

## 4. RESEARCH AND DATA INTERPRETATION

### 4.1 INTRODUCTION

The focus of this chapter is Sub-problem 3, specifically:

*Are the most significant NBR role-players, i.e. the BCOs,*

- *aware of the goals and implementation methods of the NBR?*
- *willing to support the uniform implementation of the NBR?*
- *aware of recent developmental changes to the NBR?*

The above focus points are extended to also address Sub-problem 4 and determine whether BCOs are willing to implement new regulations on sustainability in the existing administration system of the NBR.

This chapter initiates Phase 3 of the study proposal, namely the exploratory study. It starts with a progress review of the main problem and associated sub-problems, after which the implemented questionnaire is discussed.

It is hypothesised that the most significant role-players (i.e. the BCOs) are not aware of the origin, methods of implementation, and goals of the NBR, and hence they are not willing to support the uniform implementation of the NBR. Neither are they aware of recent developmental changes to the NBR.

It is also hypothesised that BCOs are willing to implement new regulations on sustainability in the existing administration system of the NBR.

### 4.2 REVIEW OF THE RESEARCH DESIGN

The research design is reviewed in Table 48.

**Table 48: List of the main problem and sub-problems, and the proposed actions to be taken**

<b>MAIN PROBLEM</b>			
<p><i>The purpose of this study is to determine the origin of the current minimum regulations and standards applicable to the built environment of South Africa, and to examine the goals and implementation methods of Act 103 of 1977 and its Regulations (together with the Code of Application (SANS 10400:1990)), in an attempt to achieve uniform implementation of the requirements and align the aforementioned with accepted passive design principles to promote a more sustainable built environment in South Africa.</i></p>			
<b>Background</b>	<b>Sub-problem 1</b> (posed as question)	<b>Progress</b>	
<p>The literature study determined the origin and goals of the NBR.</p> <p>The requirements of Act 103 of 1977 and the NBR and implementation methods have been identified.</p> <p>The latest changes to the NBR have also been described briefly.</p>	<p>What is the origin of the NBR, and did the goals and the methods of implementation of the current edition of the NBR (which represents the minimum regulations and standards applicable to the built environment of South Africa) evolve since the origin of the NBR?</p>	<b>Hypothesis</b>	<b>It is hypothesised that</b> the goals and implementation methods of the current edition of the NBR (which represents the minimum regulations and standards applicable to the built environment of South Africa) have evolved since the origin of the NBR.
		<b>Action required</b>	<b>Identify the existing literature on subject</b> (completed)
		<b>Method</b>	<b>Desk review</b> (completed)
		<b>Theme(s)</b>	<b>Act 103 of 1977 and the NBR</b>
		<b>Questions</b>	<b>Not applicable</b>
<b>Background</b>	<b>Sub-problem 2</b> (posed as question)	<b>Progress</b>	
<p>The desk review indicates that since its inception, the goals of the NBR have evolved and currently conflicting views exist on the purpose of the NBR. This duality becomes evident when comparing the instruments and tools used by the LAs to implement the requirements of the NBR. Currently the applicant has to meet different requirements at different LAs during the plan approval process.</p>	<p>Are the current regulations and standards, as defined by the NBR, implemented uniformly by the respective LAs?</p>	<b>Hypothesis</b>	<b>It is hypothesised that</b> the various LAs do not implement the requirements of the NBR in a uniform manner.
		<b>Action required</b>	<b>Identify the existing NBR instruments and implementation tools</b> used by the LAs (completed) <b>Test the hypothesis</b>
		<b>Method</b>	<b>Desk review</b> (completed) <b>Questionnaire to BCOs</b>
		<b>Theme(s)</b>	<b>1. Existing NBR</b> <b>2. Implementation of the NBR</b>
		<b>Questions</b>	Background + Introduction = 1 – 5
			Theme 1 = Question 6 Theme 2 = Questions 7 – 11
<b>Background</b>	<b>Sub-problem 3</b> (posed as question)	<b>Progress</b>	
<p>A number of changes have been made to the NBR since November 2002. Although the BCOs should be aware of these changes since they impact directly on their vocation, the communication thereof has remained within existing formalised channels (i.e. the <i>Government Gazette</i>). This part of the study determines the level of awareness of the BCOs, and their participation in the process of formulating the new regulations.</p>	<p>Are the most significant NBR role-players, i.e. the BCOs,</p> <p>3.1 aware of the goals and implementation methods of the NBR,</p> <p>3.2 willing to support the uniform implementation of the NBR, and</p> <p>3.3 aware of recent developmental changes to the NBR?</p>	<b>Hypothesis</b>	<b>It is hypothesised that</b> the most significant role-players (i.e. the BCOs), are
			3.1 not aware of the goals and implementation methods of the NBR, and
			3.2 not willing to support the uniform implementation of the NBR, and
	3.3 not aware of recent developmental changes to the NBR.		
		<b>Action required</b>	<b>Test the hypothesis</b>
		<b>Method</b>	<b>Questionnaire to BCOs</b>



		<b>Theme(s)</b>	<b>3. Changes to the NBR</b>
		<b>Questions</b>	Theme 3 = Questions <b>12, 13</b>
<b>Background</b>	<b>Sub-problem 4</b> (posed as question)	<b>Progress</b>	
Should certain passive design principles be included in the NBR, the BCOs would be responsible for the implementation of these envisioned 'sustainability regulations'. It is therefore important to determine the approach of the BCOs towards sustainability. Should the BCOs be unwilling to implement the regulations, it could lead to requirements not being effectively implemented.	Are BCOs willing to implement new sustainability regulations in the existing administration system of the NBR?	<b>Hypothesis</b>	<b>It is hypothesised that</b> BCOs are willing to implement new sustainability regulations in the existing administration system of the NBR.
		<b>Action required</b>	<b>Test the hypothesis</b>
		<b>Method</b>	<b>Questionnaire for the BCOs</b>
		<b>Theme(s)</b>	<b>4. Impact of built environment</b> <b>5. Passive design criteria</b>
		<b>Questions</b>	Theme 4 + 5 = Questions <b>14,15</b>

### 4.3 THE SURVEY

This chapter discusses a questionnaire to be completed by the BCOs. The questionnaire investigates the following:

- The origin, methods of implementation, and goals of the NBR
- The uniform implementation of the NBR by the LAs
- The awareness of the BCOs of recent developmental changes to the NBR
- The willingness of the BCOs to incorporate new regulations on sustainability into the existing administration system of the NBR

The initial section of the questionnaire deals to some extent also with Sub-problem 2. Although the latter was addressed in the preceding chapter, it is important to determine the perspective of the BCOs, as they take primary responsibility for implementing the requirements of the NBR.

The complete questionnaire is presented as Addendum L for information purposes.

#### **4.3.1 Background**

The Department of Statistics (DoS) at the University of Pretoria (UP) provides an internal consultation service to researchers. Based on availability, the DoS assigns a statistician and research consultant from the pool of departmental staff to a particular



research project. This is followed by the first project meeting, where the attendance of the supervisor, researcher, statistician and research consultant is required. During this meeting the aims of the research project are discussed, as well as possible methods to achieve these aims.

The researcher followed the required protocol during subsequent liaisons with the DoS regarding the study. In addition, an independent statistical consultant was appointed by the researcher to provide further verification and clarification of the research concept, its implementation method, and the design of the questionnaire.

#### **4.3.2 The design of the survey**

The questionnaire was structured in accordance with the various sub-problems. Various draft surveys were prepared during the design process. The different draft designs were continuously discussed with the research consultant, internal and external statisticians, and the supervisor. Each discussion served to pre-test the survey. Lastly, the questionnaire was submitted to the UP Ethics Committee for approval.

#### **4.3.3 The Ethics Committee**

The research was conducted in accordance with the official UP document on *Policy and Procedures for Responsible Research* (Committee for Research Ethics and Integrity, 2007). After approval by the departmental research committee, the research project was submitted to the Engineering, Built Environment and Information Technology (EBIT) faculty committee for Research Ethics and Integrity. The application consisted of the following documents:

1. Background to the study
2. Application form for clearance by the Ethics Committee
3. Proposed questionnaire
4. Informed consent form
5. Statement by the researcher regarding confidentiality and possible conflicts of interest



The background to the study, the request to the ethics committee, and the subsequent approval of the proposal and questionnaire are attached for information purposes as Addenda K and L.

#### **4.3.4 The one-day conference of NRCS**

Prior to its implementation, the final questionnaire was presented to two representatives of the NRCS (personal communication with Opperman & Cohen, 7 September 2010).

The NRCS extended an invitation to all the BCOs in South Africa to attend a one-day conference entitled *Sharing indigenous Wisdom* (Opperman, 2010). The conference was held on 21 September 2010, and was attended by 89 BCOs. At this event, the researcher was given the opportunity to present a lecture on *Challenges of uniformity* (Laubscher, 2010). The following aspects were covered in the presentation:

- *The origin of building regulations in ancient times and in Southern Africa.*
- *The definition of a building regulation.*
- *The current Act and NBR in South Africa.*
- *The role of the BCO.*
- *The various NBR implementation tools available to the BCO.*
- *The major role-players in the South African built environment as well as the methods they use to implement the NBR.* In essence, this was a short discussion of Phase 2.2 of the study (the second part of the pilot study) that was completed as part of the desk review.
- Finally, the attendees were asked to assist in the research by completing the survey.

It is the opinion of the researcher that the formal presentation and subsequent completion of the questionnaire at the NRCS-organised event provided a large measure of underwriting to and endorsement of the questionnaire. It should be noted that the distribution and completion of the questionnaires at this event ensured a high rate of participation (100%).



#### **4.3.5 Determining the population size**

Before the scheduled NRCS conference, the actual size of the population (the precise number of BCOs countrywide) was unknown to both the researcher and the NRCS.

According to the South African Local Government Association (SALGA), there are 283 LAs (municipalities) in South Africa (Hartley, 2010). Section 5 of Act 103 of 1977 requires each LA to appoint a BCO (South Africa, 2011: 16). However, it is possible to share a BCO between two smaller LAs, or some LAs might require more than one BCO, such as the City of Johannesburg that employs 154 BCOs (personal communication with Opperman, 13 May 2010).

In March 2010 the NRCS appointed an intern to contact all the LAs listed on the official website of SALGA. The assigned intern dedicated three months to contacting the 283 listed LAs via telephone or e-mail. The aim of this exercise was to establish the contact details of the BCOs of the respective LAs (personal communication with Opperman, 13 May 2010). During the aforementioned period, 54% of the contacted LAs either did not respond, or responded negatively to the enquiry (personal communication with Opperman, 10 March 2011). Nonetheless, the invitation to the one-day NRCS conference was extended to 277 BCOs (personal communication with Mathebula, 3 March 2011), which implies that the population size for this study was the 277 invited BCOs.

No further restrictions or filters were placed on the 277 invitees, and the target population was defined as all the BCOs who eventually attended the scheduled conference. As stated earlier, the conference was attended by 89 BCOs, and everyone participated in the study by completing a questionnaire.

#### **4.3.6 The remaining population**

The possibility of contacting the remainder of the population was discussed with the supervisor. However, concerns about the replicability of the controlled environment within which the questionnaire was completed ruled out this possibility.



It is suggested that the lecture that preceded the completion of the survey provided context and assistance to the respondents.

#### **4.3.7 Implementation of the questionnaire**

The questionnaire was distributed to the target group, and the individual questions were projected onto a screen. In this controlled environment the researcher read the questions separately, clarified any uncertainty and allowed the audience to complete each of the 15 questions individually. The duration of this stage was longer than initially anticipated, and it lasted approximately 45 minutes. This could be attributed to the clarification process. The researcher made an effort not to influence the participants in any manner regarding the projected outcome of the survey.

#### **4.3.8 Anonymity**

The survey was conducted in the manner described to the Ethics Committee, with one exception. The participants were not asked to complete an informed consent form, because this would have compromised their anonymity. The instructions and descriptions of purpose that preceded the survey allowed the researcher to make all the respondents aware of the voluntary nature of their participation and their anonymous status. The cover letter of each questionnaire (included as Addendum L) expressly stated the following:

*All information will be treated as confidential. However, after it has been processed, the results of the study will be publicly available (Laubscher, 2010).*

The completion of the survey confirms the participants' acceptance of the said conditions.

#### **4.3.9 Data processing**

The UP DoS processed the raw data using the Statistical Package for the Social Sciences version 17.0 (SPSS). Once the researcher had completed the individual coding of the questionnaires, the data was captured by the DoS.



#### **4.3.10 The target group and its level of representation of the population**

As mentioned earlier, the attendees of the one-day NRCS conference for BCOs constituted the target population for this study. However, the actual number of participants who would attend the conference and complete the questionnaire remained uncertain until the event was hosted.

Large similarities were found between the profile of provincial representation at the conference and the provincial value of building plans passed and recorded. The respective profiles were compared to establish the validity of the study (see par.4.5.1 for the data and subsequent discussion). Although the questionnaire was completed by only 89 people or 32% of the study population (all the invitees), the provincial representation of the participants was comparable with the provincial contribution to South African built environment. (For a more detailed discussion on this aspect see Figure 6 on p. 128 and Figures 86 and 87 on pp. 179-180.)

#### **4.3.11 The rating of the target group**

The appointment of a BCO by an LA takes place in accordance with the minimum requirements as set out in Act 103 of 1977 and the NBR. Act 103 of 1977 requires the BCO to have a minimum qualification, and assumes that the respondents have daily contact with the subject matter. The response (on the NBR) obtained from this target group was therefore rated as informed by the researcher.

### **4.4 GRAPHIC PRESENTATION OF DATA**

The statistically processed data received from the University of Pretoria's Department of Statistics is graphically presented next. This is done in chronological order of the questions, using the following structure:

- The particular question (extracted from the questionnaire)
- A graphic summary of valid statistical occurrences for the question
- A graphic summary of responses to the question

Note that the original statistical frequencies are listed in Addendum M for reference purposes.

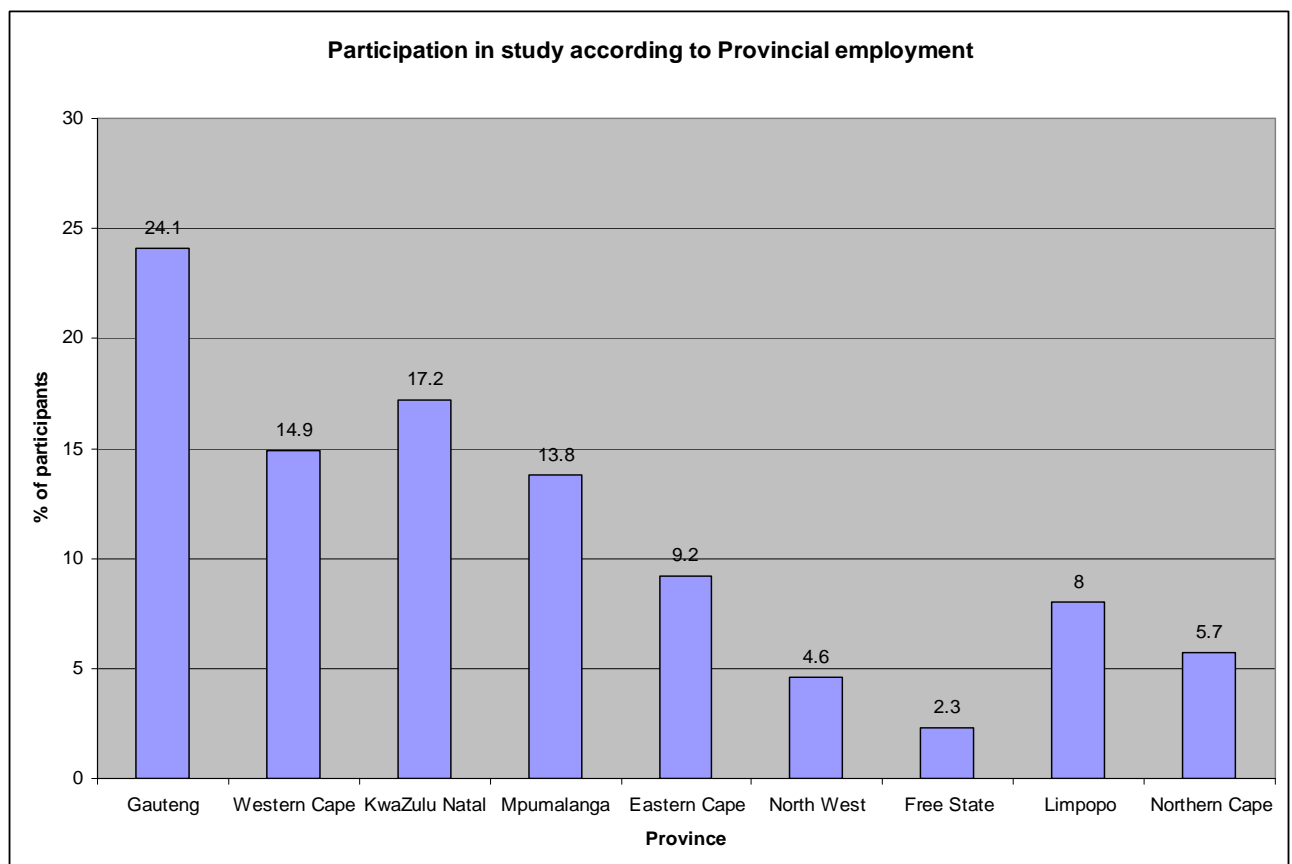


#### **4.4.1 Question 1**

##### **4.4.1.1 Discussion of Question 1**

Question 1 asked the respondents to indicate the **province** in which they are currently working. This question was completed by 87 of the possible 89 respondents. This provided a 98% valid response rate, and the results are summarised in Figure 6. (Note that the sequence in which the provinces are listed relates to the explanation on p. 90.)

**Figure 6: Graphic summary of responses to Question 1**



#### **4.4.2 Question 2**

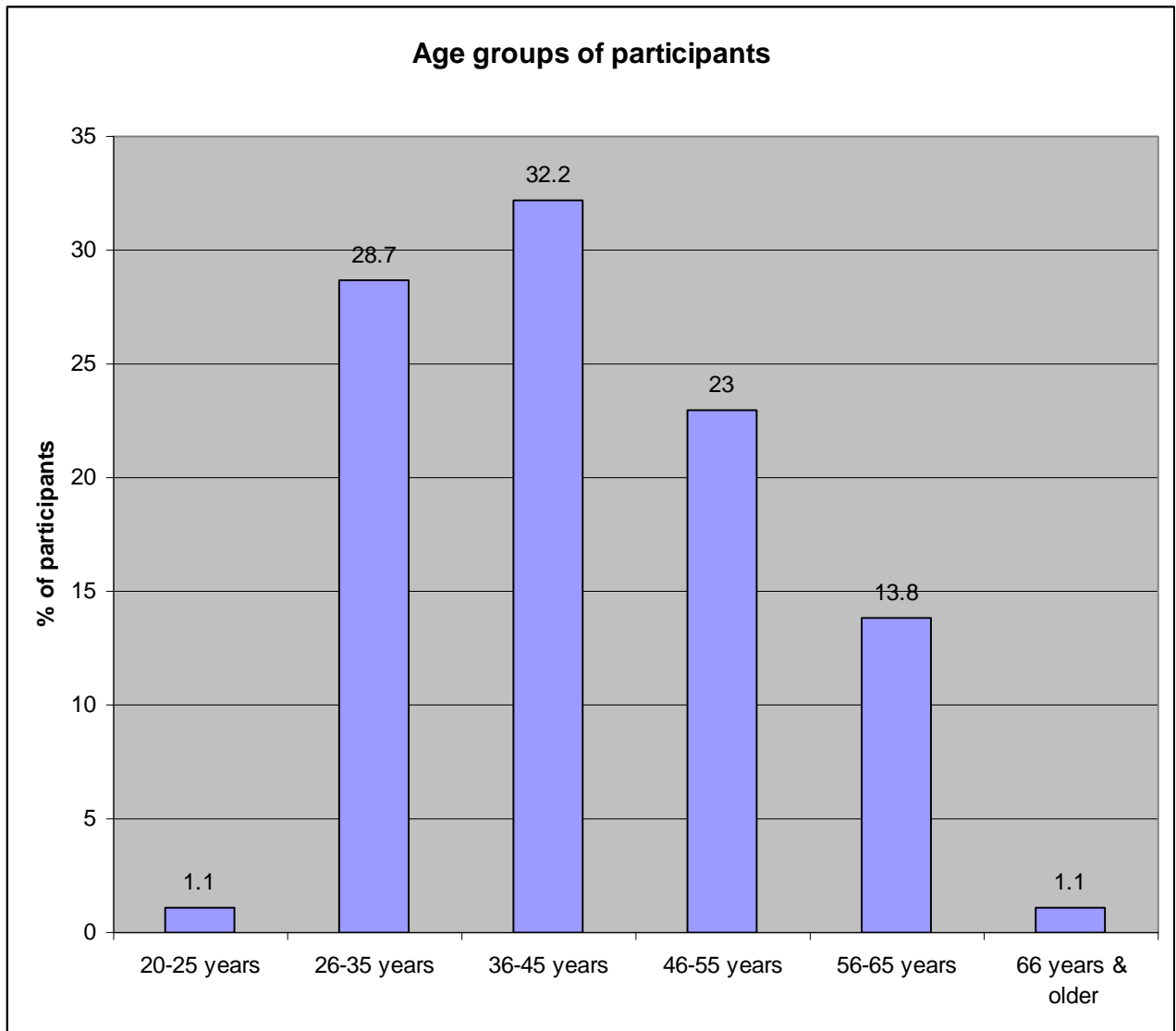
##### **4.4.2.1 Discussion of Question 2.1**

Question 2.1 asked the respondents to indicate their gender. This question was completed by 89 of the possible 89 respondents. The gender composition of the participants was 88% male and 12% female.

