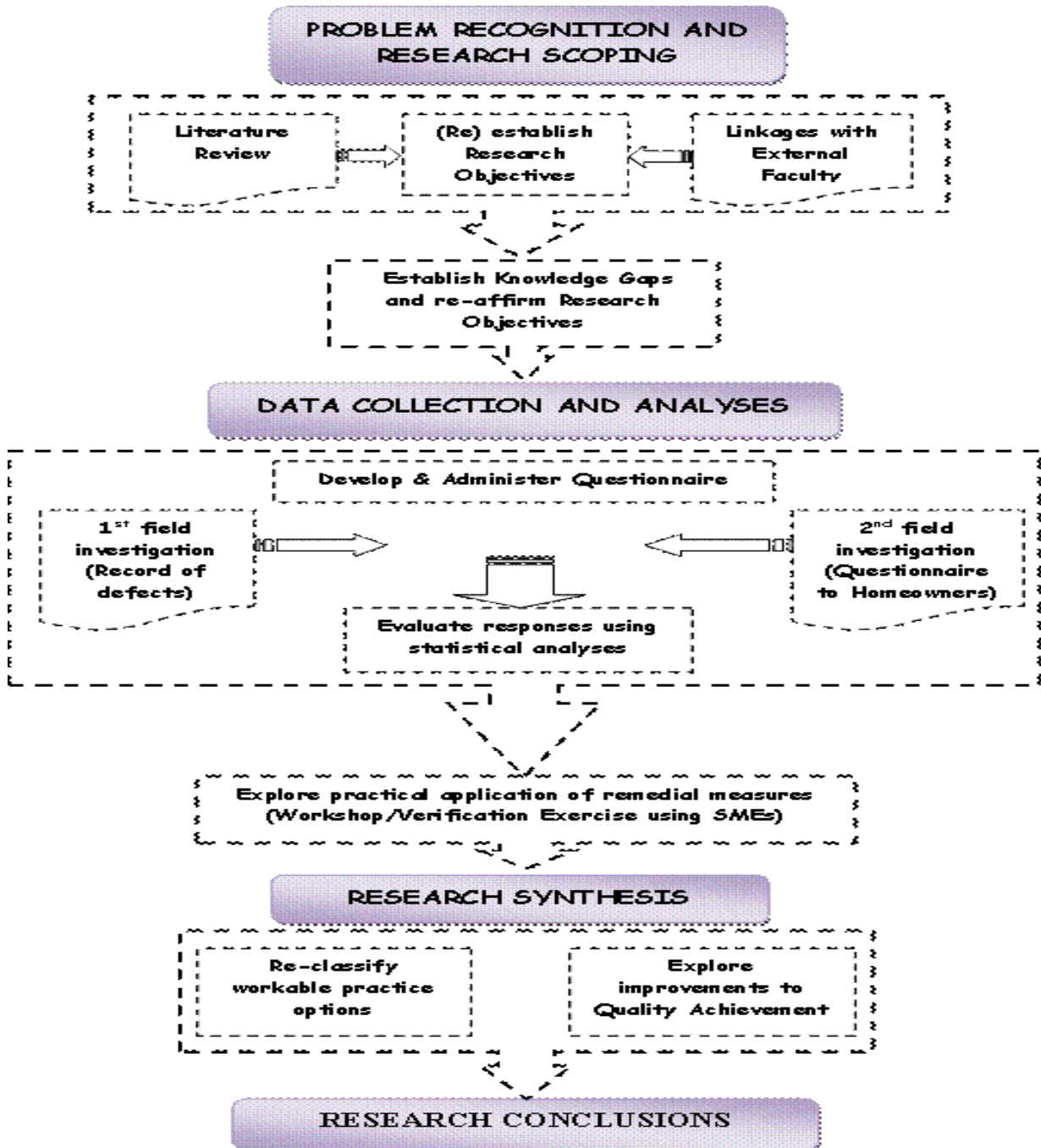


Figure 1 - The Research Framework

The second phase is the data collection and analyses phase. Two data collection tools will be developed, to collect information from two key research participants. The first set of information will be extracted from developers' and building inspectors' defects records, to capture the magnitude of defects in new residential buildings in New Zealand.

