IMPLEMENTATION OF A BUILDING SUSTAINABILITY RATING TOOL: A SURVEY OF THE NEW ZEALAND BUILDNG INDUSTRY

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ABSTRACT

The correct implementation of Building Sustainability Rating Tools (BSRTs) is fundamental to their overall success; despite this, little research has been done. The purpose of this project was to determine the conditions required for the successful implementation of a New Zealand BSRT.

To help determine these conditions a survey was designed to investigate the understanding of the New Zealand building industry regarding sustainability and BSRTs. Also examined was industry awareness regarding the New Zealand Green Building Council (NZGBC) and its newly developed BSRT, Green Star NZ.

The objectives of the survey were to:
- Identify possible issues regarding implementation of Green Star NZ, to assist in smoothing the period of transition for implementation
- Increase the potential for a more successful BSRT, including market penetration and widespread application

The survey was developed in collaboration with the NZGBC, with the intention of encompassing a wide building industry representation (for example, property developers, building contractors, and architects). The participants were canvassed from several associated building organisations which agreed to assist in the distribution of the survey by emailing their respective members. The survey was conducted between 19 February and 12 March 2007 and ultimately received 476 responses.

This paper describes the survey methodology and initial results and outlines some preliminary conclusions.

KEYWORDS:

Building sustainability rating tools; Green Star NZ; Questionnaire surveys

INTRODUCTION

BSRTs have enjoyed considerable success worldwide and their development has created the critical mass of interest necessary to cement their role in creating positive change. However, while they have been successful in entering the consciousness of the building industry, the number of actual assessed and certified projects is still relatively low (Cole, 2005).

Here in New Zealand the NZGBC has only been in operation since February 2006. This initiative was beginning to have an impact on the relevant sectors of the building industry and with release of Green Star NZ this impact was expected to strengthen further. The NZGBC has stated that the implementation of Green Star NZ can only be successful if the selected tool is widely accepted and adopted by industry its members. If these key stakeholders are reluctant to adopt the tool, voluntary uptake will not occur and implementation will be slow (Ministry for the Environment, 2006).

Aims and Objectives

In order to help facilitate the process of implementation the aim of this research was to investigate the requirements of end-users and stakeholders including their understanding of sustainability, the NZGBC, and BSRTs, to ensure that potential barriers were identified and addressed in the early stages of Green Star NZ's implementation

The research had the following specific objectives:
- To identify possible information gaps regarding sustainability, sustainable buildings and BSRTs
- To provide the necessary 'snapshot' of the New Zealand building industry of the current New Zealand market
- To provide a base point for measurement of the adoption/uptake of Green Star NZ

METHODOLOGY

The General Methodology

This research was quantitative in nature, using a questionnaire survey to fulfil the above aims and objectives. The survey was conducted through a questionnaire over the three-week period from the 19 February 2007 to the 12 March 2007. This relatively short period was critical for the study. While a longitudinal study lasting several months may have resulted in a greater number of responses, this would have increased the potential for bias, as new events motivated change and/or new information updated the knowledge base of the respondents (Särndal and Lundström, 2005).

Sample Frame and Target Population

The target population was the New Zealand building industry, in particular end-users and stakeholders of Green Star NZ.

It is important to define both a stakeholder and an end-user in the context of this research as the survey aimed to distinguish between these groups. An end-user was defined as someone who is directly involved in the application of the Green Star NZ and in this context, someone who is likely to aspire to accreditation.

Stakeholders were defined as individuals with an interest and/or an involvement in the outcome of the Green Star NZ process, but not directly involved with the application of the tool. Stakeholders include (as defined by the NZGBC):
- Commercial property developers
- Investors, owners and property managers
- Residential developers and major portfolio owners
- Owner occupiers
- Major corporate tenants and retailers
- Building contractors
- Building product manufacturers and distributors
- Architects and Draftpersons
- Engineers
- Property and construction professionals
- Research and non-government organisations
- Related interests (utilities, financial institutions, insurance companies, etc)

End-users on the other hand included:
- Assessors

- Consultants
- Particular stakeholders (architects, designers, engineers)

According to 2006 Census data the size of the target population was estimated to be 126,421 (based on the number of businesses in New Zealand) (Statistics New Zealand, 2006). However there was a level of ambiguity in relation to this figure, due to the difficulty in defining the enterprises within the 'owner occupiers', 'major corporate tenants and retailers', and 'related interests' categories. For example, 'related interests' could be seen to be very broad, encompassing all parts of industry not associated with the other eleven building industry categories (e.g. legal services such as lawyers); hence they have not been identified within this figure.