#### 4.4.2.2 Discussion of Question 2.2

Question 2.2 asked the respondents to indicate their age. This question was completed by 87 of the possible 89 respondents, thus providing a 98% valid response rate. The results are summarised in Figure 7.

Figure 7: Graphic summary of responses to Question 2.2



#### 4.4.2.3 Comparison of data obtained in Questions 2.1 and 2.2

The process of statistical inference was used to compare the data obtained in Questions 2.1 and 2.2. The results indicate the median age composition of the participants and the number of years' experience that they have of working in the built environment. These are summarised in Figures 8 and 9.

**Figure 8: Graphic summary of statistical inference of Questions 2.1 and 2.2**

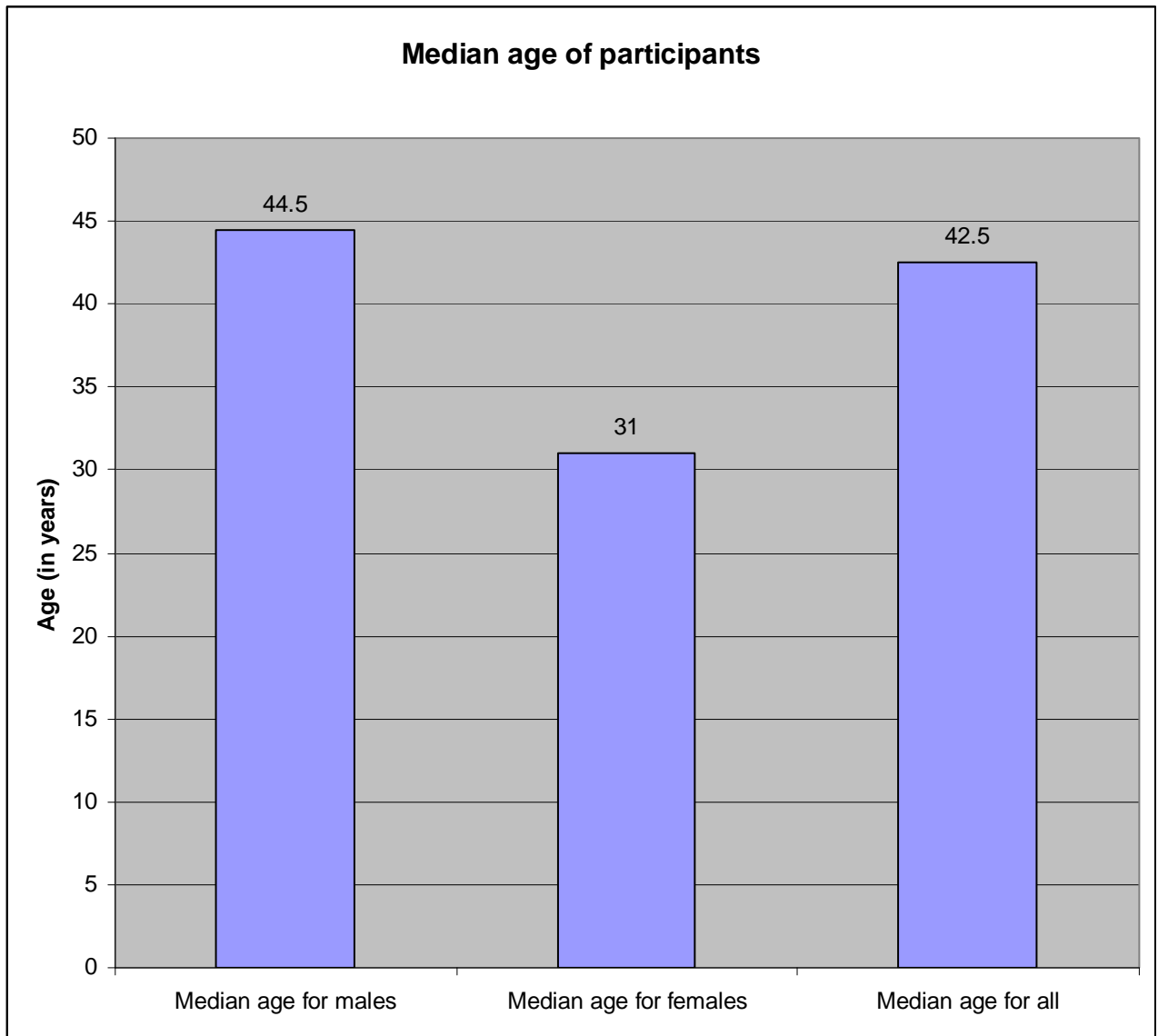
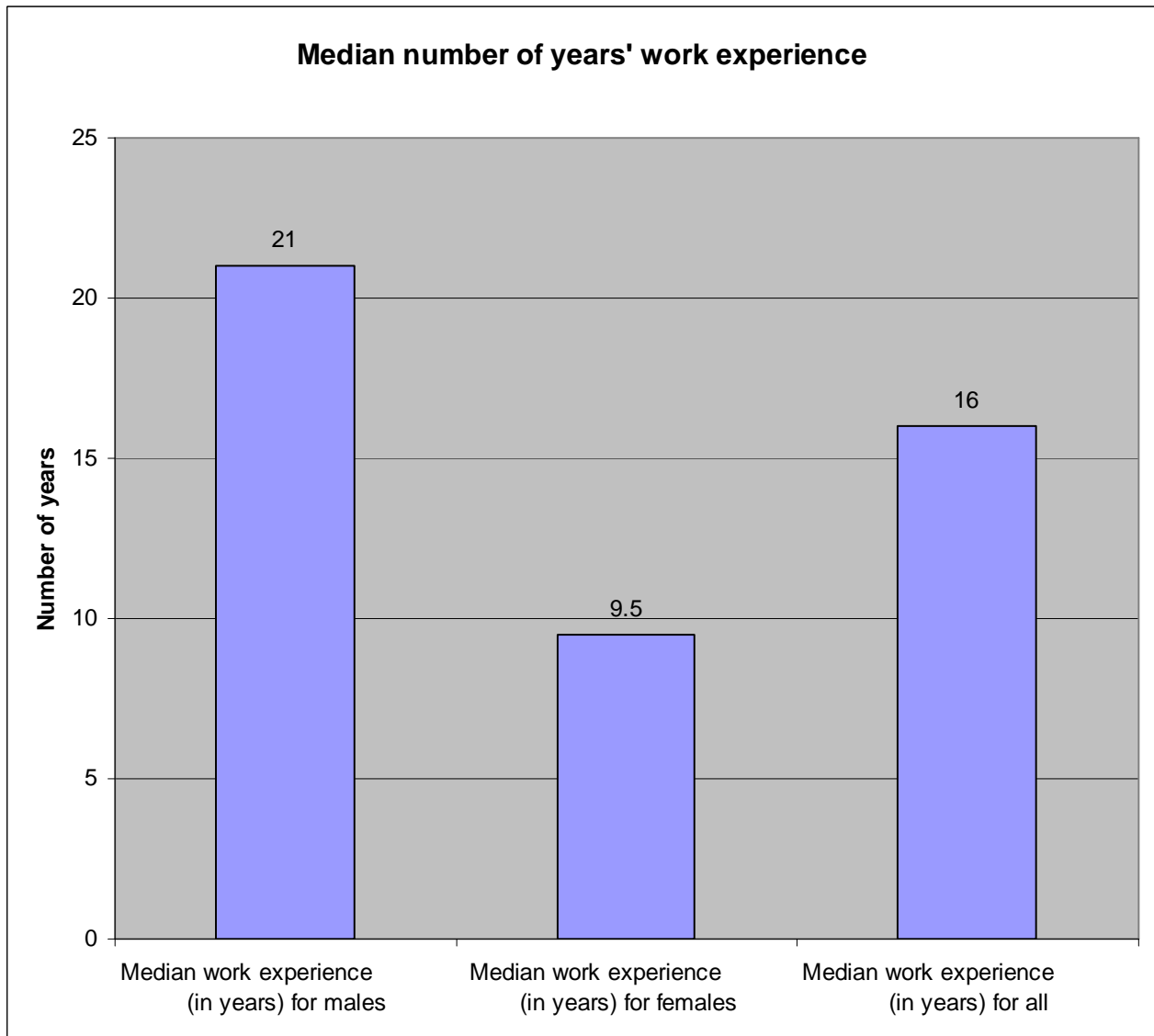


Figure 9: Graphic summary of statistical inference of Questions 2.1 and 2.2



### **4.4.3 Question 3**

#### **4.4.3.1 Discussion of Question 3**

Question 3 asked the respondents to indicate their current occupation. This question was answered by 77 respondents, thus providing an 86.5% valid response rate. The researcher allowed for multiple careers by providing the following occupation classes for possible selection:

- Administrator
- Architect
- BCO
- Specifications writer
- Planner

- Other (please describe briefly)

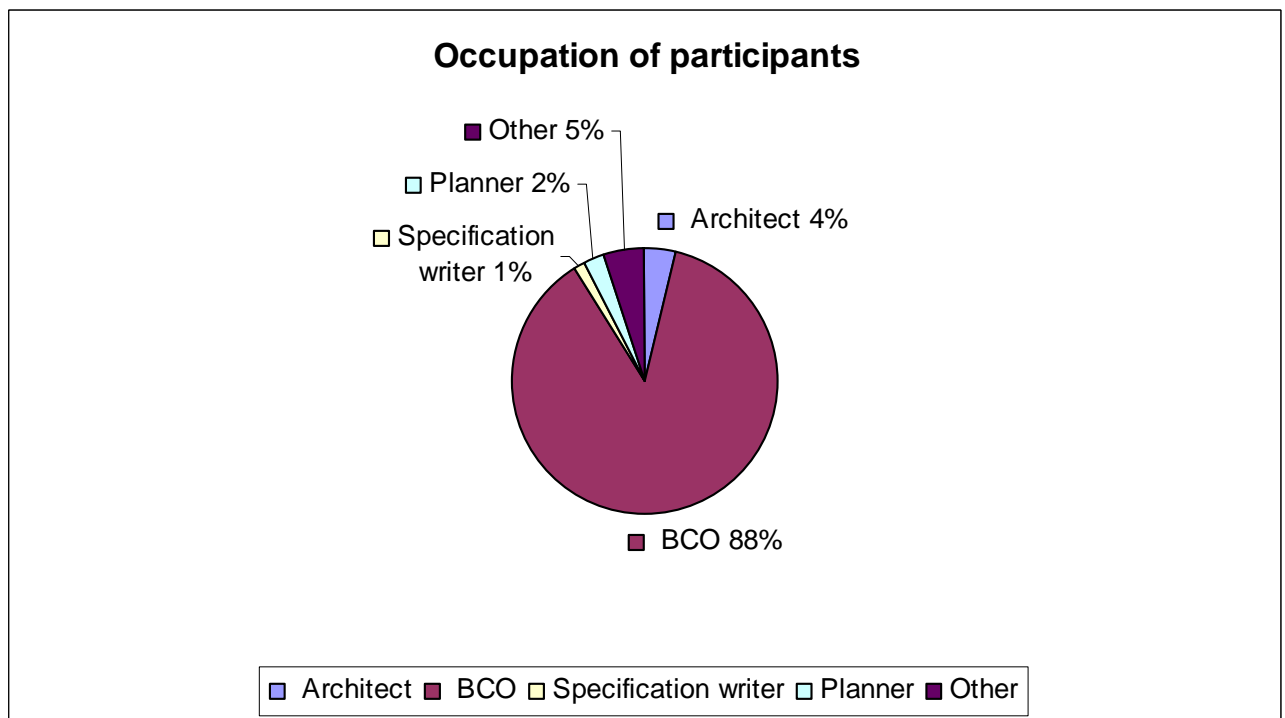
Under the option *Other* the respondents indicated the following additional descriptions:

- Architectural technologist
- Management
- Technician
- Engineering
- Assistant
- Project Officer
- Technical Consultant
- Other (no description)

The BCOs from the target population were found to come from the disciplines listed in Figure 10.

#### 4.4.3.2 Graphic summary of responses to Question 3

Figure 10: Graphic summary of responses to Question 3



#### 4.4.4 Question 4

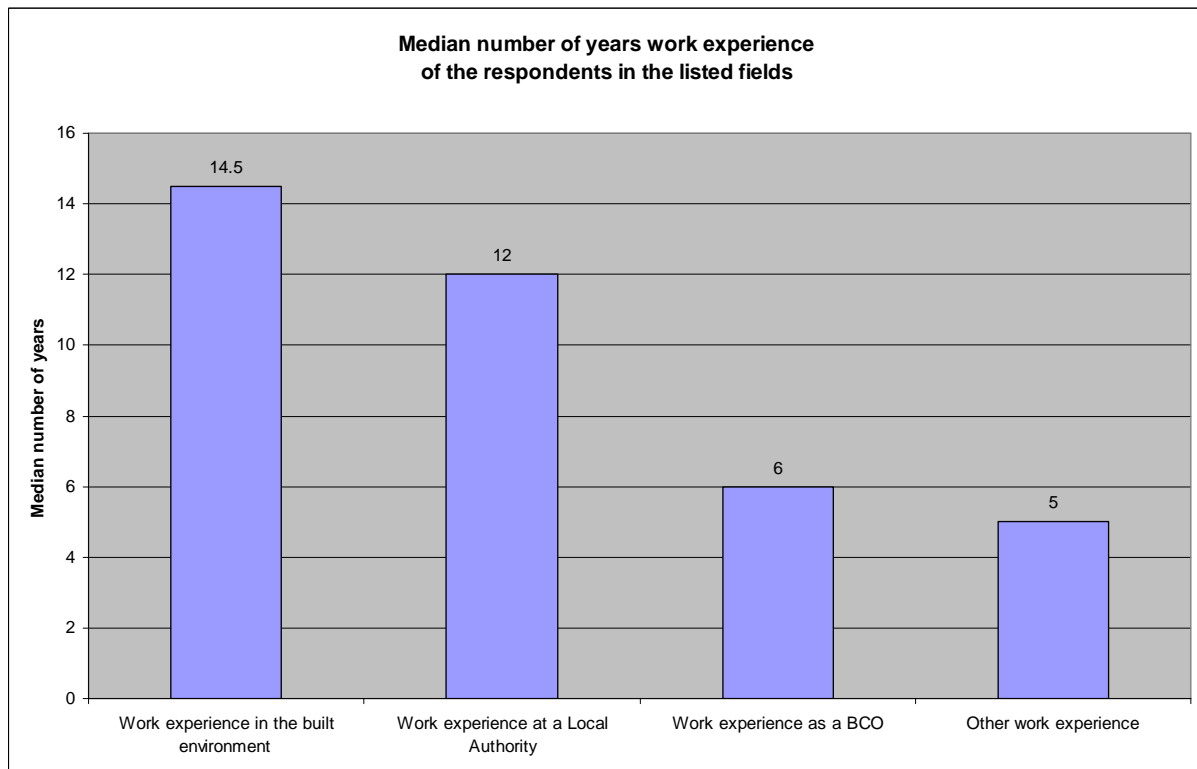
##### 4.4.4.1 Question 4 extracted from questionnaire

Table 49: Question 4

4 Please provide the following information on your <b>work experience</b> :		Number of valid responses	% of total population
4.1	<b>Total duration</b> of work experience (in years)	84	94%
4.2	<b>Duration</b> of work experience <b>in the built environment</b> (in years)	84	94%
4.3	<b>Duration</b> of work experience <b>at a Local Authority</b> (in years)	83	93%
4.4	<b>Duration</b> of work experience <b>as a BCO</b> (in years)	68	76%
4.5	<b>Other</b> work experience (please describe briefly)	39	44%

##### 4.4.4.2 Graphic summary of responses to Question 4

Figure 11: Graphic summary of responses to Question 4

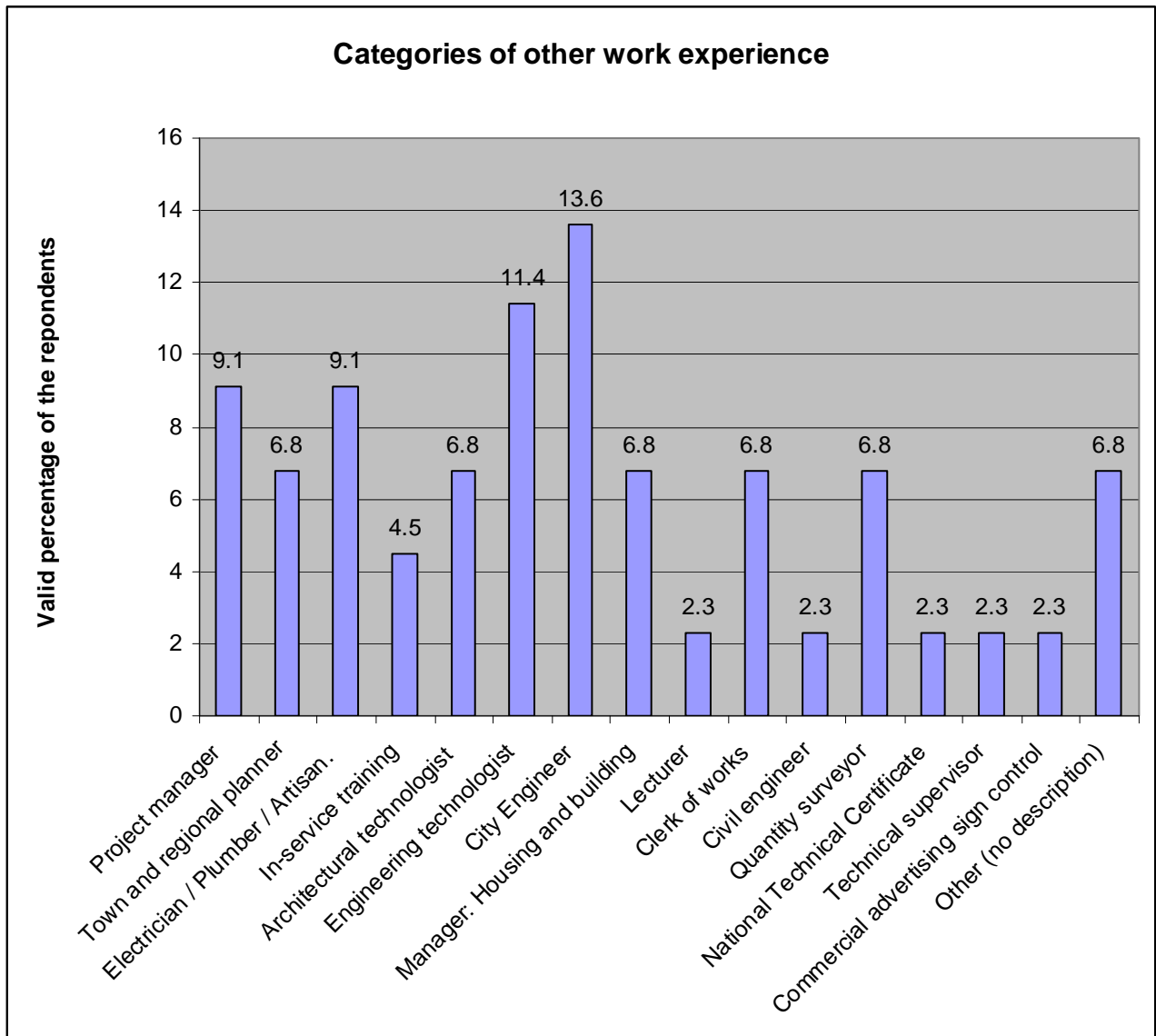


##### 4.4.4.3 Graphic summary of responses to Question 4

It should be noted that Question 4.5 generated multiple responses. Of the respondents, 39 (43.8%) selected this option and 44 other career possibilities were

listed. Furthermore, a number of the respondents did not indicate the duration of their experience in a particular field. The results for the different categories of work experience are summarised in Figure 12:

Figure 12: Graphic summary of responses to Question 4.5



#### **4.4.5 Question 5**

##### **4.4.5.1 Discussion of Question 5**

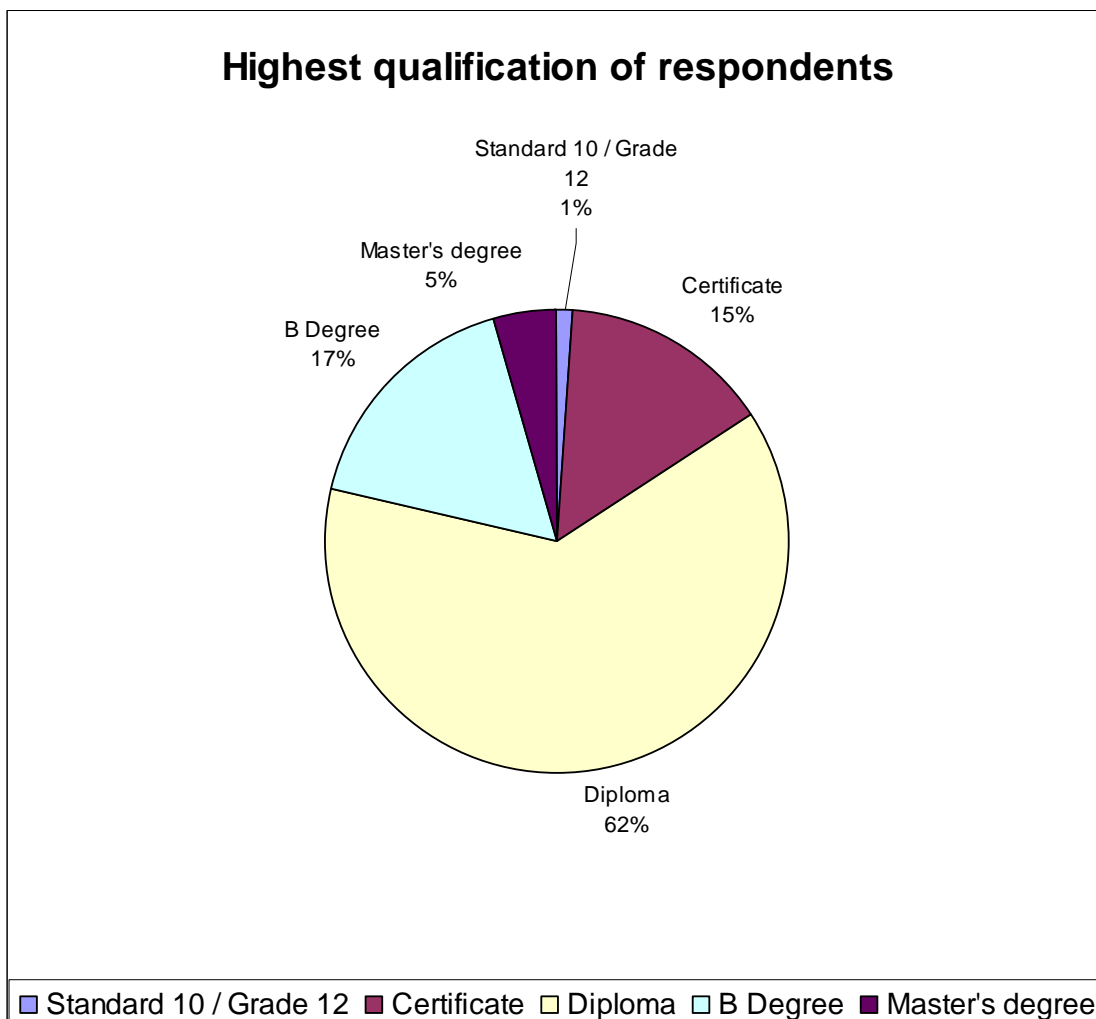
In Question 5, the participants were asked to indicate their qualifications. All 89 respondents completed this question. The following possibilities were provided to choose from:

- Standard 10/Grade 12
- Certificate

- Diploma
- Bachelor's degree
- Master's degree
- Other (please describe briefly)

The information obtained from this question involved multiple responses, since the respondents had to answer *Yes/No* to each option. Some of the respondents did not mark all their qualifications, but only the highest one. With the assistance of the statistician from the UP DoS, each recorded response was revisited to ensure whether the last category contained the highest qualification of the respondent. After careful deliberation (and consultation with the statistician) it was decided not to include the *other* category, since it proved not to represent the highest qualification of the participants. The distribution of qualifications is listed in Figure 13.