While the second set of information will be obtained through the administration of a semi-structured questionnaire to new homeowners. This will determine their satisfaction levels with their new homes and their experiences with quality performance by their developers. The survey will also determine the prospects for snagging new residential buildings for defects before or after handover. Data collected will be analysed using simple statistical tools. A verification exercise involving subject matter experts will be conducted to validate the results from the analyses.

The third phase involves the synthesis of the research findings, re-classification of workable practice options that could improve quality achievement levels. While the last phase will conclude the research and give necessary suggestions for improving the house building process in New Zealand.

Given the nature of the current research problem and the different research methods available, it is appropriate to employ a mixed method approach. Mixed research method is chosen for the study because the research objectives and questions will benefit from a combination of different approaches for the purposes of triangulation, complementary, development, initiation and expansion. Methods to be used include content analyses, surveys, and interviews to establish the current quality performance in the residential building sector and to suggest improvements that will benefit every stakeholder in the house building sector in New Zealand. The chosen methods will utilise the strength of both the qualitative and quantitative research method. According to Amaratunga *et al.*, (2002) the combination of the strength and weaknesses of both the qualitative and quantitative research approaches can focus on the relevant strengths.

The analysis of the data will be via coded entry into SPSS and Excel as appropriate, and thereafter with its manipulation utilising ANOVA and correlation testing. The analysis would aim at determining the significance of snags; differences and correlates of information amongst research participants. It is fully expected that other highly useful measures of performance will emerge during this analysis phase, along with discontinuities and irregularities that will have to be addressed through other means. Simple interpretive and descriptive methods of presentation will be adopted so that the findings could be communicative and understandable to readers. McQueen and Knussen, (2002) explain that descriptive statistics are used to describe, illustrate and summarise information in three ways viz: forming numbers into tables, generating charts and diagrams from the numbers, and then calculating general statistics.

#### **4 Potential Benefits of the research**

At present insufficient data exists regarding current New Zealand quality performance in order to take forward the driving down of quality failures and defects rectification costs. The research will provide essential data for future industry improvement initiatives in reducing residential building defects at handover. This study contends that the snag reporting methodology would provide to companies participating in the research survey, and the building industry some significant benefits. The main likely benefits include:

Comparison and benchmarking of performance – improved snag reporting processes will allow more detailed assessment and auditing of quality achievement within the building industry. The result of those assessments will indicate high, medium and low performers and may provide a benchmark for good practice. It is anticipated that there will be substantial scope for international benchmarking of performance, since preliminary contacts have been made with organisations in the UK who have already undertaken this type of research and are willing to share data.

Improved image and reputation – the building industry is highly competitive and survival may be dependent on a good image of quality achievement by a firm. Quality differentiates a firm from its competitors. It is not unlikely that long term players in the construction industry are those who have acquired a reputation for meeting their clients' needs for quality through consistently lowering numbers of snags. Companies developing their capabilities on the back of the data generated will be able to significantly increase their performance.

Improved service delivery – A quality conscious firm with reduced defects and less cost of rectification is likely to benefit from increased efficiency in its operations and ultimately the product/service that it delivers.

Growth in turnover – An expanding client base will follow from an increase in the satisfaction rate of clients. Turnover therefore increases and an organisation's financial profile is enhanced.

Increased profit margins - A good quality management system should reduce the 'cost of non-conformance' while the 'cost of conformance' stabilised or reduced in the long run.

Overall the research will benefit the wider construction industry through increased productivity coming from a reduced labour cost compared to the value of the constructed product.

## 5 Conclusions and Further Research

The pursuit of quality should be a never ending journey of continuous improvement. Improved quality management systems should help the constructor to look at the right ways of delivering buildings to facilitate doing the right things right, rather than simply doing things right. Doing the right things require a system that monitors the production process so that defective works are quickly identified and rectified. Presently snag reporting (building inspection) is mostly carried out for old and existing residential buildings, but little is being done in new builds in New Zealand. As a key objective of the research (reported in this paper), the magnitude of the defects at handover is investigated and the means by which snag reporting can be introduced within the house building production process will be identified.