Sample Selection

As the survey was aimed at the New Zealand building industry the first step was to contact all relevant organisations. An email outlined the research and the intended study, and the assistance each organisation could provide through their participation and by helping to administer the survey. The organisations that agreed to participate were asked to forward an email with a link to the survey onto their contact database once the survey was open to responses. For purposes of calculating response rates each participating organisation was asked to provide the number of contacts they had within their database. In total nineteen organisations (out of 53 initially contacted) agreed to provide their assistance in administering the survey (refer to acknowledgements)[1].

Sample Size

Based on a finite population the required sample size to achieve a confidence interval or 95% with a margin of error of $\pm$ 5%, the survey would require a sample of 376 participants to be representative of the population.

Sample Design Limitations

Burkell (2003) suggests that non-response presents two problems for the interpretation of results. First, it reduces the sample size, decreasing the precision with which results can be stated. Second, and more importantly, it introduces error into the sampling process by excluding a non-random subset of the population. If the excluded subset is different from those who responded to the survey, there is a distinct possibility of bias. To know this would require information about the differences between respondents and non-respondents.

Some research indicates that non-respondents are more like late respondents in both expressed attitudes and demographics (Burkell 2003). Therefore the technique to account for any survey non-response is to divide the data into two select subgroups those before and those after the reminder email using the Independent Sample T-test procedure, comparing the means of the two. While Burkell (2003) suggests that this technique may be overly conservative, increasing the likelihood for underestimation of the results because of the low response rate, it was seen to be the most appropriate technique to account for non-response in this research.

Survey Instrument

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[1] Organisations such as the BRANZ, the Ministry for the Environment (MfE), and the Energy Efficiency and Conservation Authority (EECA) were not asked to participate in administering the survey. This was because they were seen to be separate enterprises rather than organisations where individuals joined up as members or to be part of an emailing list. Furthermore these separate enterprises (BRANZ, MfE, EECA, etc) were assumed to have individuals associated with other surveyed building industry related organisations

A web-survey instrument with email as the administration method was chosen over the other possibilities due to a number of factors. The main reason being that it was seen to be the most effective way in terms of the limited resources and time available to survey as many people as possible. A web-based programme also provided the added benefit of collecting results into an immediately usable format, reducing time and possible error of manual data entry.

Survey Design and Development

Industry involvement was regarded as an important factor in this research. The questionnaire was developed with the assistance of a Project Advisory Group and the help of the NZGBC CEO, Jane Henley. All these parties were involved in shaping the survey, giving it a more industry focused outlook. To ensure the survey was valid and elicited the intended responses from the target population, it was thoroughly tested on a sample audience before implementation.

Although the survey aimed to establish the wants and needs of end-users/stakeholders, it was important to gauge level of understanding in the industry of both BSRTs and sustainability. Therefore the survey questions were directed at two key areas. These were:
  - General field questions – providing background to the level of knowledge and understanding of BSRTs, the NZGBC, sustainability, and also the drivers for what is pushing industry to build sustainably
  - Implementation-specific questions – seeking responses regarding the implementation of the BSRT such as output type, training, accreditation, value (economic and environmental), etc

The questionnaire was made up of seven key sections. These were:
  1. Industry Information
  2. Background
  3. Building Sustainability Rating Tools
  4. Green Star New Zealand
  5. The New Zealand Green Building Council
  6. Triggers, Drivers, Obstacles and Reasons for Sustainable Building
  7. Information Requirements

RESULTS

The results in this paper provide a brief indication of the total results collected in the survey. The results here examine the level of interest and involvement in sustainability, sustainable building and BSRTs, the importance of a Green Star NZ to be an equivalent of the Australian system, and the drivers and obstacles to sustainable building. At its conclusion the survey ultimately received 476 responses, which approximated to a response rate of 3% with a confidence interval of 95% and margin of error of $\pm$ 4%. As can be seen in Table 1, four groups made up almost 70% of the responses. Architects and Draftpersons represented 32%, Building Product Manufacturers and Distributors 15%, Engineers 12%, and Property and Construction Professionals 10%. This type of response was expected as Architects and Draftpersons, Engineers, and Property and Construction Professionals are more likely to seek Green Star NZ accreditation, while Building Product Manufacturers and Distributors have a particular interest in ensuring their products contribute to sustainable building.