**Figure 13: Graphic summary of responses to Question 5**





#### 4.4.6 Question 6

##### 4.4.6.1 Question 6 extracted from questionnaire (with corresponding number of respondents)

Table 50: Question 6

6		Number of valid responses	% of total population
There are different views regarding the <b>primary focus</b> of the amended <b>National Building Regulations and Building Standards Act (Act 103 of 1977)</b> .			
Please rate the <b>importance</b> of the following possible focus areas:			
6.1	To <b>limit inflation</b> in the built environment	82	92%
6.2	To ensure <b>uniform regulation</b> in the built environment	87	98%
6.3	To ensure a <b>healthy built environment</b>	88	99%
6.4	To ensure a <b>safe built environment</b>	88	99%
6.5	To <b>promote sustainability</b> in the built environment	88	99%
6.6	To form a <b>basis for future development</b> of the built environment	87	98%
6.7	<b>Other</b> (please describe briefly)	9	10%

##### 4.4.6.2 Graphic summary of responses to Question 6

Figure 14: Graphic summary of responses to Question 6.1

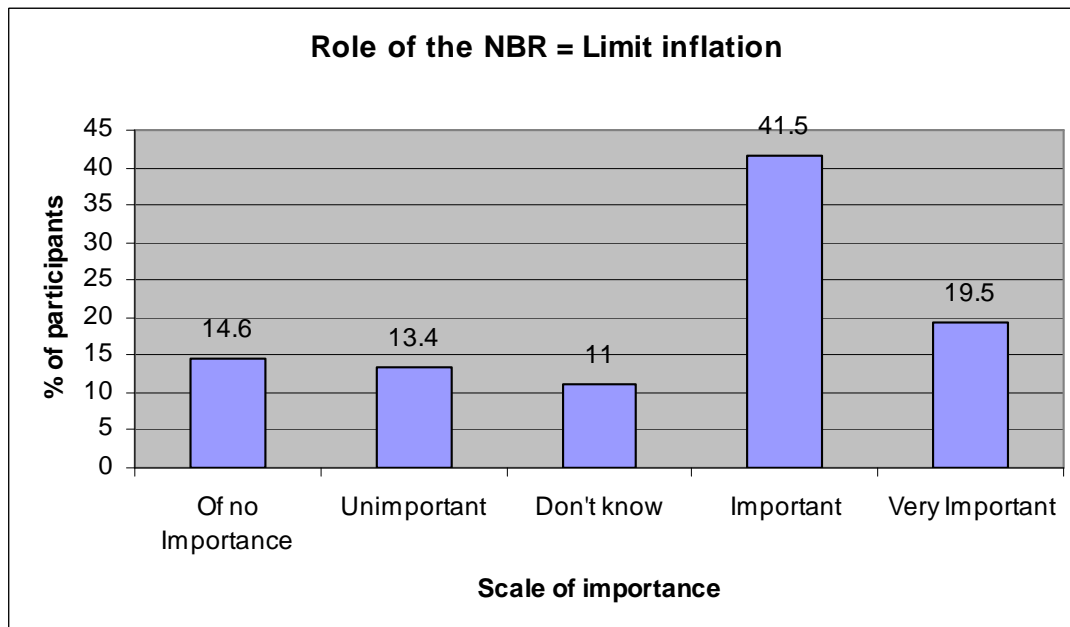


Figure 15: Graphic summary of responses to Question 6.2

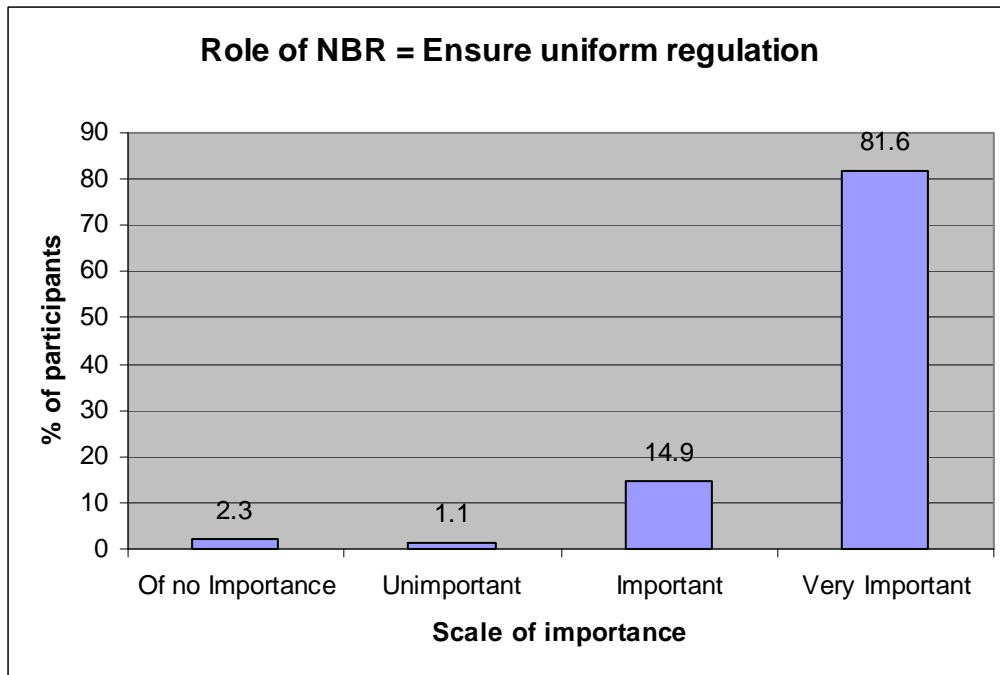


Figure 16: Graphic summary of responses to Question 6.3

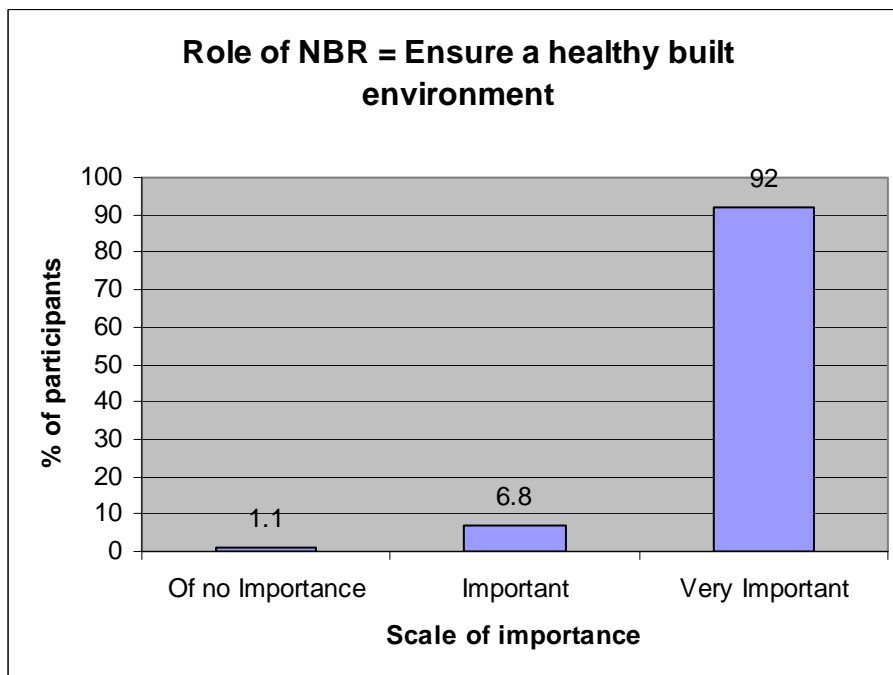


Figure 17: Graphic summary of responses to Question 6.4

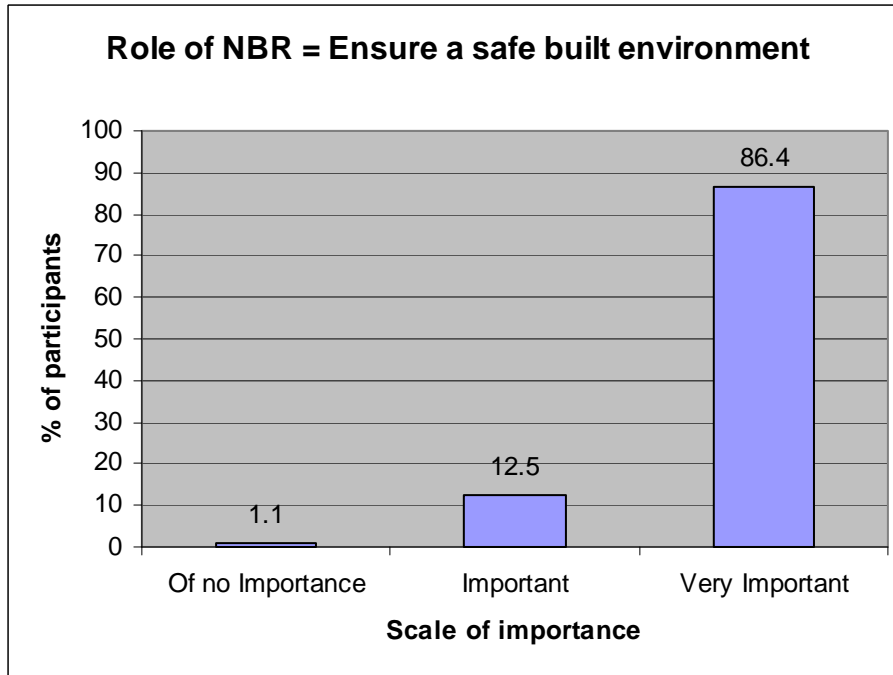


Figure 18: Graphic summary of responses to Question 6.5

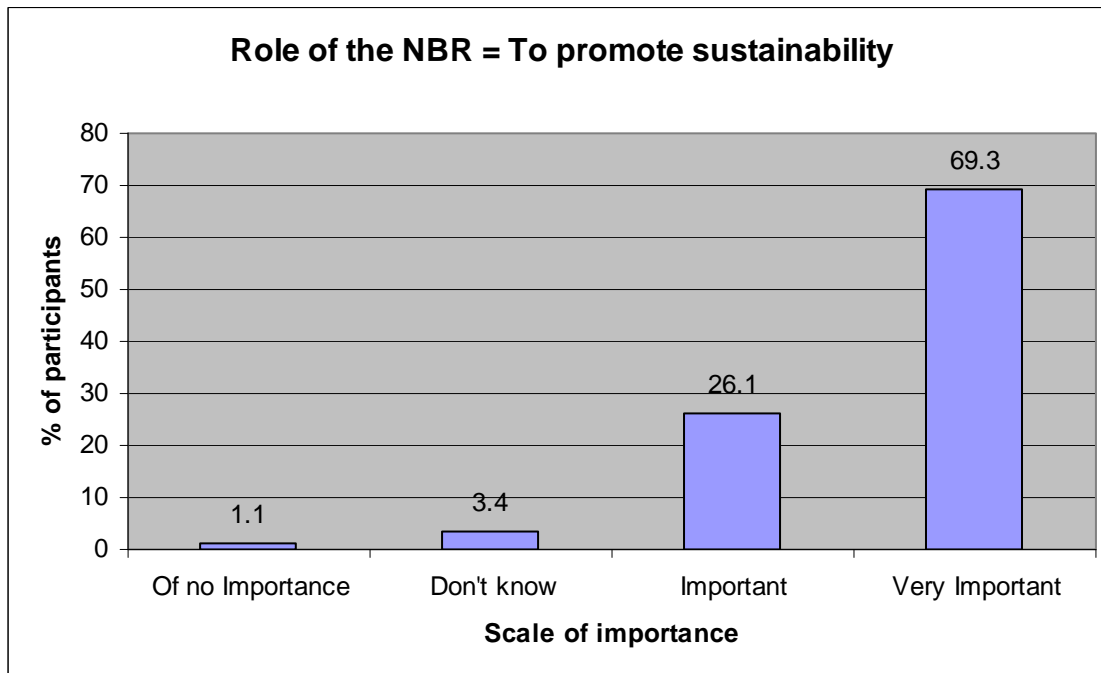
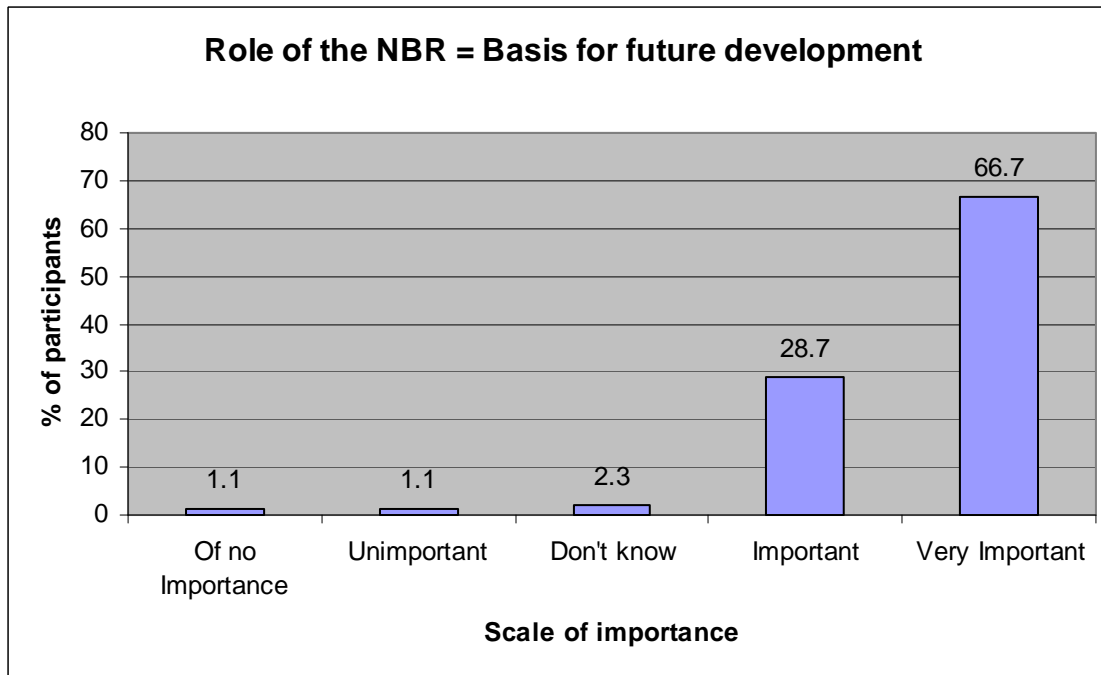


Figure 19: Graphic summary of responses to Question 6.6



#### 4.4.6.3 Reponses to Question 6.7 (Other)

Nine of the respondents (slightly over 10%) identified other possible focus areas for the amended Act 103 of 1977. These included the following:

- Energy efficiency (identified by one respondent, thus resulting in a valid frequency of 11.1%)
- Quality control (two respondents; valid frequency 22.2%)
- Enforcement of contraventions (one respondent; valid frequency 11.1%)
- Conservation of the natural environment (one respondent; valid frequency 11.1%)
- Long-term impact of decisions should be taken into account (one respondent; valid frequency 11.1%)
- Remuneration of the BCO (one respondent; valid frequency 11.1%)
- Enforcement of the Act/addressing of compliance (one respondent; valid frequency 11.1%)
- Consideration of neighbours to avoid buildings becoming a nuisance to them (one respondent; valid frequency 11.1%)

#### 4.4.6.4 Ranking of responses to Question 6

The mean<sup>56</sup> averages of the responses to Question 6 were calculated to rate the responses from high to low, or most important to least important. According to these averages, the order of importance was as follows:

- Ensure a healthy built environment (Question 6.3)
- Ensure a safe built environment (Question 6.4)
- Ensure uniform regulations in the built environment (Question 6.2)
- Other (Question 6.7)
- Promote sustainability in the built environment (Question 6.5)
- Form a basis for future development of the built environment (Question 6.6)
- Limit inflation in the built environment (Question 6.1)

#### 4.4.7 Question 7

##### 4.4.7.1 Question 7 (Part 1) extracted from questionnaire (with corresponding number of respondents)

Table 51: Question 7 (Part 1)

7		Number of valid responses	% of total population
<i>Legislative control of the built environment is a complex issue. A number of LAs have drafted <b>documents to supplement the NBR. How often does the BCO make use of these</b> during the execution of his daily tasks, and which documents are consulted?</i>			
<b>How often do you refer to</b> (or consult) the following documents?			
7.1	<i>The amended National Building Regulations and Building Standards Act (Act 103 of 1977)</i>	88	99%
7.2	<i>The <b>National Building Regulations</b> promulgated in terms of the relevant sections of Act 103 of 1977 (i.e. section 17(1), section 20 read with section 9, section 20 read with section 16, and section 20 read with section 17(5)a)</i>	87	98%
7.3	<i>The amended <b>Code of Practice</b> for the Application of the National Building Regulations (SABS 0400-1990 or SANS 10400)</i>	87	98%
7.4	<i>The <b>Deemed-to-Satisfy Rules</b> as included in The Code of Practice for the Application of the National Building Regulations (SABS 0400-1990 or SANS 10400)</i>	89	100%
7.5	<i>Guidelines for the <b>preparation of building plans</b></i>	87	98%
7.6	<i>Plan submission <b>application form</b></i>	88	99%
7.7	<i><b>Checklist</b> for plan approval</i>	89	100%
7.8	<i><b>Notice of approval</b></i>	87	98%
7.9	<i>Regulations for <b>relaxing a building line</b></i>	89	100%

<sup>56</sup> The mean is the measure of central tendency and could be defined as a simple statistical model of the centre of a distribution of scores (Field, 2009: 20, 789).