It is hoped that by the completion of this research, mandatory building inspection will be incorporated into the house buying process in New Zealand. New homeowners can therefore fully utilise the 12 months defects warranty period proposed as an amendment to the Building Act 2004. Checking new builds for defects before or after handover would enable developers to rectify potential defects before they become burdens for homeowners. Homeowners want completed products that are defect-free and worth the utmost value for their investment. Builders should make these a performance criterion and should view the meeting of customer requirements a way of gaining competitive advantage in today's harsh market environment. Ultimately there would be increased confidence on developers by new homeowners on the quality of their new homes. If new builds are to stand the test of time, it is important that the production process do it once and do it right.

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## 7 References

- Amaratunga, D., Baldry, D., Sarshar, M., and Newton, R. (2002). Quantitative and qualitative research in the built environment: Application of 'mixed method' research approach. *Work Study*, 51(1), 17-31.
- Auchterlounie, T. (2009). Recurring quality issues in the UK private house building industry. *Structural Survey*, 27(3), 241-251.
- Building and Construction Sector Productivity Taskforce. (2009). A modern efficient and productive New Zealand built infrastructure industry. New Zealand.
- CIC. (2009). Review of Building Act 2004. New Zealand: The Construction Industry Council.
- Cossar, C. (2003, January 25). Check it out. *New Zealand Herald*.
- Craig, N. (2008). "The prevailing trend of defects and snagging in new homes in the UK". Unpublished PhD Thesis, Glasgow Caledonia University Glasgow.
- DTZ New Zealand. (2004). Changes in the structure of the New Zealand housing market: Centre for Housing Research Aotearoa New Zealand.
- Georgiou, J. (2000). A Comparison of defects in houses constructed by owners and registered builders in Victoria 1988-1996. Unpublished Master's thesis, Deakin University, Geelong - Australia.
- Gibson, A. (2010, 9 February). Rise in claims for leaky homes services. *New Zealand Herald*.
- Holder, V. (2002, May 4). All developers are not equal. *New Zealand Herald*.
- Hunn, D. (2002). Report of the overview group on the weathertightness of building to building industrial authority. New Zealand.
- Ilozor, B. D., Okoroh, M. I., and Egbu, C. E. (2004). Understanding residential house defects in Australia from the state of Victoria. *Building and Environment*, 39(3), 327-337.

- Kaye, J. (2011). Building and construction law: Risk and liability: Who, what and how. Retrieved 20th November, 2010, from <http://www.conferenz.co.nz>
- Laxon, A. (2002, November 29). How market forces failed homeowners. New Zealand Herald.
- McQueen, R., and Knussen, C. (2002). Research Methods for Social Science. : Prentice Hall, Harlow.
- Mills, A., Love, P., E. D, and Williams, P. (2009). Defect cost in residential construction. Construction Engineering and Management, 1(12), 12-16.
- Mohd, T., and Buang, A. (2010, December 1st - 3rd). The weakness of housing planning practices in Malaysia. Paper presented at the International Conference on Construction and Real Estate Management, Brisbane, Australia. from
- Ong, S. (1997). Building defects, warranties and project financing from pre-completion marketing. Journal of Property Finance, 8(1), 35-51.
- Page, I. C. (2011, April/May). Defects in new houses. Build 123, 37.
- Pfahlert, J. (2002, 8 October ). Construction industry action list to raise housing standards. New Zealand Construction Industry Council: News Release.
- Porteous, W. A. (1992). Identification, Evaluation, and Classification of Building Failure. Unpublished PhD thesis, Victoria University of Wellington, New Zealand.
- PWC. (2009). Weathertightness - Estimating the cost: Department of Building and Housing, New Zealand.
- Sommerville, J. (2007). Defects and rework in new build: An analysis of the phenomenon and drivers. Structural Survey, 25(5), 391-407.
- Sommerville, J., and Craig, N. (2005, 4-8 July). Managing the snagging process. Paper presented at the COBRA RICS Annual Conference, Queensland University of Technology, Brisbane. from
- Sommerville, J., Craig, N., and Bowden, S. (2004). The standardisation of construction snagging. Structural Survey, 22(5), 251-258.
- Sommerville, J., and McCosh, J. (2006). Defects in new homes: An analysis of data on 1,696 new UK houses. Structural Survey, 24(1), 6-21.
- Williamson, M. (2010). Cost-effective quality: Next generation building control in New Zealand.