Table 1: Makeup of survey participants

Which part of the building industry most represents you?	Percentage
Architects and Draftpersons	33%
Building Product Manufacturers and Distributors	15%

Engineers	12%
Property and Construction Professionals (Surveyors, Consultants, Project Managers, etc)	10%
Building Contractors	7%
Research (including Universities) and Non Government Organisations	6%
Owner Occupiers (Education, Central and Local Government, Defence, Corporate, etc)	5%
Investors, Owners and Property Managers	4%
Related Interests (Utilities, Financial, Insurance, Legal, etc)	4%
Major Corporate Tenants and Retailers	2%
Commercial Property Developers	2%
Residential Developers and Major Portfolio Owners	1%
Total	**100%**

Level of Interest and Involvement

Participant interest was found to be far greater than participant involvement in sustainability, sustainable building and BSRTs (Figures 1 and 2). For example over 40% of the participants said they were 'extremely interested' in sustainability and sustainable building, whereas less than 20% were 'extremely involved'. The interpretation here is that while there seems to be a high level of interest from the building industry, its involvement is much lower. More importantly a potential gap has been identified where the NZGBC or other parts of the industry could direct information and/or events to get them more involved.
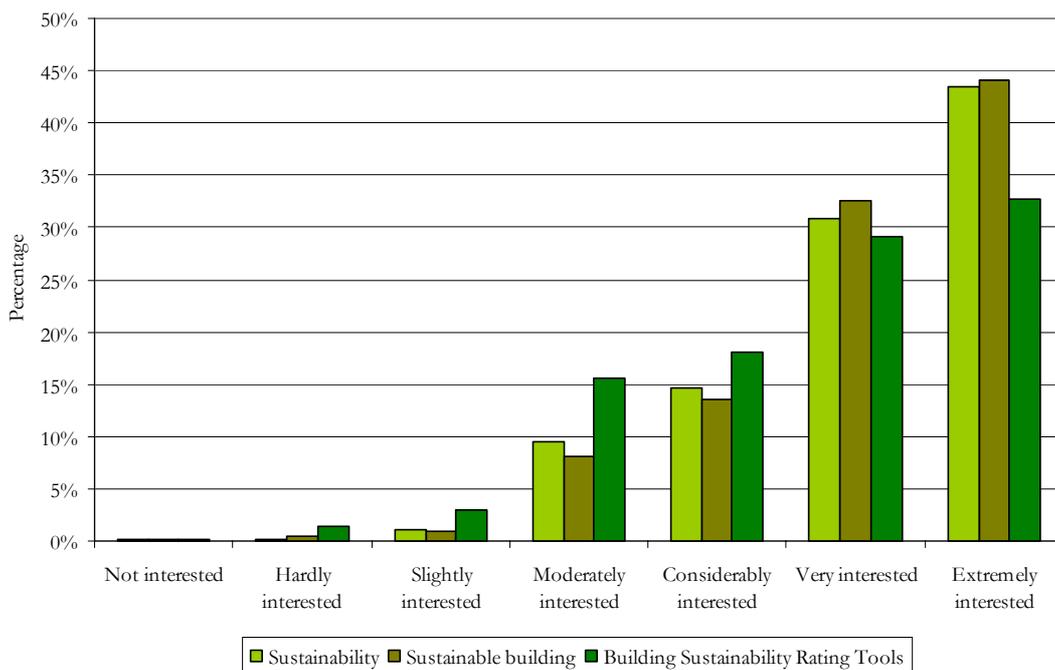
Figure 1: Total response to the level of interest in sustainability, sustainable building and Building Sustainability Rating Tools
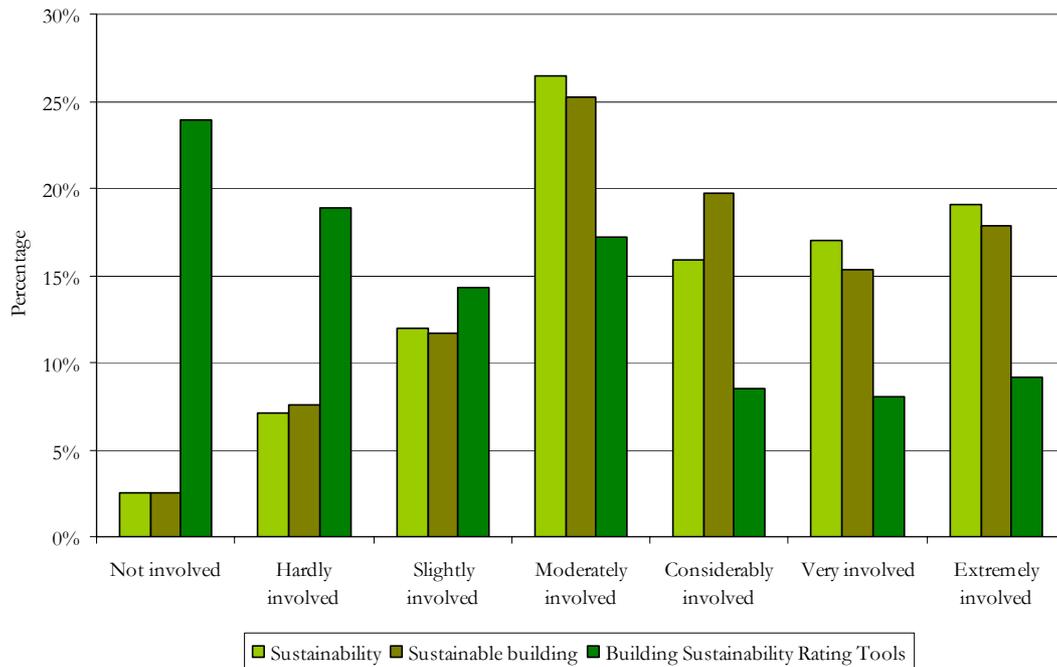
Figure 2: Total response to the level of involvement in sustainability, sustainable building and Building Sustainability Rating Tools