#### 4.4.7.2 Graphic summary of valid statistical occurrences

Figure 20: Graphic summary of valid statistical occurrences for Question 7 (Part 1)

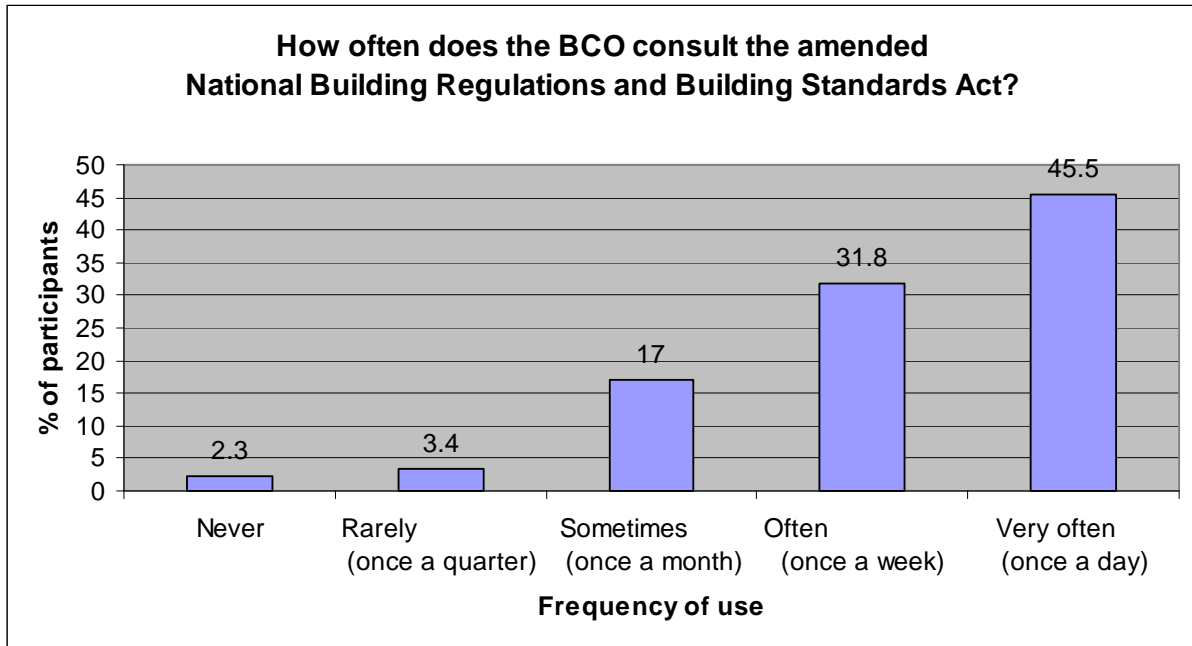


Figure 21: Graphic summary of responses to Question 7.2

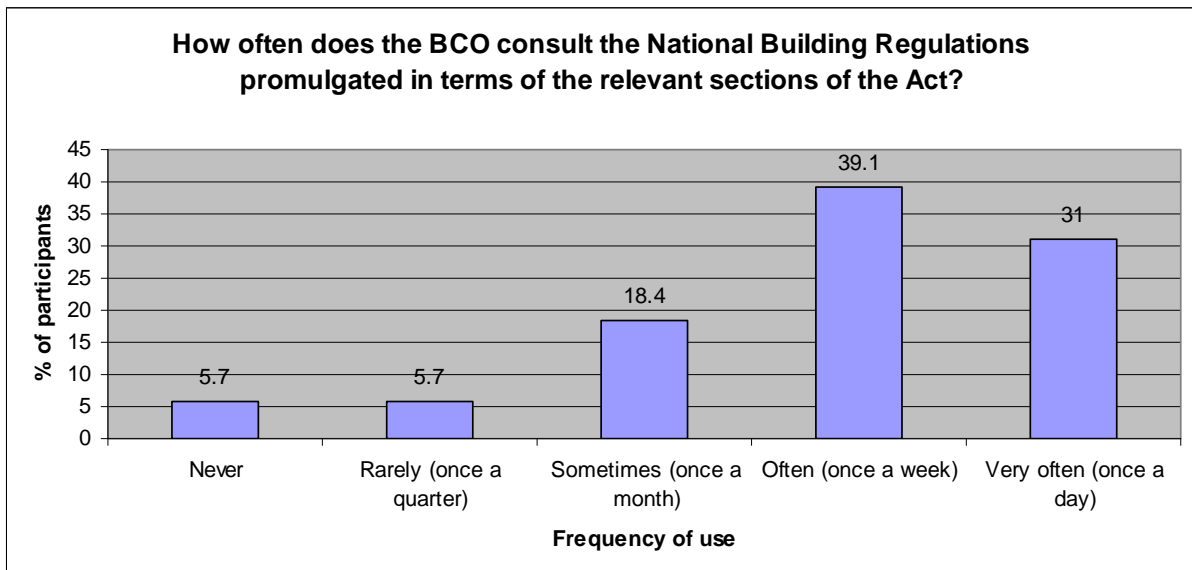


Figure 22: Graphic summary of responses to Question 7.3

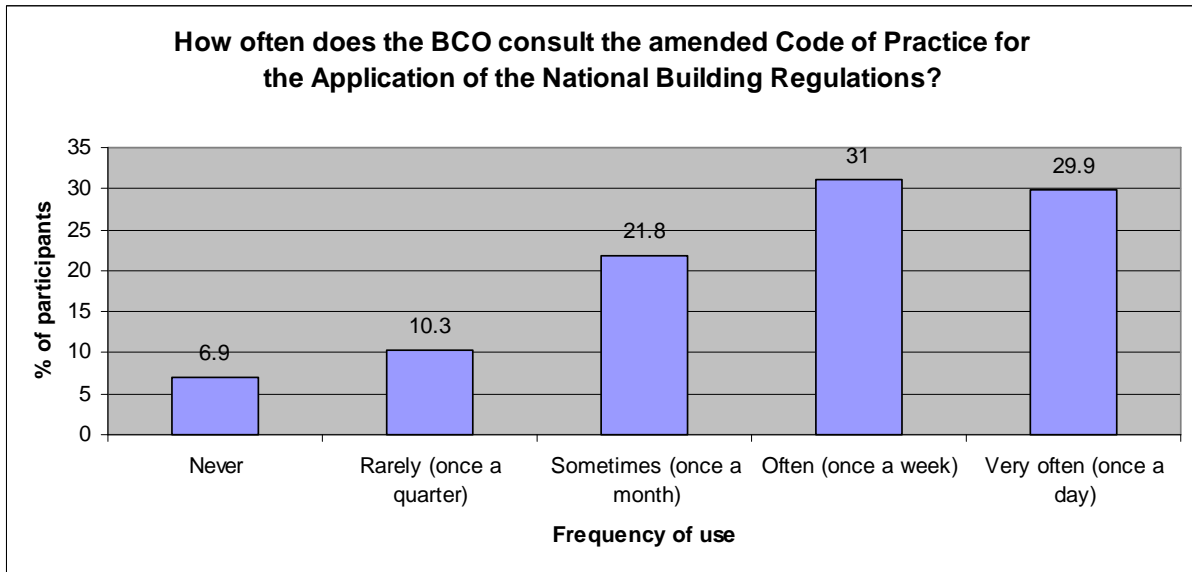


Figure 23: Graphic summary of responses to Question 7.4

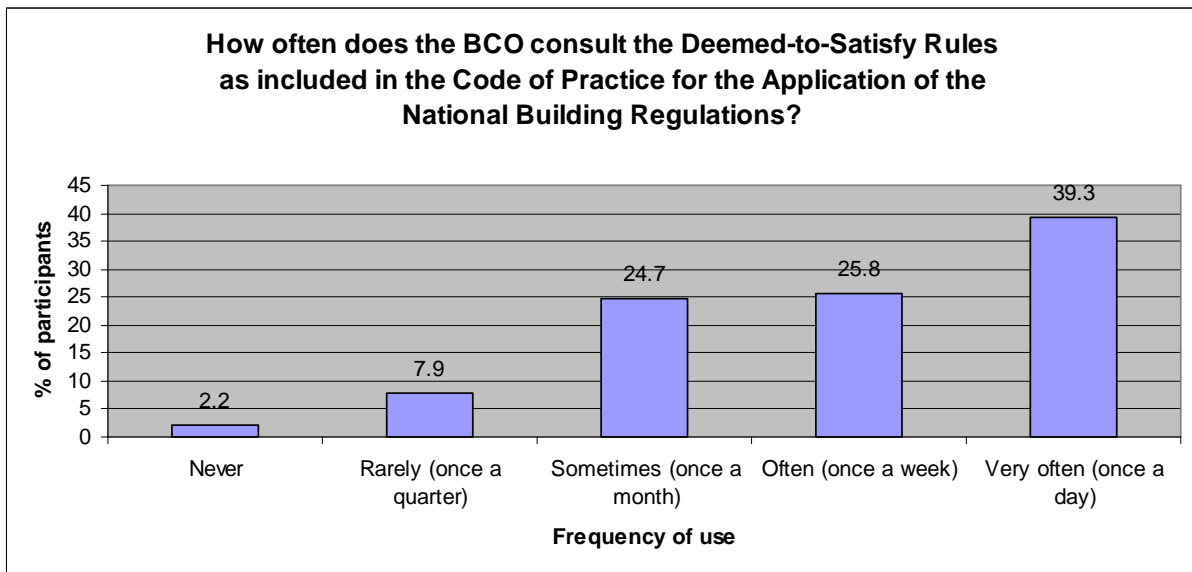


Figure 24: Graphic summary of responses to Question 7.5

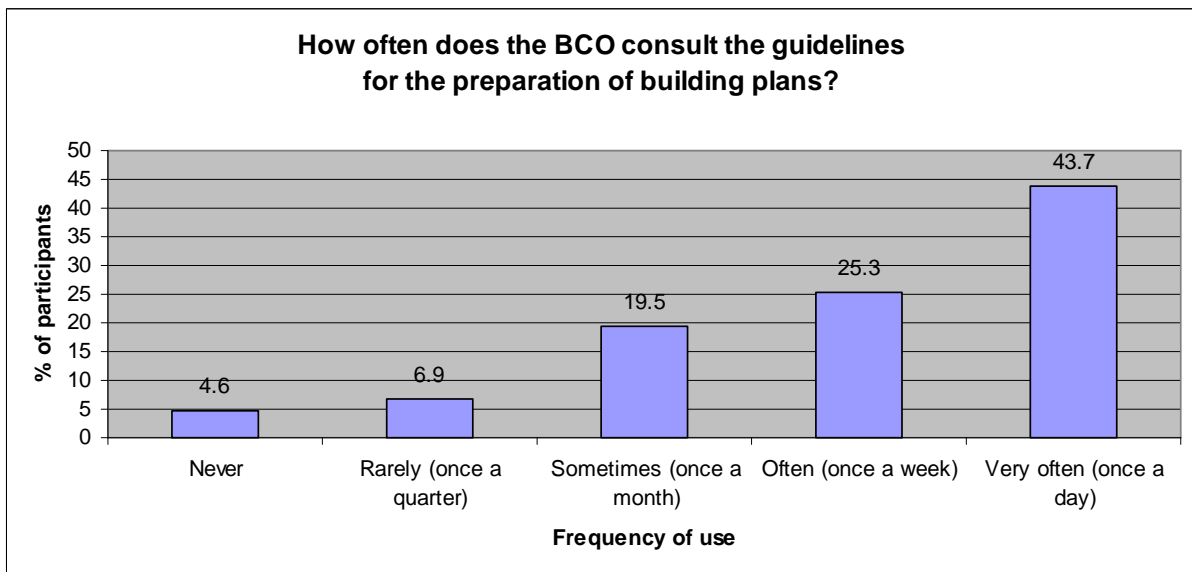


Figure 25: Graphic summary of responses to Question 7.6

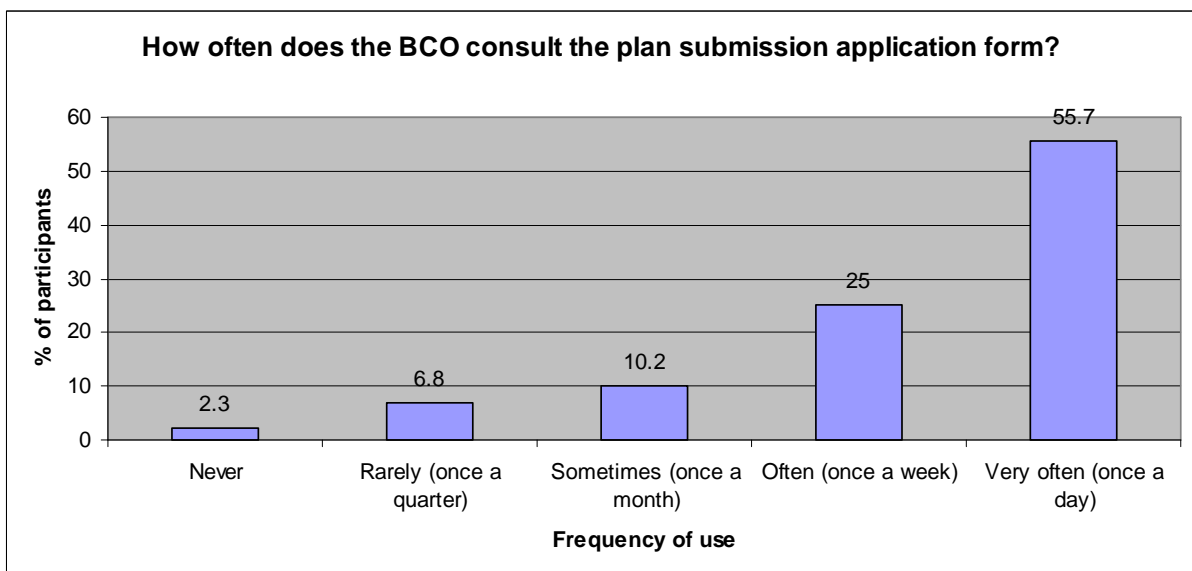




Figure 26: Graphic summary of responses to Question 7.7

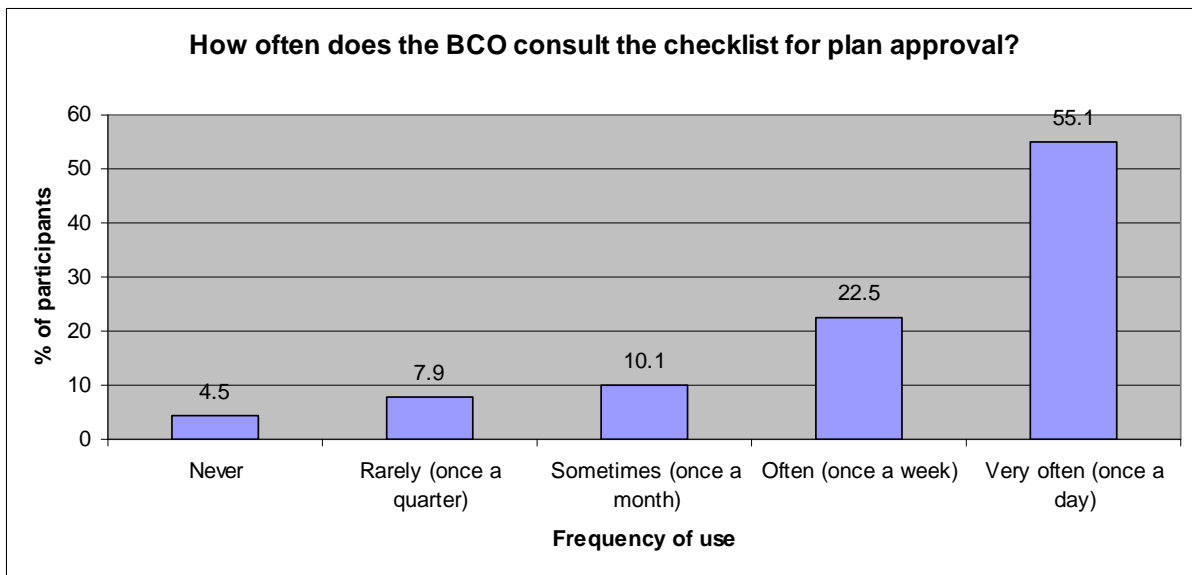


Figure 27: Graphic summary of responses to Question 7.8

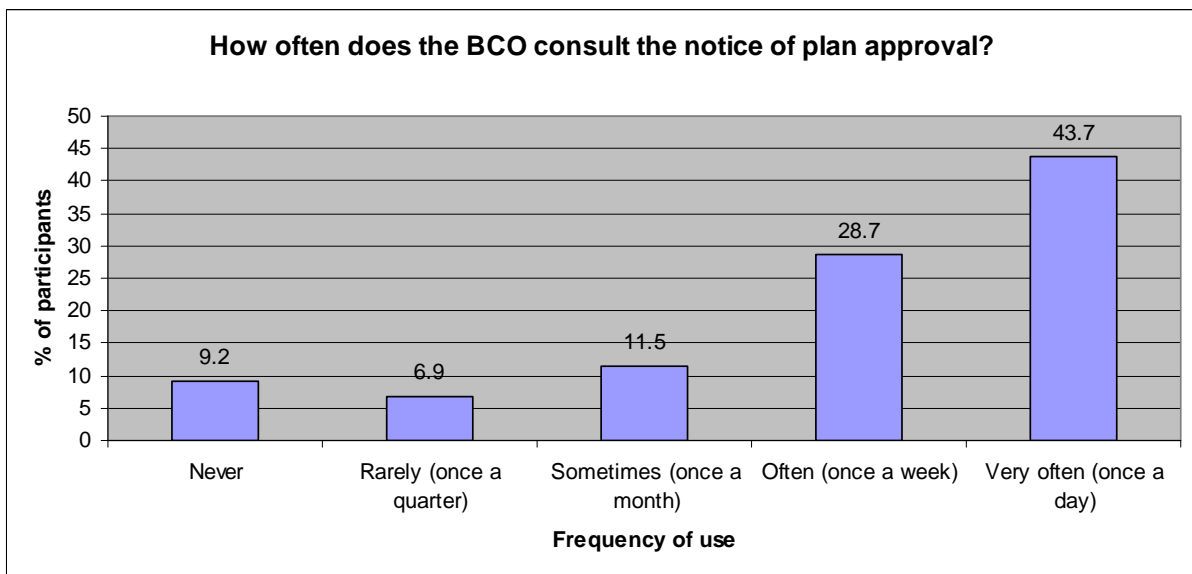
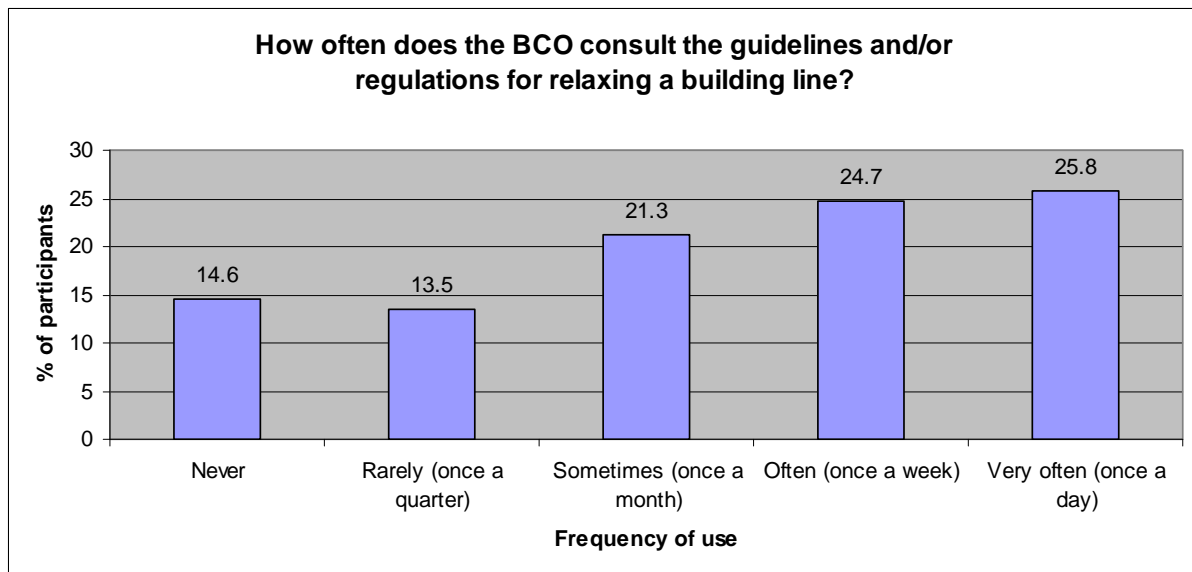


Figure 28: Graphic summary of responses to Question 7.9



**4.4.7.3 Question 7 (Part 2) extracted from questionnaire (with corresponding number of respondents)**

Table 52: Question 7 (Part 2)

7		Number of valid responses	% of total population
Legislative control of the built environment is a complex issue. A number of LAs have drafted <b>documents to supplement the NBR. How often does the BCO make use of these</b> during the execution of his daily tasks, and which documents are consulted?			
How often do you refer to (or consult) the following documents?			
7.10	Regulations for <b>reducing</b> (or relaxing) a <b>height restriction</b>	87	98%
7.11	<b>Planning Ordinances</b>	87	98%
7.12	<b>Urban planning/zoning schemes</b>	89	100%
7.13	Regulations for the <b>departure from urban planning/zoning schemes</b>	89	100%
7.14	<b>'Green' building guidelines/by-laws</b>	89	100%
7.15	<b>Sustainable housing policy</b>	89	100%
7.16	Guidelines for <b>architectural design manuals</b>	87	98%
7.17	Guidelines for <b>Heritage and Conservation</b>	89	100%
7.18	<b>Other</b> (please describe briefly)	15	16%

#### 4.4.8 Graphic summary of responses to Question 7 (Part 2)

Figure 29: Graphic summary of responses to Question 7.10

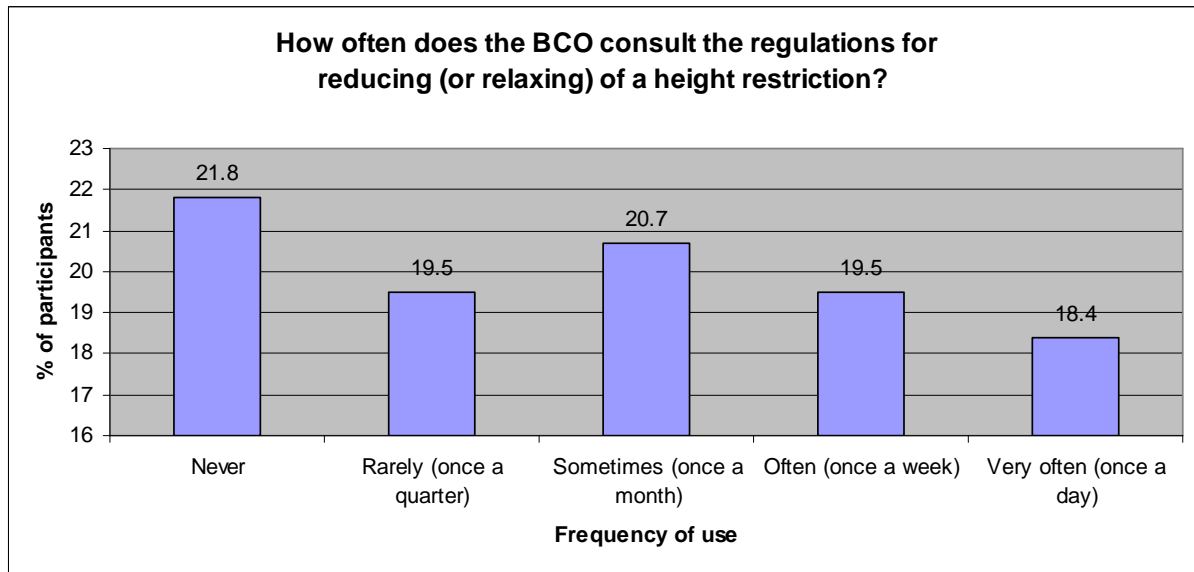


Figure 30: Graphic summary of responses to Question 7.11

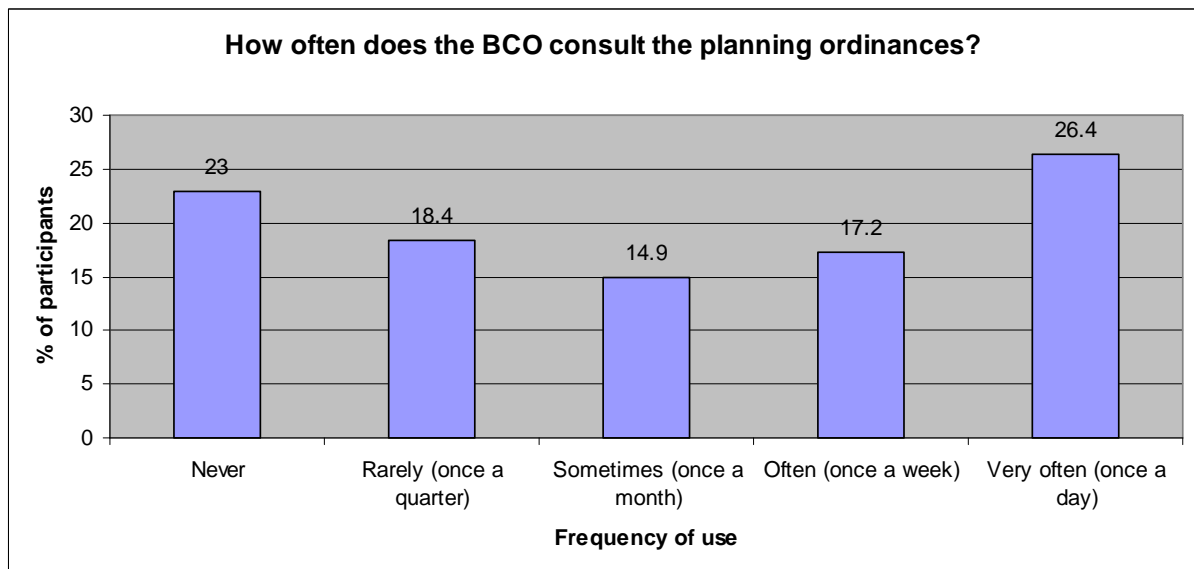


Figure 31: Graphic summary of responses to Question 7.12

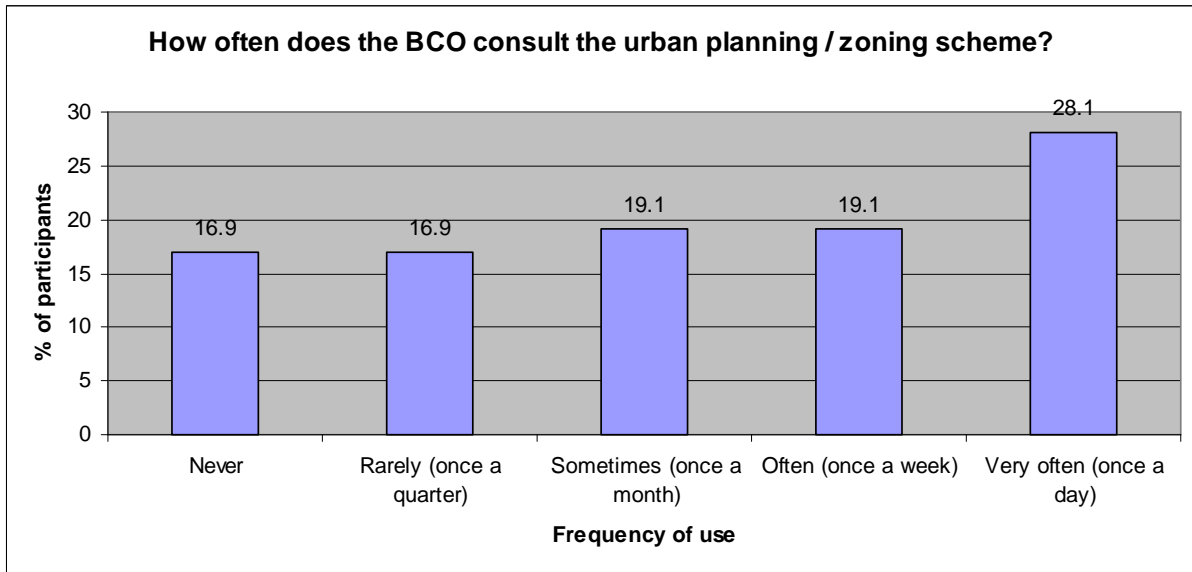


Figure 32: Graphic summary of responses to Question 7.13

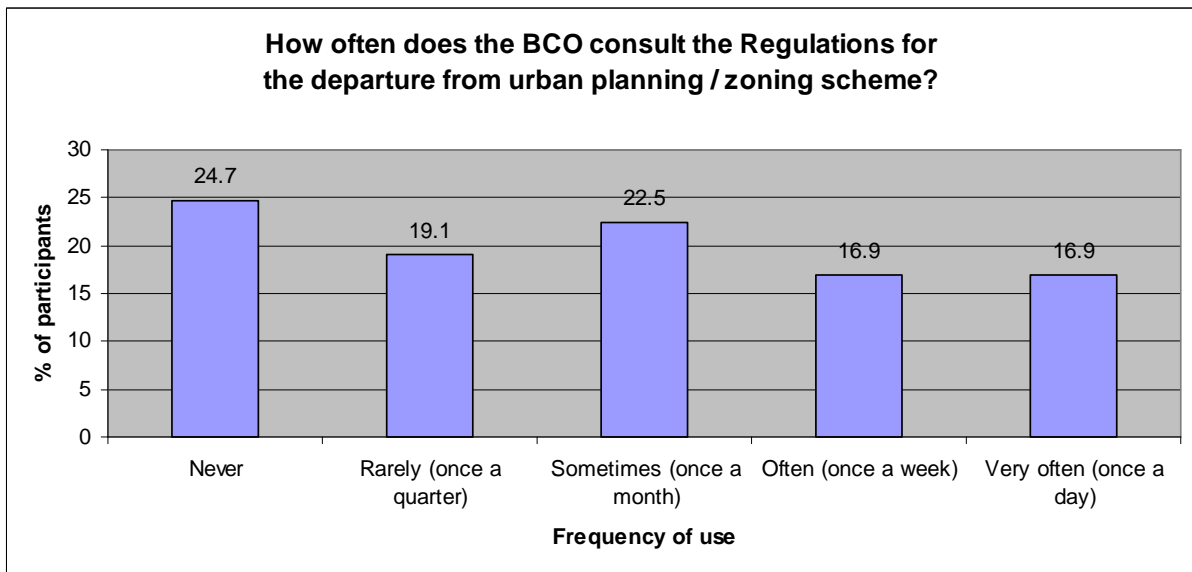


Figure 33: Graphic summary of responses to Question 7.14

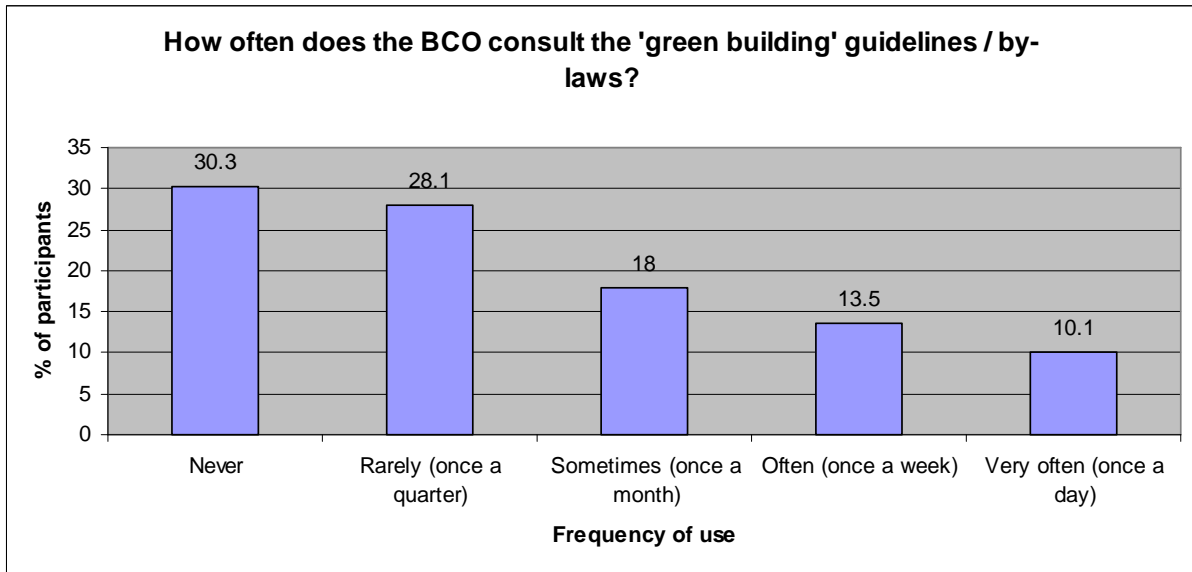


Figure 34: Graphic summary of responses to Question 7.15

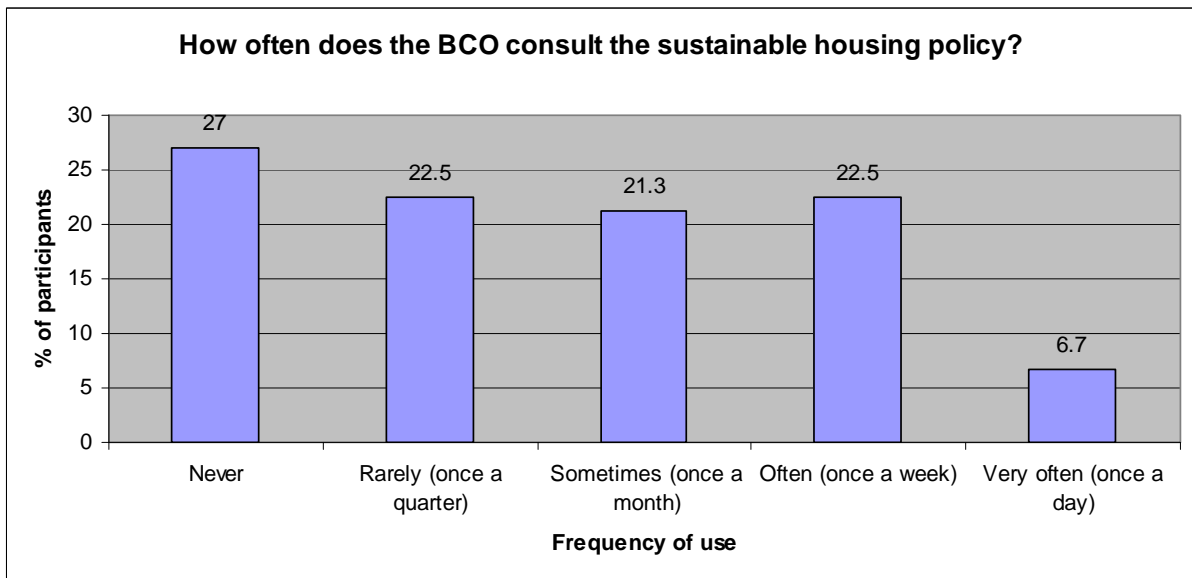


Figure 35: Graphic summary of responses to Question 7.16

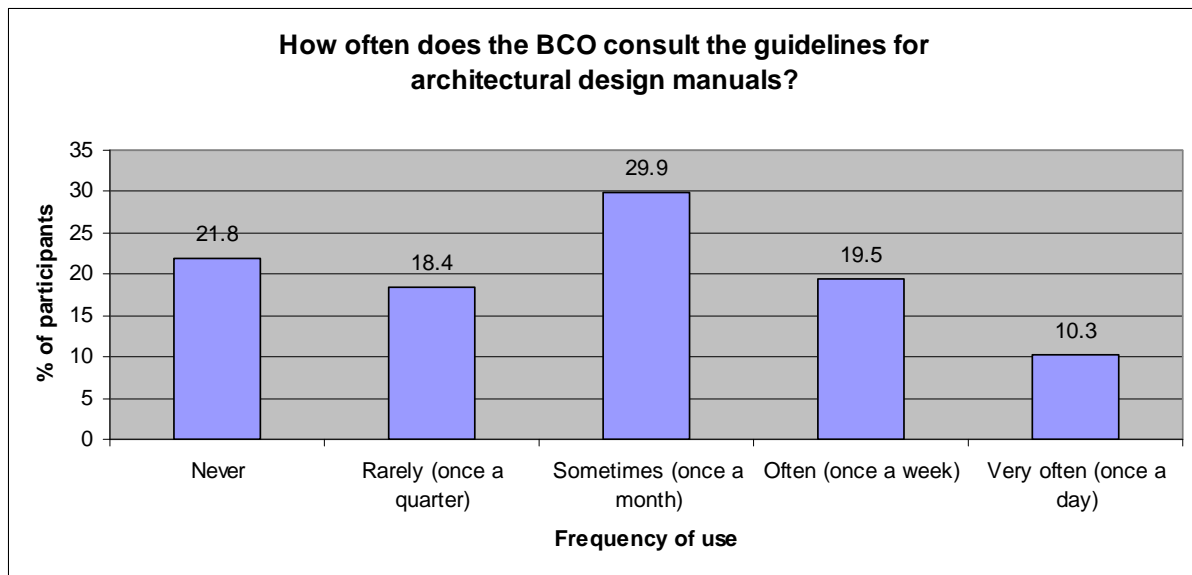
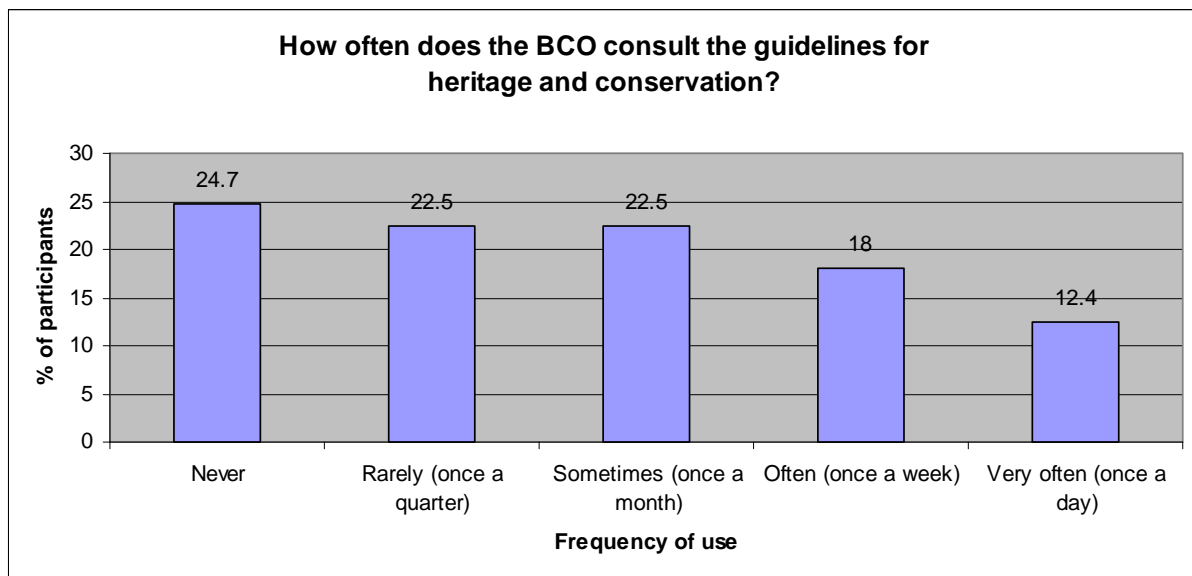


Figure 36: Graphic summary of responses to Question 7.17



#### 4.4.8.1 Response to Question 7.18.1 (Other)

The respondents identified *other* documents for possible use by the BCO to supplement the NBR, such as the following:

- Spatial Development Frameworks (SDFs), especially concerning densification
- Problem building by-laws (sic)

- Human Settlement Guidelines (popularly known as the ‘Red Book’<sup>57</sup>)
- Reviews of court cases
- Other local by-laws and policy documents
- Other SANS/SABS codes
- Other (no description)
- Comments from other departments in the LA
- Applications for advertisements in terms of local by-laws
- *Specifile*<sup>58</sup> (although no rating is provided)
- Building by-law (although no rating is provided)

#### 4.4.9 Question 8

##### 4.4.9.1 Question 8 extracted from questionnaire (with corresponding number of respondents)

**Table 53: Question 8**

8		Number of valid responses	% of total population
Please indicate your <b>level of agreement</b> with each of the following statements:			
8.1	As far as the <b>applicant</b> is concerned, SABS 0400-1990 (or SANS 10400) represents the <b>minimum requirement</b> for a <b>building</b> project.	85	96%
8.2	SABS 0400-1990 (or SANS 10400) represents the <b>maximum requirement</b> that the <b>Local Authority (LA)</b> , and therefore the <b>Building Control Officer (BCO)</b> , could expect from a building project.	87	98%

<sup>57</sup> The ‘Red Book’ consists of two volumes and it was developed over two years by the CSIR under the patronage of the National Department of Housing. Volume 1 focuses primarily on planning issues, while volume 2 deals with engineering services (Van Rooyen, 2009).

<sup>58</sup> The *Specifile Building Library* (referred to as *Specifile* in the South African building industry) was launched in 1959 and comprises of a 12-volume set of loose-leaf binders. These contain technical brochures on building products available in South Africa, which are updated on a quarterly basis (Coetzee, 2011).

#### 4.4.9.2 Graphic summary of responses to Question 8

Figure 37: Graphic summary of responses to Question 8.1

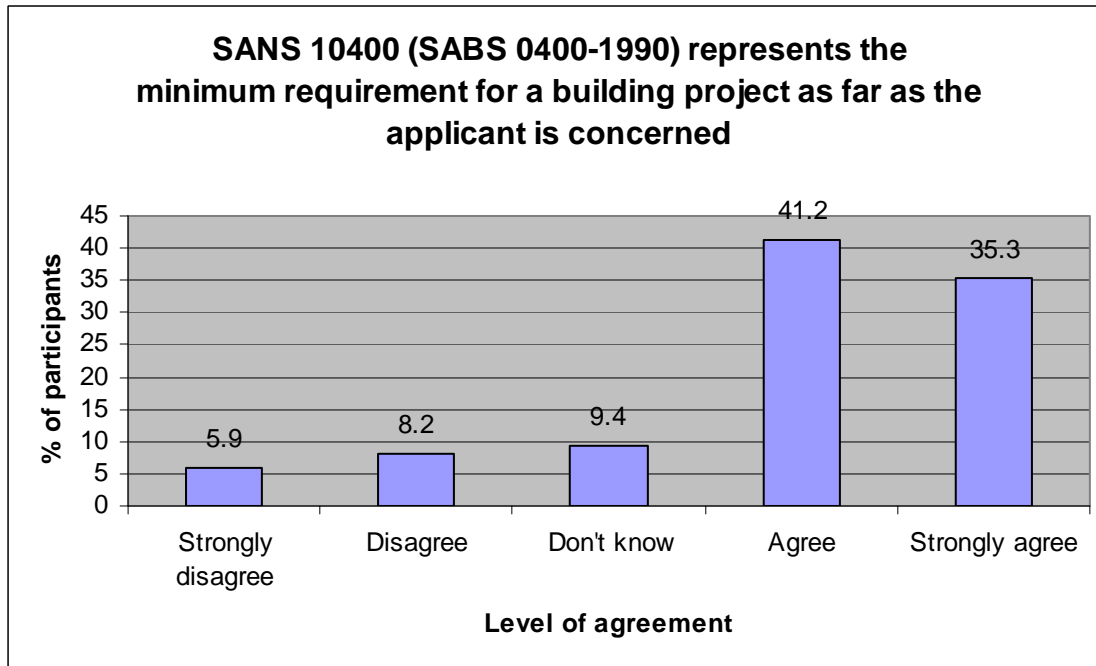
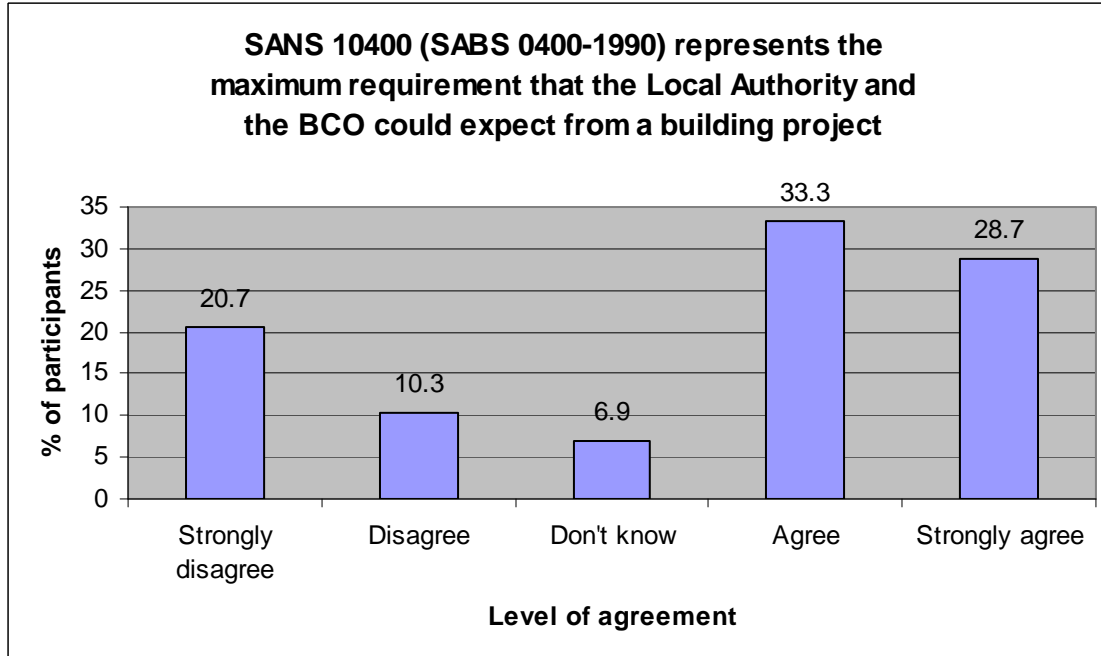