Green Star: A New Zealand Equivalent?

Reinforcing the decision by the NZGBC to develop the Australian Green Star system, Figure 3 shows the importance the participants place on an Australian/New Zealand equivalent tool. As shown, 85% of responses fall between 'moderately important' and 'extremely important'. This reflects the familiarity between both countries, as we share standards and follow similar practices and have firms that operate on both sides of the Tasman. An equivalent tool would allow building types to be compared and could even create some friendly competition, which in turn could result in more sustainable buildings.
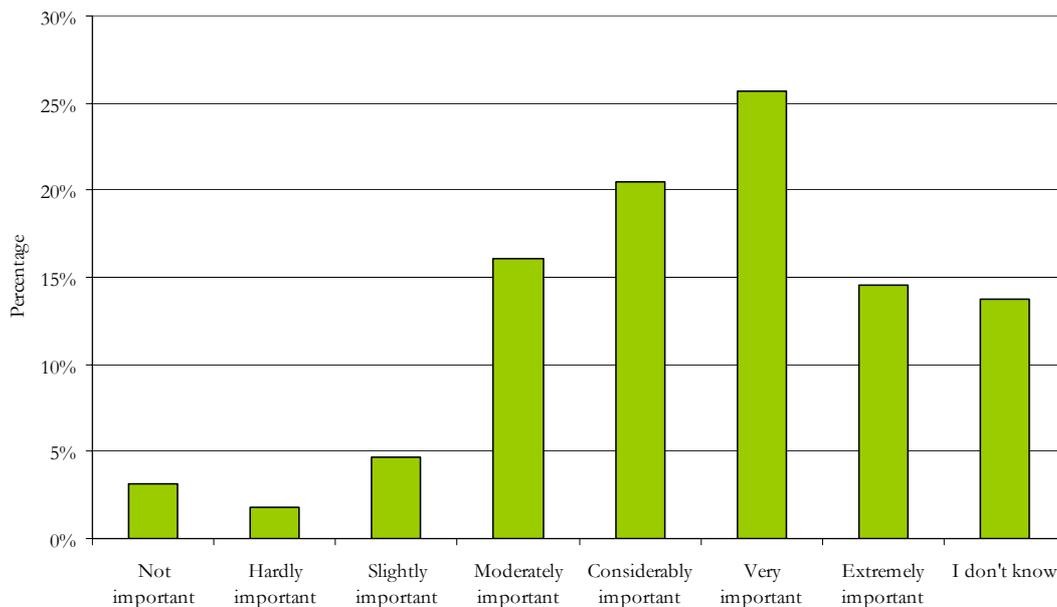
Figure 3: Total response to how important is it for Green Star New Zealand to be a New Zealand equivalent of the Australian Green Star system