Figure 38: Graphic summary of responses to Question 8.2







### 4.4.10 Question 9

#### 4.4.10.1 Question 9 extracted from questionnaire (with corresponding number of respondents)

Table 54: Question 9

9 <i>The <b>Building Control Officer (BCO)</b> of a Local Authority (LA) is <b>responsible for the implementation of the latest version of The Code of Practice for the Application of the National Building Regulations (SABS 0400-1990 or SANS 10400).</b> Therefore it is important to obtain the opinion of the BCO on this Code and its implementation.</i>		Number of valid responses	% of total population
<i>Please indicate your <b>level of agreement</b> with each of the following statements:</i>			
9.1	<i>The Code (SABS 0400-1990 or SANS 10400) is <b>an accessible document</b> that is easily understandable.</i>	89	100%
9.2	<i>The Code (SABS 0400-1990 or SANS 10400) <b>provides answers to all the questions/issues that a BCO has to address daily.</b></i>	89	100%
9.3	<i>The Code (SABS 0400-1990 or SANS 10400) is <b>structured logically</b> in accordance with all the necessary <b>stages of a construction</b> project.</i>	87	98%
9.4	<i>The Code (SABS 0400-1990 or SANS 10400) is <b>an appropriate administrative instrument.</b></i>	89	100%
9.5	<i>The Code (SABS 0400-1990 or SANS 10400) <b>ensures uniform regulation</b> of the built environment.</i>	89	100%

#### 4.4.10.2 Graphic summary of responses to Question 9

Figure 39: Graphic summary of responses to Question 9.1

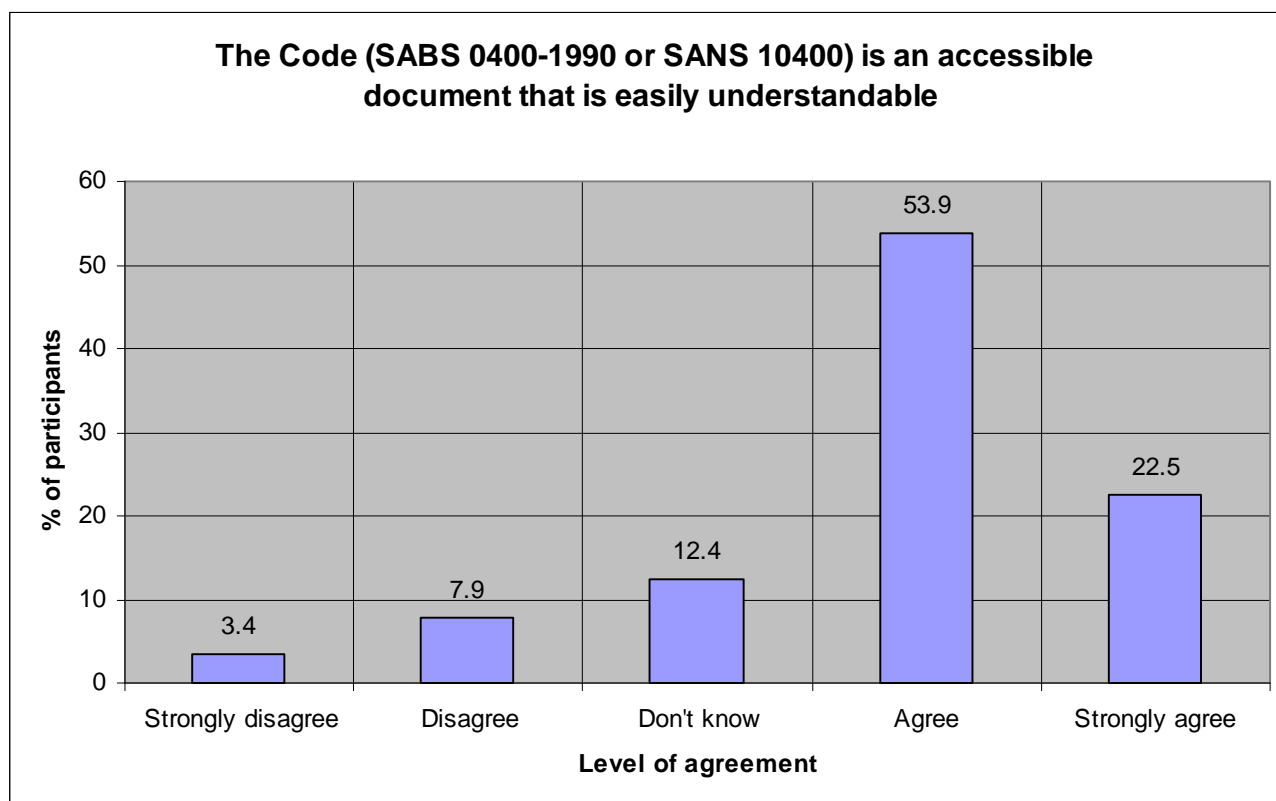


Figure 40: Graphic summary of responses to Question 9.2

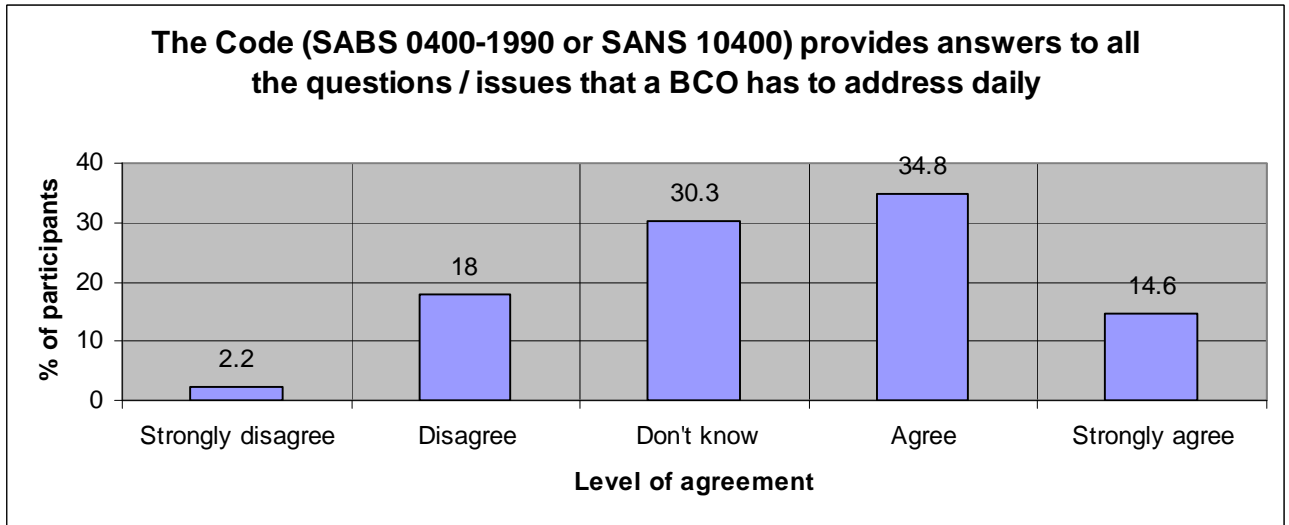


Figure 41: Graphic summary of responses to Question 9.3

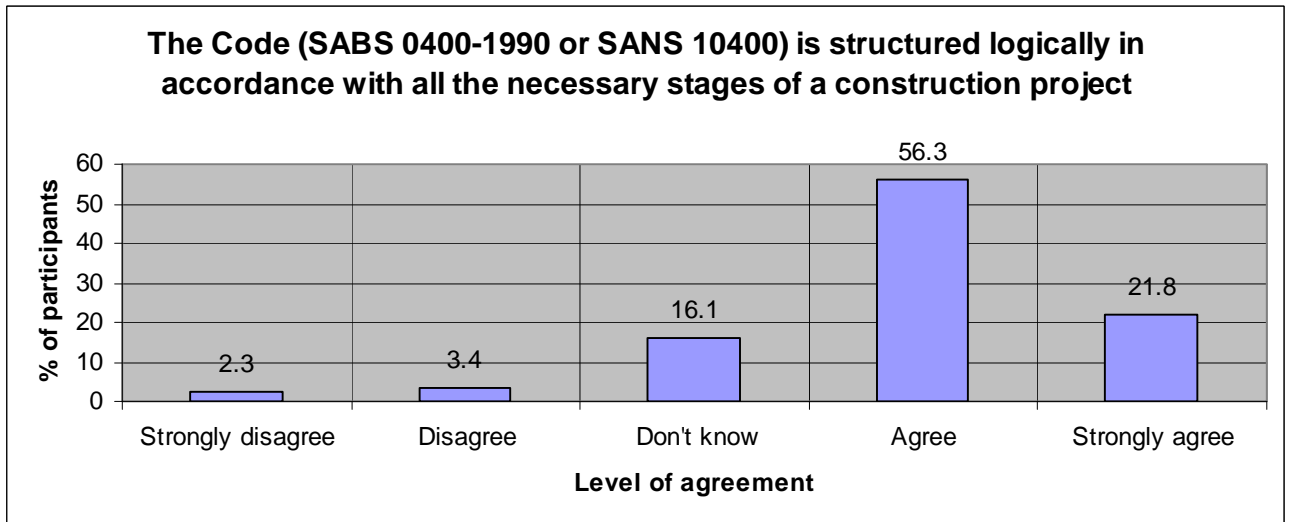


Figure 42: Graphic summary of responses to Question 9.4

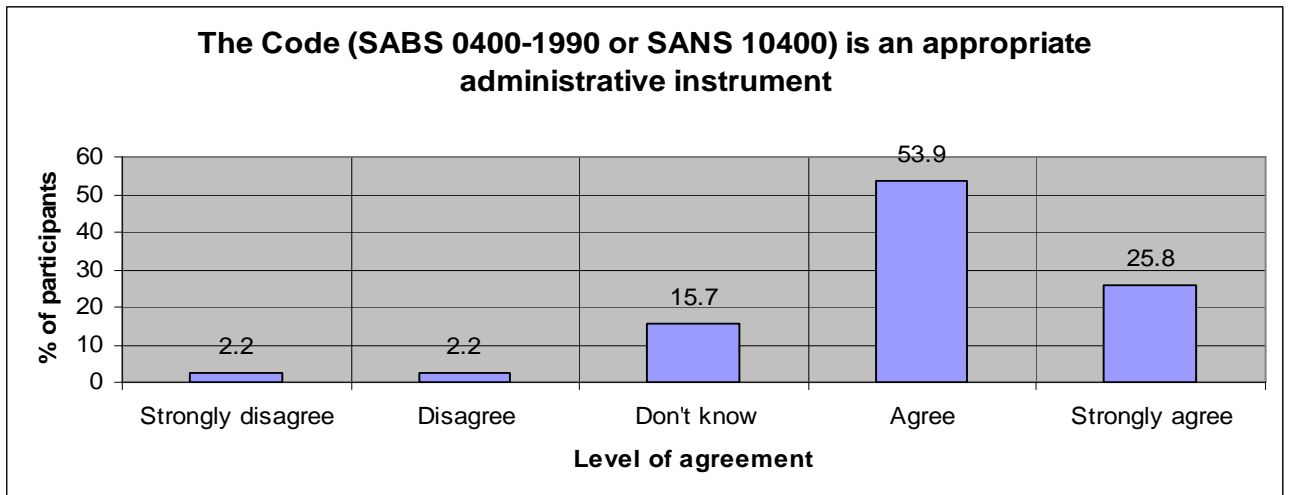
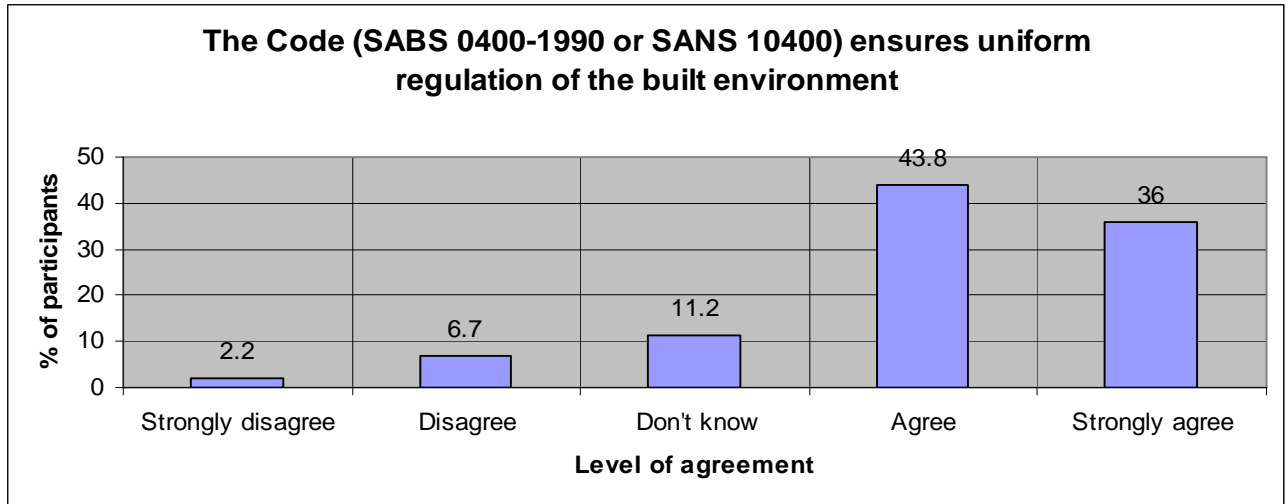


Figure 43: Graphic summary of responses to Question 9.5



#### 4.4.10.3 Ranking of responses to Question 9

The mean averages of the responses were calculated for Questions 9.1 to 9.5. This calculation allows the responses to be ranked from most important to least important. According to the respondents, the order of importance was as follows:

- The Code (SABS 0400-1990 or SANS 10400) ensures uniform regulation of the built environment (Question 9.5)
- The Code (SABS 0400-1990 or SANS 10400) is an appropriate administrative instrument (Question 9.4)
- The Code (SABS 0400-1990 or SANS 10400) is structured logically in accordance with all the necessary stages of a construction project (Question 9.3)
- The Code (SABS 0400-1990 or SANS 10400) is an accessible document that is easily understandable (Question 9.1)
- The Code (SABS 0400-1990 or SANS 10400) provides answers to all the questions/issues that a BCO has to address daily (Question 9.2)

### 4.4.11 Question 10

#### 4.4.11.1 Question 10 extracted from questionnaire (with corresponding number of respondents)

Table 55: Question 10

10		Number of valid responses	% of total population
<p><i>The Code (SABS 0400-1990 or SANS 10400) defines certain requirements and procedures relating to the plan approval process. However, at present the various LAs use different documents when implementing the relevant requirements and procedures.</i></p> <p>Please indicate your <b>level of agreement</b> with each of the following statements:</p>			
10.1	<i>The objectives of the Code (SABS 0400-1990 or SANS 10400) are sufficiently represented in the <b>plan submission form</b> that is currently used by the LA.</i>	86	97%
10.2	<i>The objectives of the Code (SABS 0400-1990 or SANS 10400) are sufficiently represented in the <b>checklist for plan approval</b> that is currently used by the LA.</i>	87	98%
10.3	<i>The objectives of the Code (SABS 0400-1990 or SANS 10400) are sufficiently represented in the <b>notice of approval</b> that is currently used by the LA.</i>	86	97%
10.4	<i>The Code (SABS 0400-1990 or SANS 10400) should define a <b>national standardised submission and approval pro forma</b>.</i>	86	97%