Drivers for Sustainable Building

Participants were asked to choose the main drivers for sustainable building from the list shown in Table 2. According to Figure 4, Option A 'rising energy costs' (49% of the responses) was one of the main drivers for sustainable buildings. This is in accordance with both Australia and the United States which weighted rising energy costs as the most important. Likewise 'client demand' and 'environmental conditions' were also deemed highly important in driving sustainable buildings.

Table 2: Definition of answer choices for main drivers for sustainable building

Option A	Rising energy costs
Option B	Government regulation
Option C	Lower life-cycle costs
Option D	Client demand
Option E	Independent rating system (Green Star New Zealand)
Option F	Government rating systems (EECA Home Energy Rating Scheme)
Option G	Competitive advantage
Option H	Superior performance
Option I	Increased education
Option J	Environmental conditions
Option K	Attraction and retention of staff
Option L	Increased emphasis on productivity
Option M	International trends show it is smart business
Option N	Disruptive/enabling technology
Option O	Other(s)
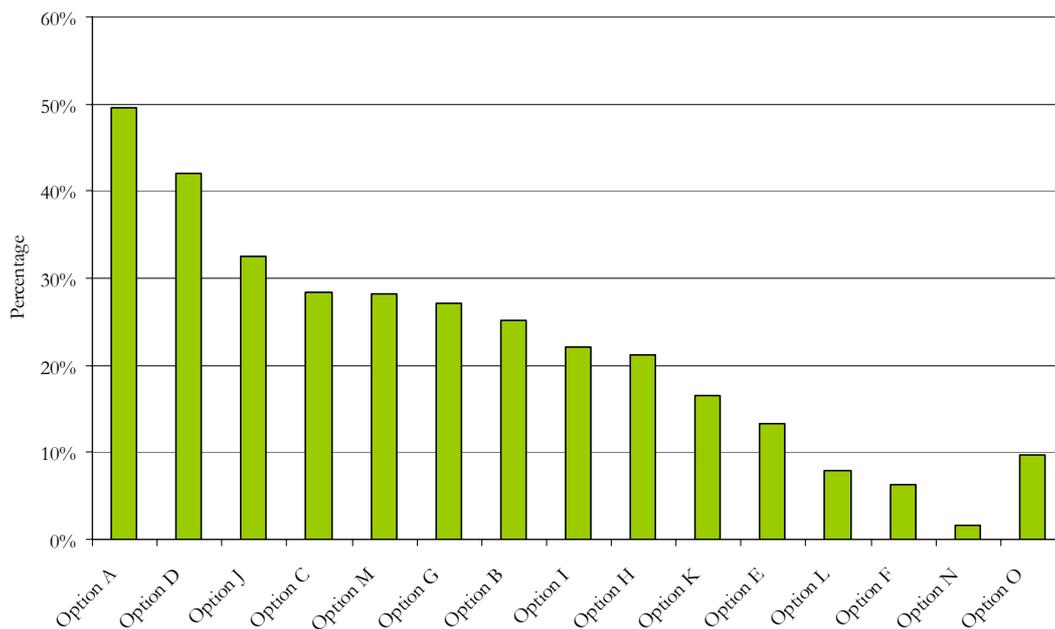
Figure 4: Total response of main drivers for sustainable building

Obstacles to sustainable Building

Participants were also asked about the obstacles to sustainable building. The results (Figure 5) show that 'perceived higher upfront costs' account for 65% of the responses. Additionally, 'lack of education' and 'lack of awareness' were also seen as strong barriers to sustainable building. Future analyses will further explore these and other results from the survey, in particular, the differences and similarities between building industry sectors. Also t-tests will be used to analyse the differences between early and late respondents to examine the significance of non-response (Smith, 2007).

Table 3: Definition of answer choices to the obstacles to sustainable building

Option A	Perceived higher up front costs
Option B	Lack of education
Option C	Lack of awareness
Option D	No fiscal incentive
Option E	Different accounting methods
Option F	No coordination or consistency
Option G	Politics
Option H	Payback periods
Option I	Education of non 'green' people
Option J	Other(s)
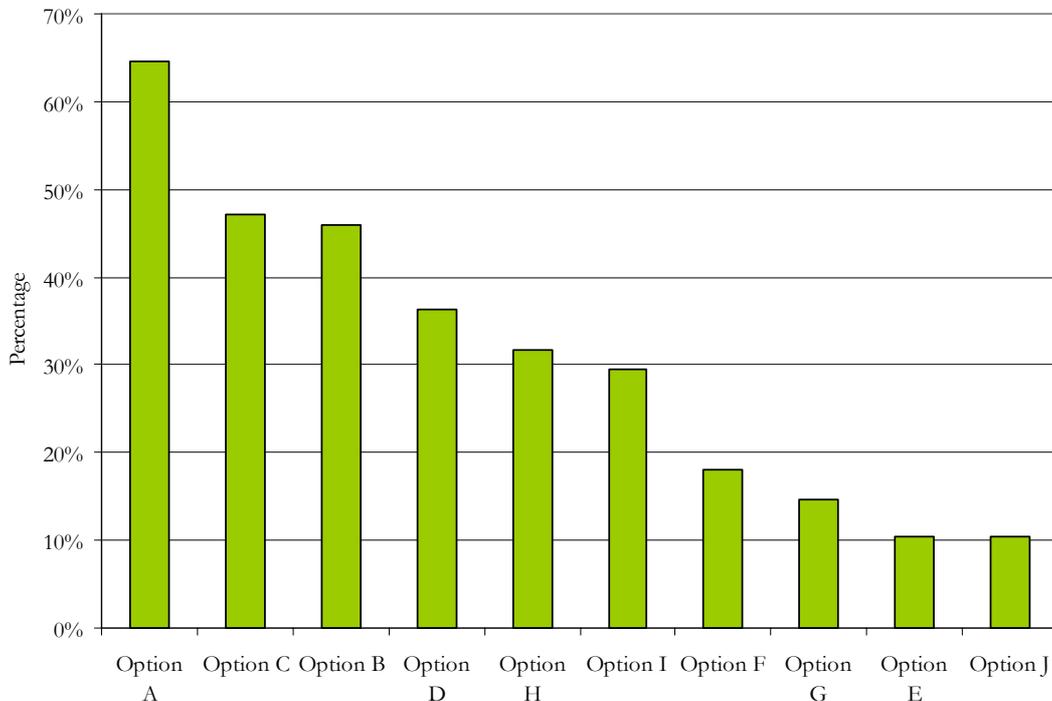
Figure 5: Total response to the obstacles to sustainable building

Comparative Results

It is of interest to compare the results of this survey with previous studies from the United States and Australia. In most cases the level of importance placed on the drivers (Table 2) to sustainable building by the New Zealand building industry are lower than those perceived by the United States and Australia. This emphasises the differences between the studies and more importantly how with experience New Zealand's perceptions may elevate the influence of Green Star NZ and the NZGBC grows.