#### 4.4.11.2 Graphic summary of responses to Question 10

Figure 44: Graphic summary of responses to Question 10.1

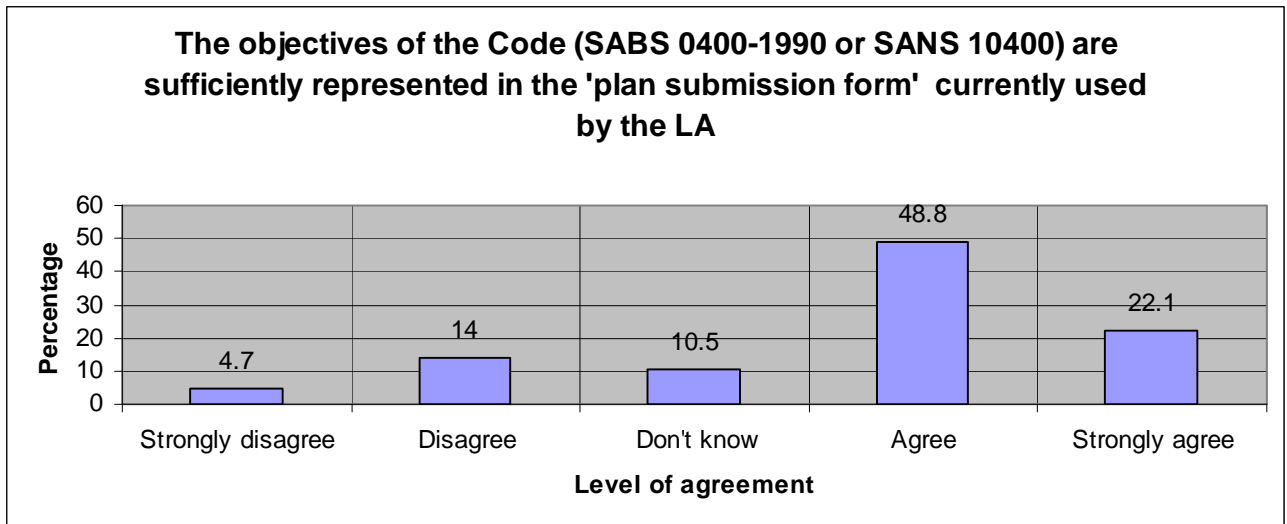


Figure 45: Graphic summary of responses to Question 10.2

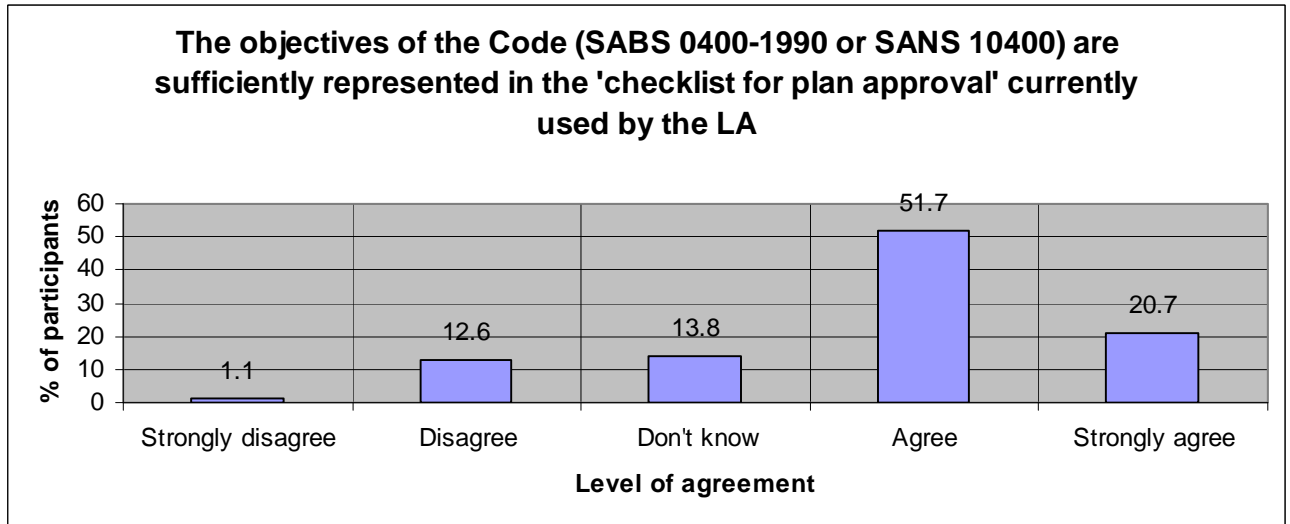


Figure 46: Graphic summary of responses to Question 10.3

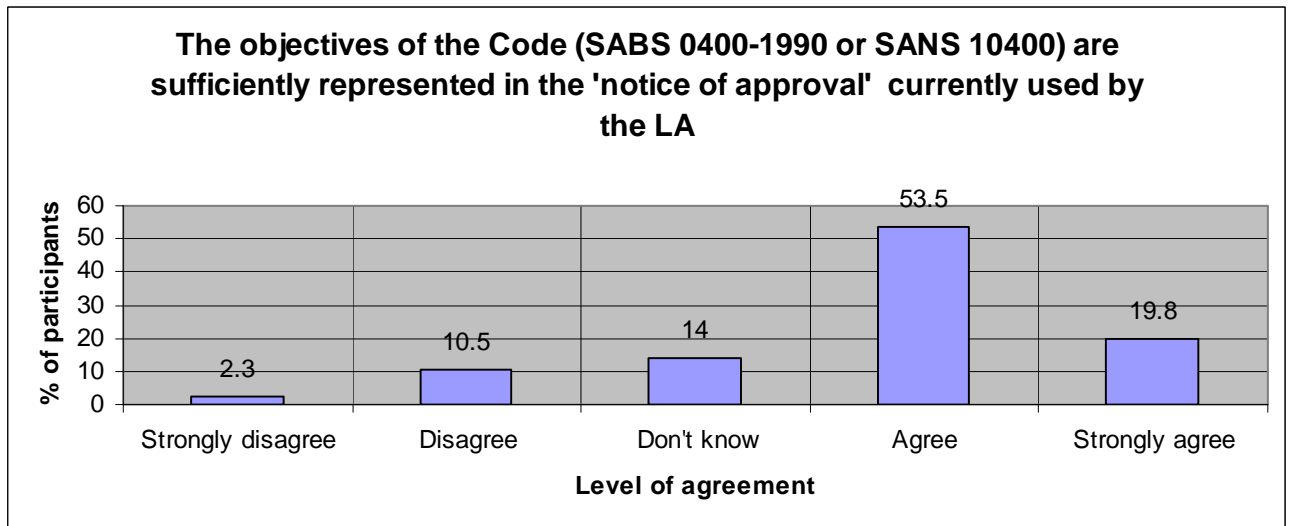
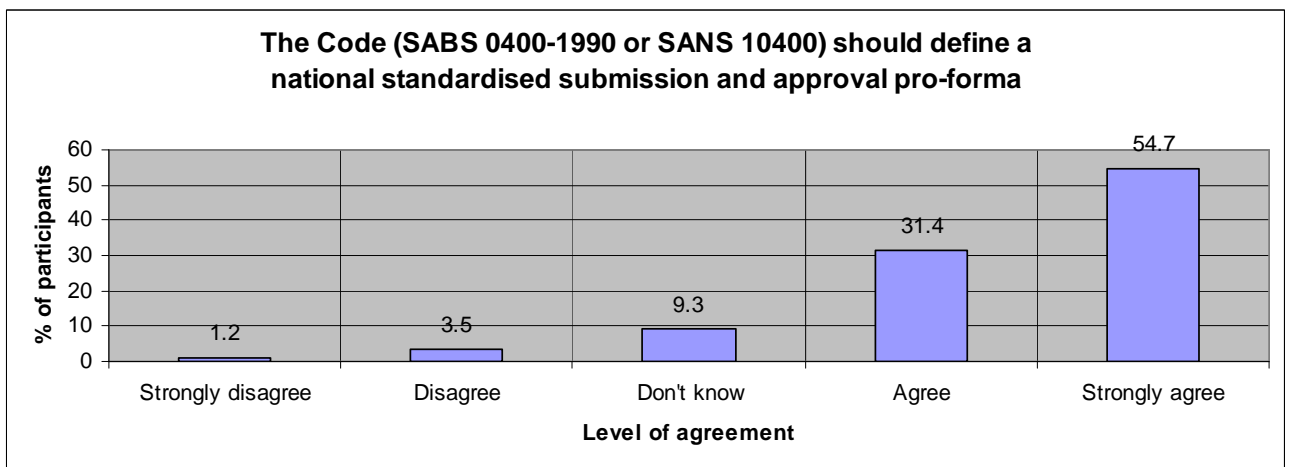


Figure 47: Graphic summary of responses to Question 10.4



### 4.4.12 Question 11

#### 4.4.12.1 Question 11 extracted from questionnaire (with corresponding number of respondents)

Table 56: Question 11

11	At present the Code ( <b>SABS 0400-1990</b> or <b>SANS 10400</b> ) is <b>not implemented uniformly in South Africa</b> . This is <i>inter alia</i> the result of certain parts being exempt from the NBR.	Number of valid responses	% of total population
Please indicate your <b>level of agreement</b> with each of the following statements:			
11.1	There should be <b>two different Codes</b> under SABS 0400-1990 (or SANS 10400) – one applicable to the <b>formal segment</b> of the South African built environment, and a separate Code for <b>informal settlements</b> .	87	<b>98%</b>
11.2	The erection of <b>government-subsidised housing</b> should fall <b>outside the mandate of SABS 0400-1990</b> (or SANS 10400), and therefore also <b>outside the mandate of the BCO</b> . (In other words, low-cost housing should not be submitted to the LA for plan approval or be subject to inspections conducted by the BCO.)	87	<b>98%</b>
11.3	As soon as any <b>alterations or additions</b> are made to a <b>government-subsidised house</b> , it should fall under <b>the formal sector</b> , adhering to all the relevant requirements of SABS 0400-1990 (or SANS 10400).	83	<b>93%</b>
11.4	All <b>official government buildings</b> should be <b>exempt from the full approval procedure</b> .	86	<b>97%</b>

#### 4.4.12.2 Graphic summary of responses to Question 11

Figure 48: Graphic summary of responses to Question 11.1

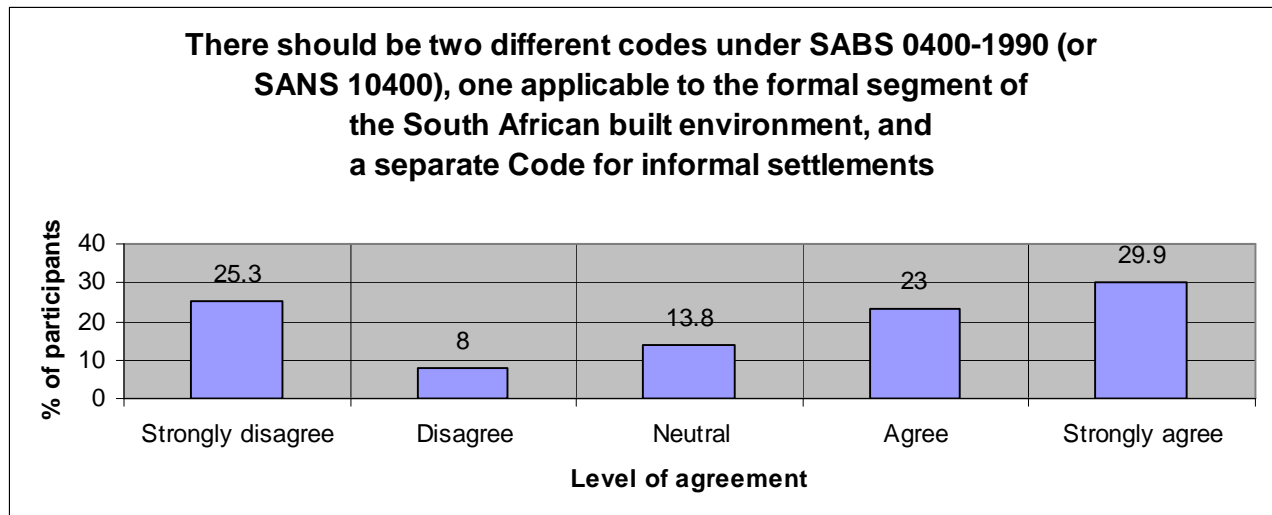


Figure 49: Graphic summary of responses to Question 11.2

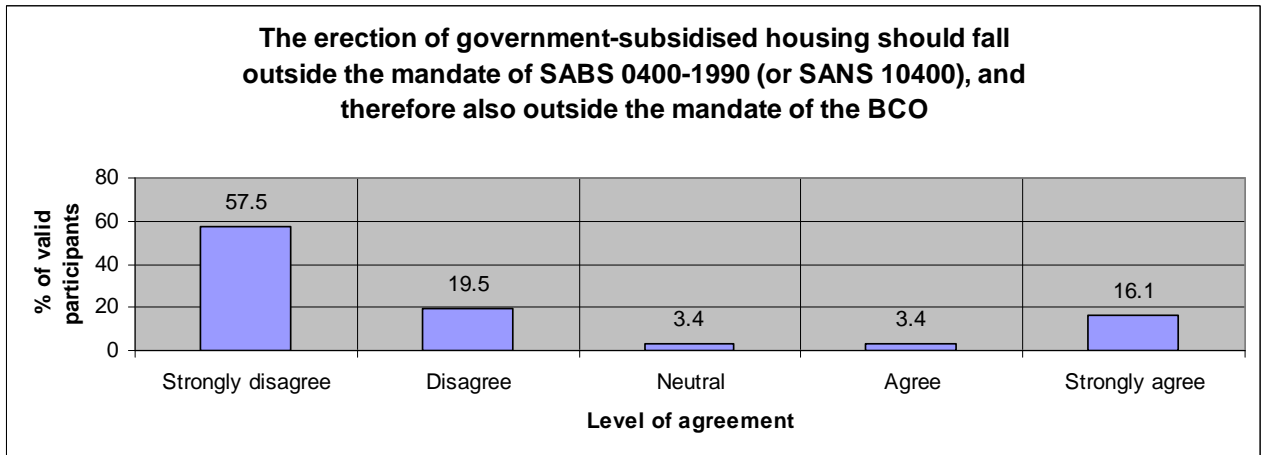


Figure 50: Graphic summary of responses to Question 11.3

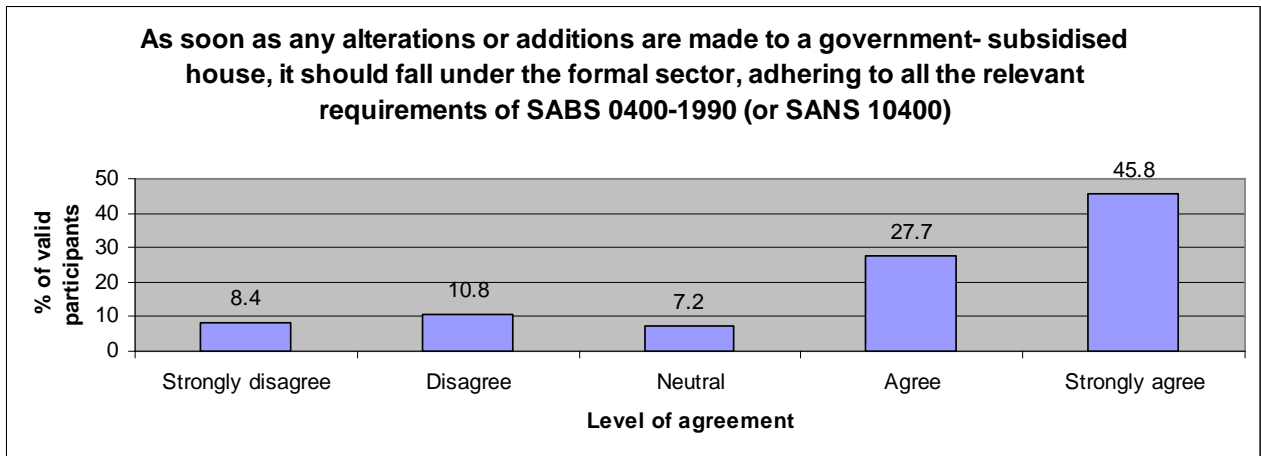
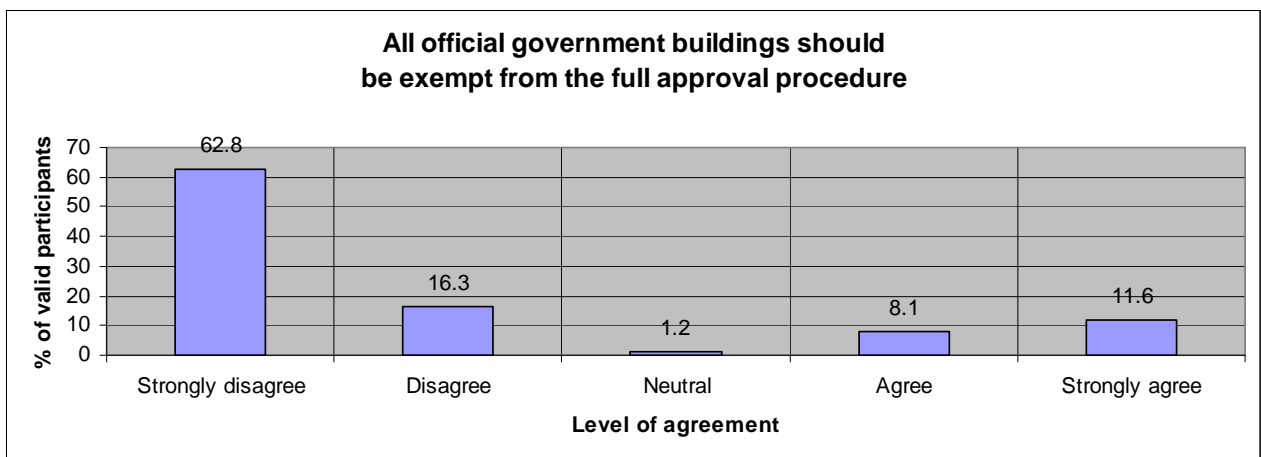


Figure 51: Graphic summary of responses to Question 11.4



### 4.4.13 Question 12

#### 4.4.13.1 Question 12 extracted from questionnaire (with corresponding number of respondents)

Table 57: Question 12

12 Various <i>imminent changes to the NBR</i> are envisioned.		Number of valid responses	% of total population
Please respond to the following statements:			
12.1	I am aware that the respective standards for <b>SANS 10400 (Parts A-H, J-W)</b> have been <b>published to replace the amended Code of Practice</b> for the Application of the National Building Regulations ( <b>SABS 0400-1990</b> ).	87	98%
12.2	I have <b>submitted a formal comment*</b> on the relevant published standards for <b>SANS 10400 (Parts A-H, J-W)</b> that are scheduled to replace SABS 0400.	86	97%
12.3	I am <b>aware of</b> the voluntary standard <b>SANS 204: 2008 (Parts 1, 2 + 3)</b> that focuses on energy efficiency in buildings.	87	98%
12.4	I am <b>aware that</b> the standard <b>SANS 10400-XA: 2010 (Energy usage in buildings)</b> was <b>published for public comment</b> on 2010-06-15.	85	96%
12.5	I have <b>submitted a formal comment*</b> on <b>SANS 10400-XA: 2010 (Energy usage in buildings)</b> .	87	98%
12.6	I am <b>aware that</b> the standard <b>SANS 10400-O: 2010 (Lighting and ventilation)</b> has been <b>published for public comment</b> .	85	96%
12.7	I have <b>submitted</b> (or plan to submit before or on 2010-10-26) <b>a formal comment*</b> on <b>SANS 10400-O: 2010 (Lighting and ventilation)</b> .	86	97%
*Note: Formal comments on standards: These comments could have been made in your personal capacity, through the LA or other professional body during the period for invited comments.			