The results could be interpreted as a precursor for New Zealand's future, as the United States and Australian studies were conducted with their respective BSRT already well established in the industry, whereas in New Zealand, Green Star NZ had not officially been launched.
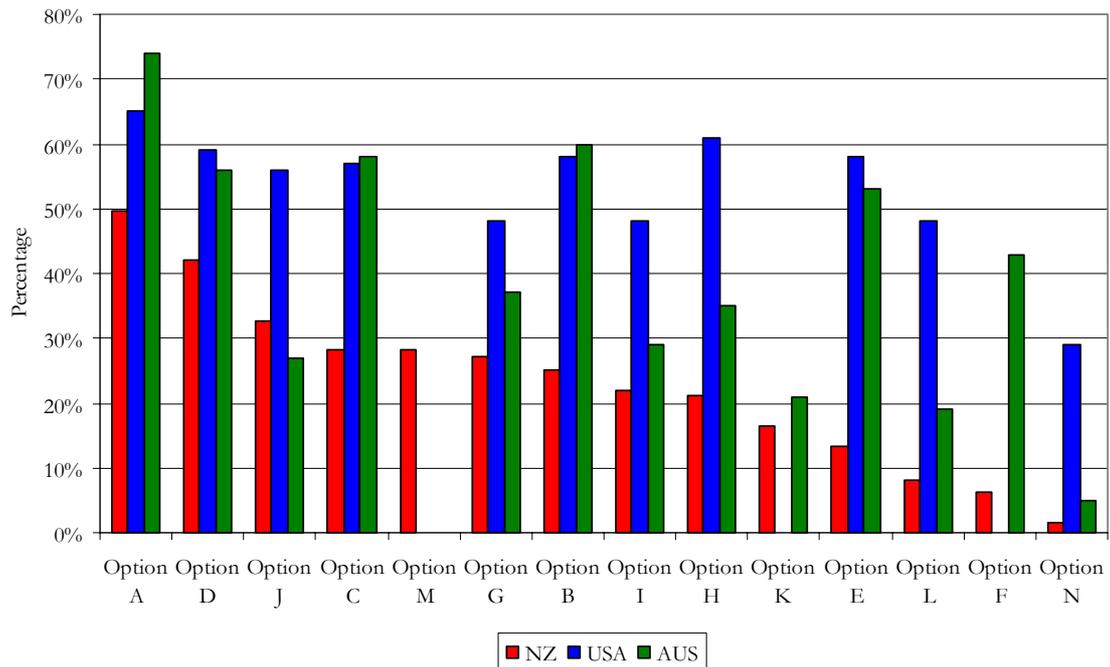

Figure 6: Overall comparison of drivers for sustainable building

CONCLUSION

While only showing a sample of the total results analysed, the above provide an indication of some of the gaps and barriers in the New Zealand building industry. For example there is a significant gap between the level of interest and involvement in sustainability and sustainable buildings. This reveals where the NZGBC and other organisations can direct their own research and create strategies to overcome these barriers. It is expected that further analyses will demonstrate that by investigating the implementation phase of Green Star NZ will assist in facilitating a better, more successful BSRT for New Zealand. Additionally the results from the research could serve to enhance and improve:

- The identification of possible issues regarding the BSRT and therefore help smooth the period of transition for implementation and make it more New Zealand specific
- The potential for a more successful BSRT, including, penetration of the market and widespread application
- The relationship between the NZGBC and industry, encouraging dialogue to help develop the tool
- Ultimately the chances for the development of more sustainable buildings in New Zealand, through increasing education and awareness

FUTURE ANALYSES

This paper has only touched on some preliminary findings, the future analyses will deal with some of the other questions to which responses were sought, such as:

- What do you see as the purpose of a Building Sustainability Rating Tool?
- How important is it to have a New Zealand specific Building Sustainability Rating Tool?
- How important is it for Green Star New Zealand to be a New Zealand equivalent of the Australian Green Star system?
- To what extent do you think Green Star New Zealand will influence the building industry in a shift towards more sustainable building development in New Zealand?

- How important is it that New Zealand buildings seek full Green Star accreditation?
- To what extent do you think the New Zealand Green Building Council will influence the building industry in a shift towards more sustainable building development?
- In your experience who triggers sustainable building in the first place?
- In your opinion who should be the main driver for sustainable building?
- At what stage of the building process is sustainable building most likely triggered?
- What do you believe are the economic reasons/benefits of sustainable building?
- What do you believe are the environmental reasons/benefits of sustainable building?
- What do you believe are the social reasons/benefits of sustainable building?
- What information do you require in with regards to sustainable building?

ACKNOWLEDGEMENTS

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