#### 4.4.13.2 Graphic summary of responses to Question 12

Figure 52: Graphic summary of responses to Question 12.1

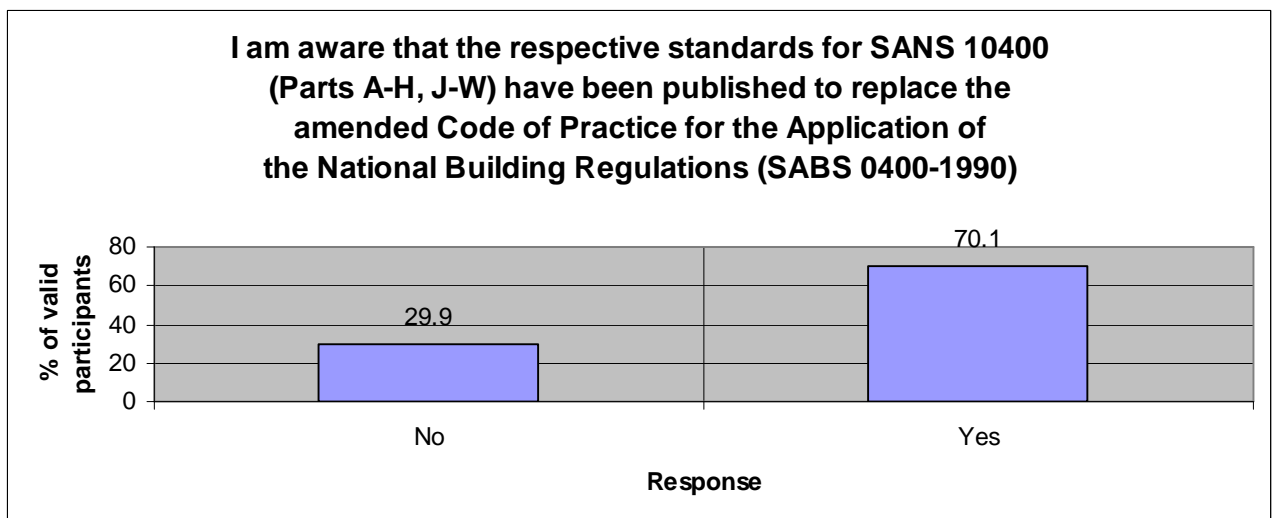




Figure 53: Graphic summary of responses to Question 12.2

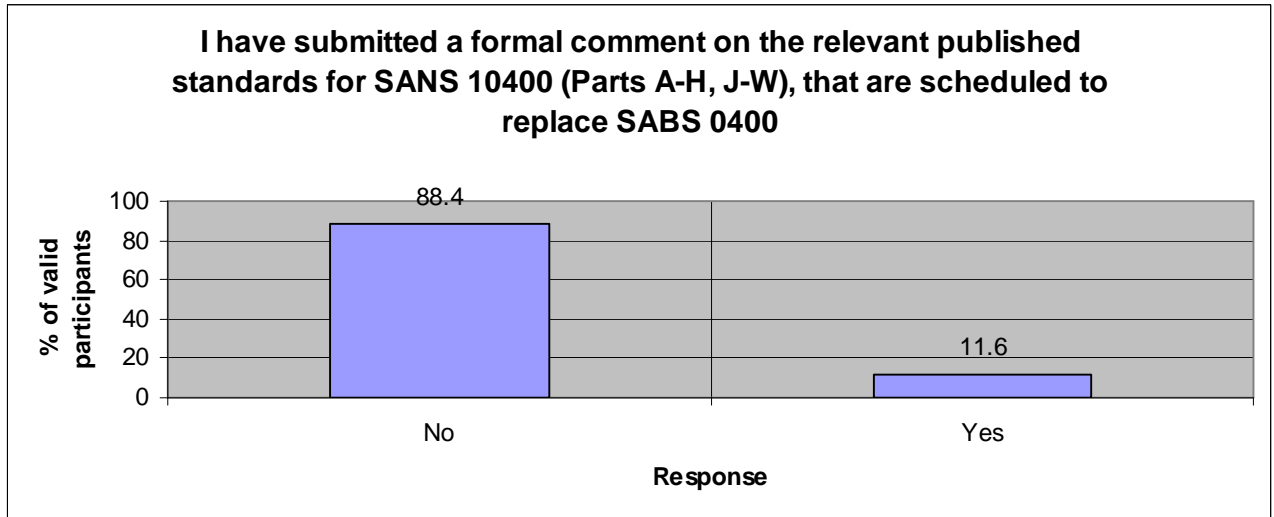


Figure 54: Graphic summary of responses to Question 12.3

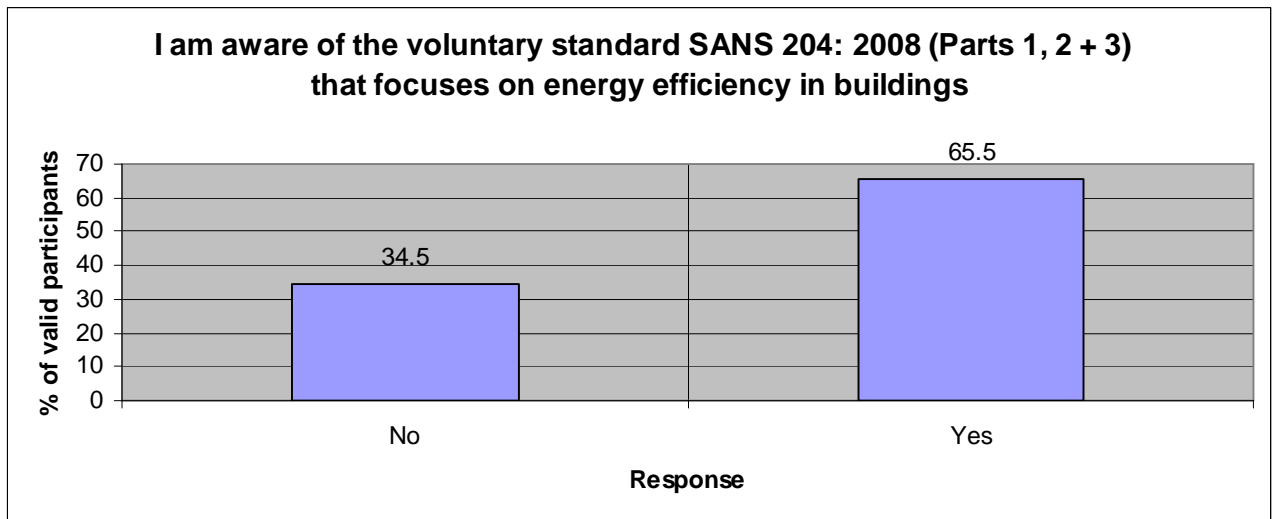


Figure 55: Graphic summary of responses to Question 12.4

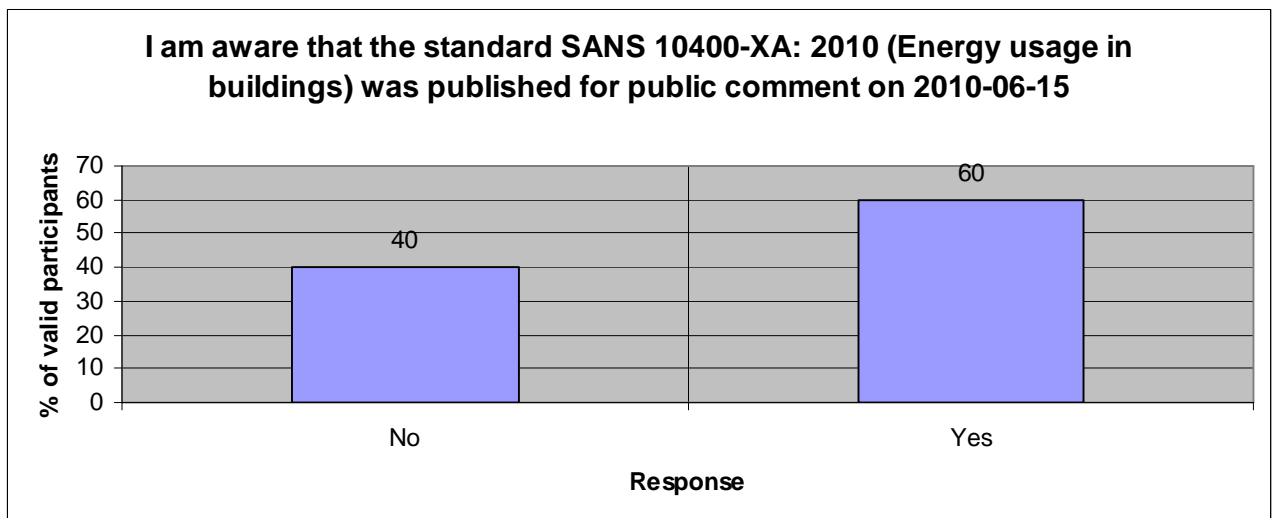


Figure 56: Graphic summary of responses to Question 12.5

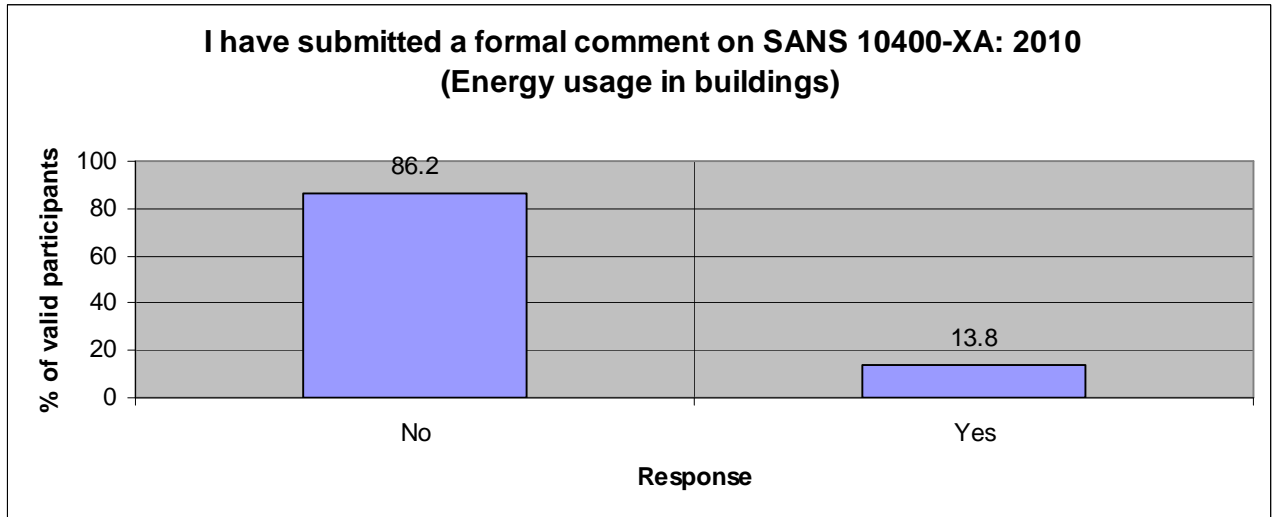


Figure 57: Graphic summary of responses to Question 12.6

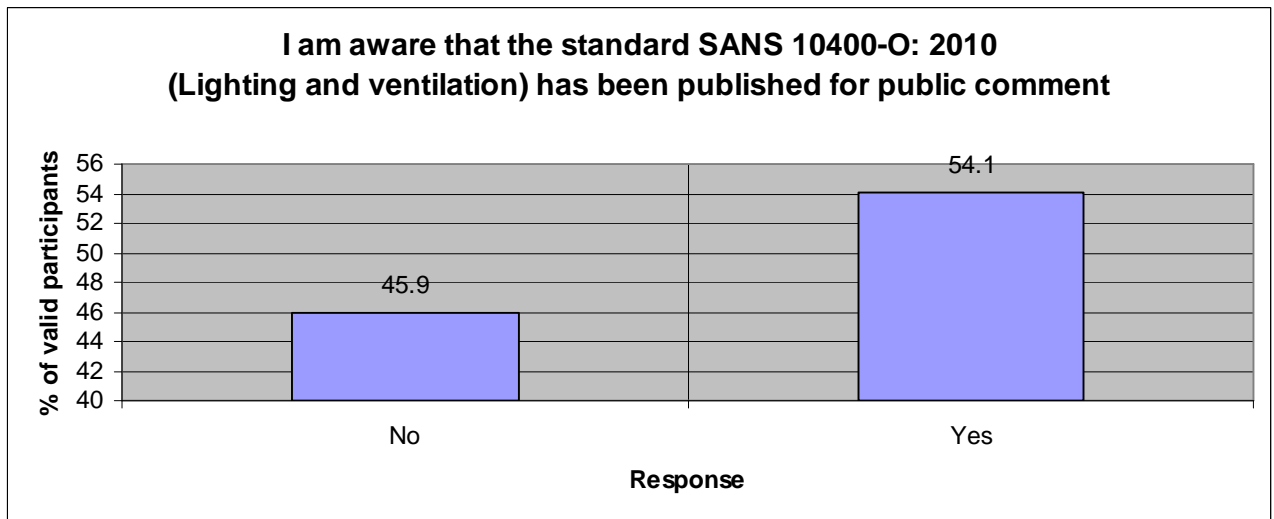
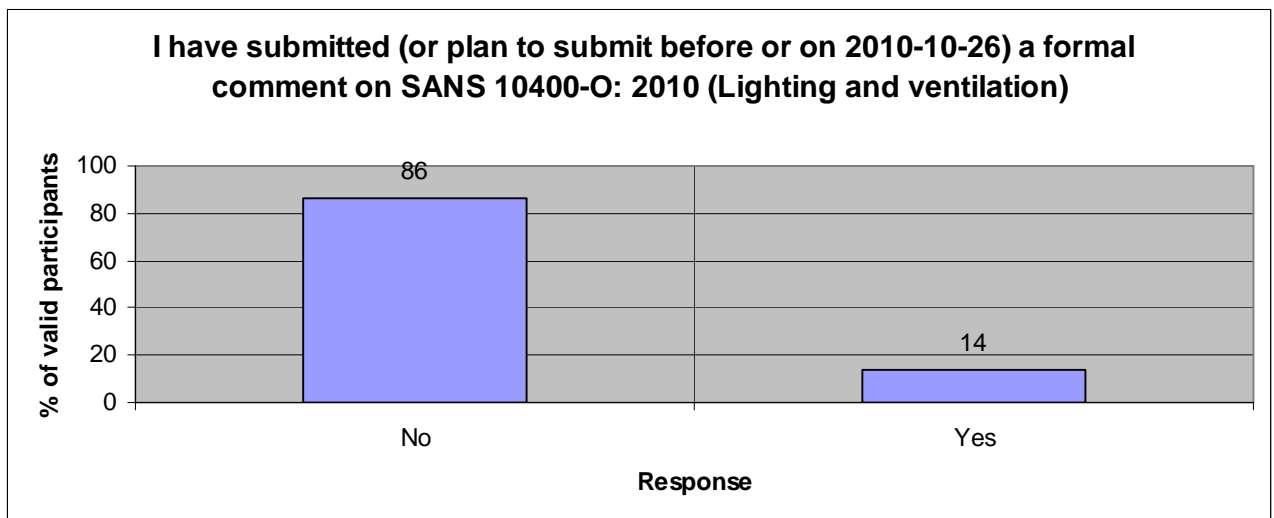


Figure 58: Graphic summary of responses to Question 12.7



### 4.4.14 Question 13

#### 4.4.14.1 Question 13 extracted from questionnaire (with corresponding number of respondents)

Table 58: Question 13

13 This section focuses on <b>the impact of envisioned changes to the NBR on the BCO</b> . (In other words, how the above changes would influence the daily operation of the BCO).		Number of valid responses	% of total population
Please indicate your <b>level of agreement</b> with each of the following statements:			
13.1	The <b>implementation</b> of the new standards as set out in <b>SANS 10400 (Parts A-H, J-W)</b> will have a <b>significant impact</b> on my daily functioning as a BCO.	85	96%
13.2	The <b>implementation</b> of the new standards as set out in <b>SANS 10400-XA: 2010 (Energy usage in buildings)</b> will have a <b>significant impact</b> on my daily functioning as a BCO.	85	96%
13.3	The implementation of the new standards as set out in <b>SANS 10400-O: 2010 (Lighting and ventilation)</b> will have a <b>significant impact</b> on my daily functioning as a BCO.	85	96%

#### 4.4.14.2 Graphic summary of responses to Question 13

Figure 59: Graphic summary of responses to Question 13.1

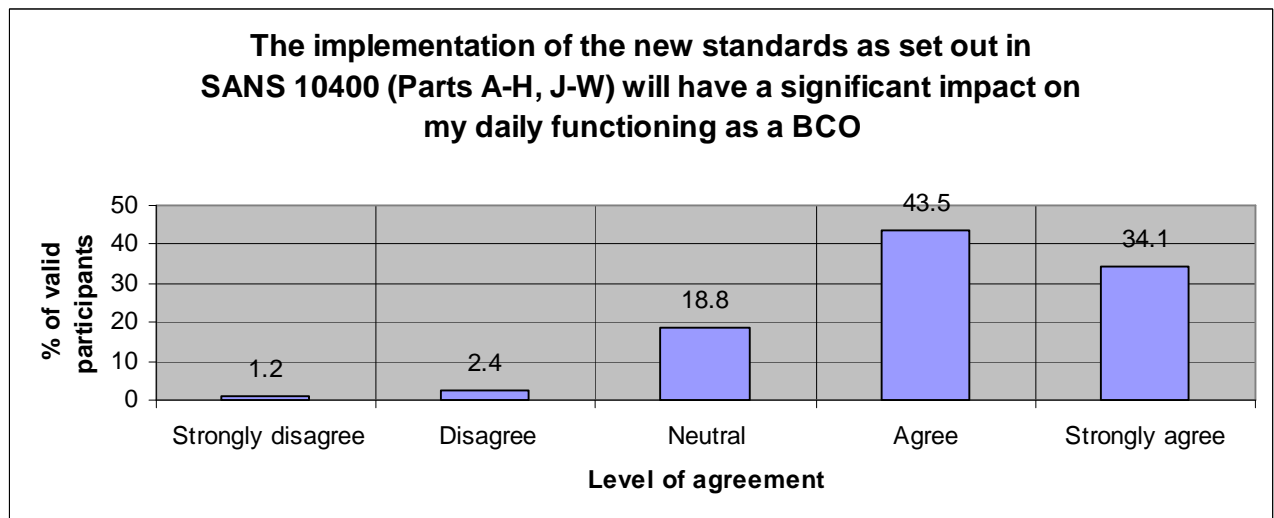


Figure 60: Graphic summary of responses to Question 13.2

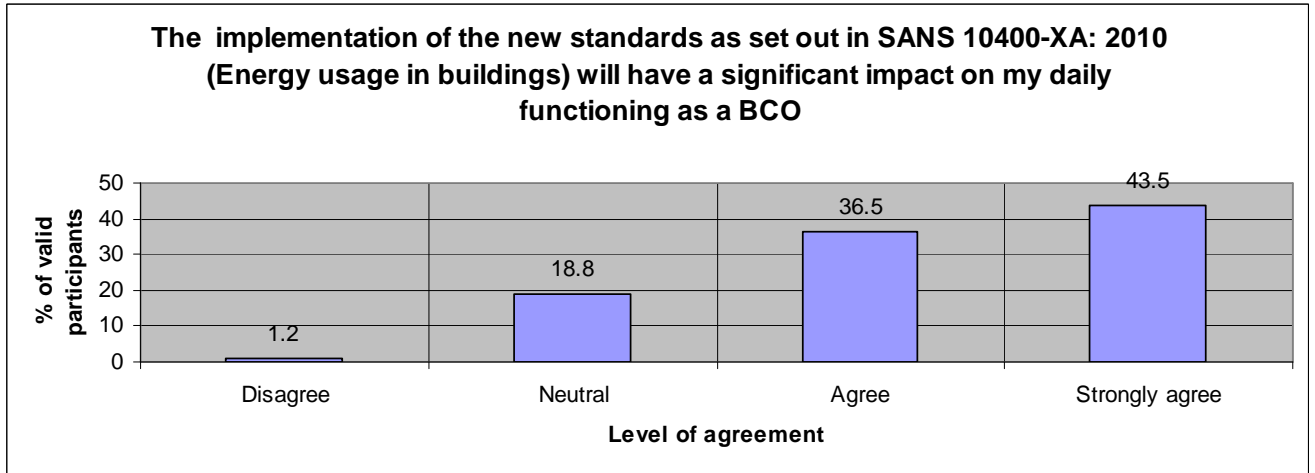
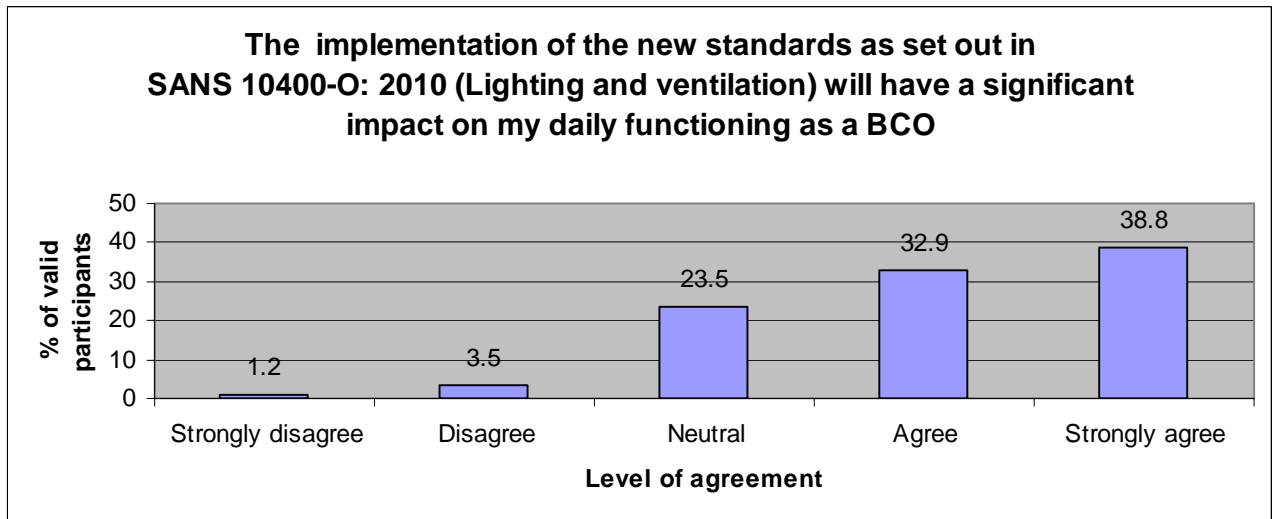


Figure 61: Graphic summary of responses to Question 13.3



#### 4.4.15 Question 14

##### 4.4.15.1 Question 14 (Part 1) extracted from questionnaire (with corresponding number of respondents)

Table 59: Question 14 (Part 1)

14 This question focuses on the <b>possible</b> inclusion of <b>criteria</b> that could <b>promote sustainability</b> in the built environment as <b>additional requirements of the NBR</b> .		Number of valid responses	% of total population
Please indicate your <b>level of agreement</b> with each of the following statements:			
14.1	The concept of ' <b>sustainability</b> ' should be incorporated in the NBR.	88	99%
14.2	The concept of ' <b>resource efficiency</b> ' should be incorporated in the NBR.	88	99%
14.3	The concept of ' <b>green buildings</b> ' should be incorporated in the NBR.	86	97%
14.4	<b>Development</b> in the built environment should be done in a <b>sustainable</b> manner.	84	94%
14.5	<b>Buildings</b> should be designed to <b>limit</b> their total <b>energy consumption</b> to a minimum.	87	98%

##### 4.4.15.2 Graphic summary of responses to Question 14 (Part 1)

Figure 62: Graphic summary of responses to Question 14.1

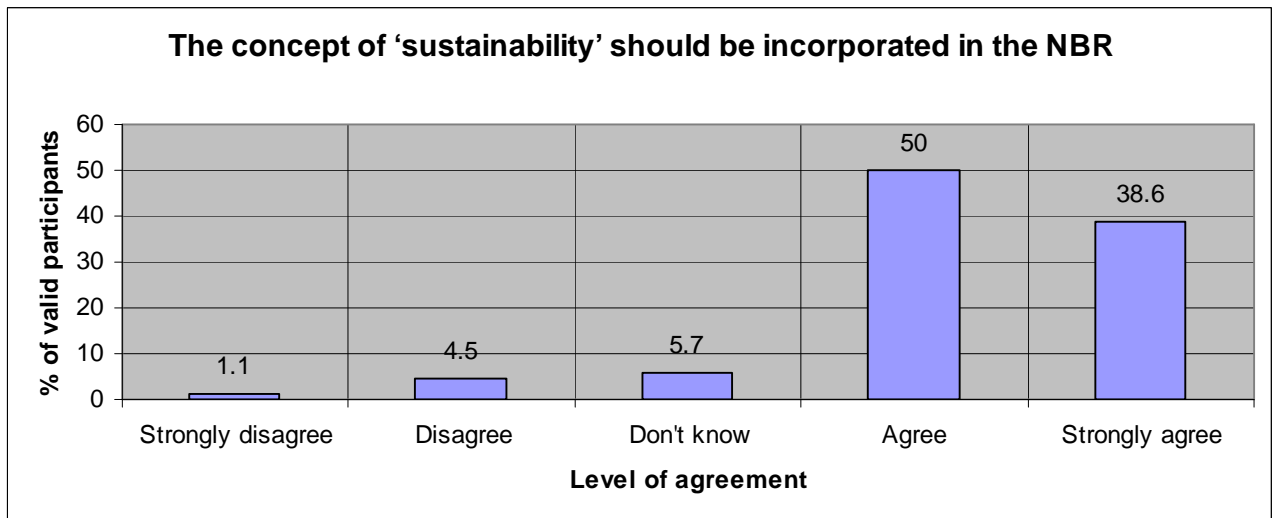


Figure 63: Graphic summary of responses to Question 14.2

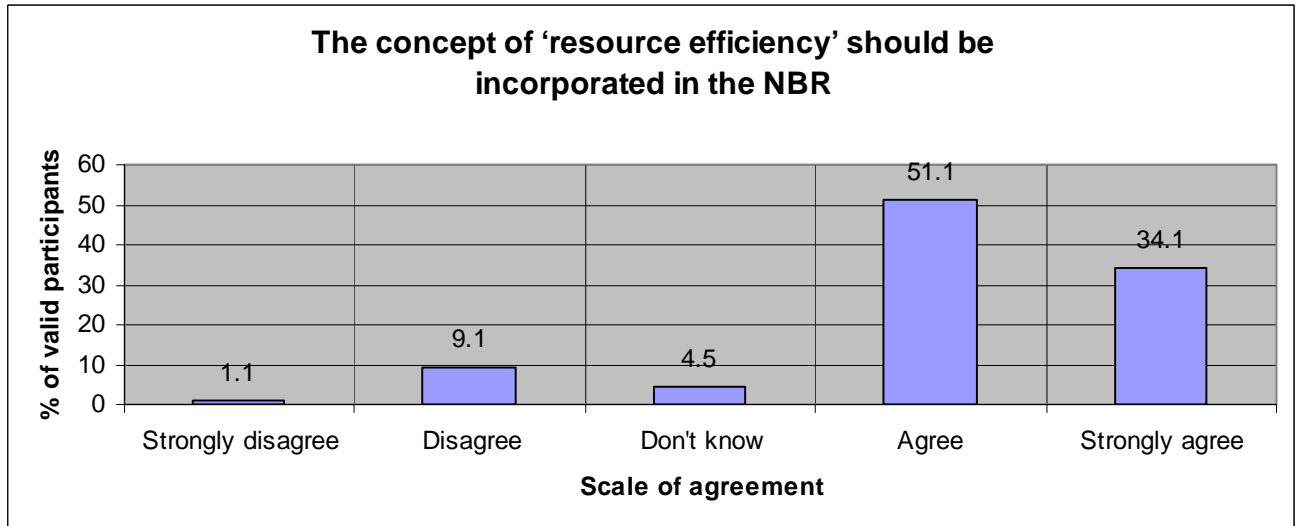


Figure 64: Graphic summary of responses to Question 14.3

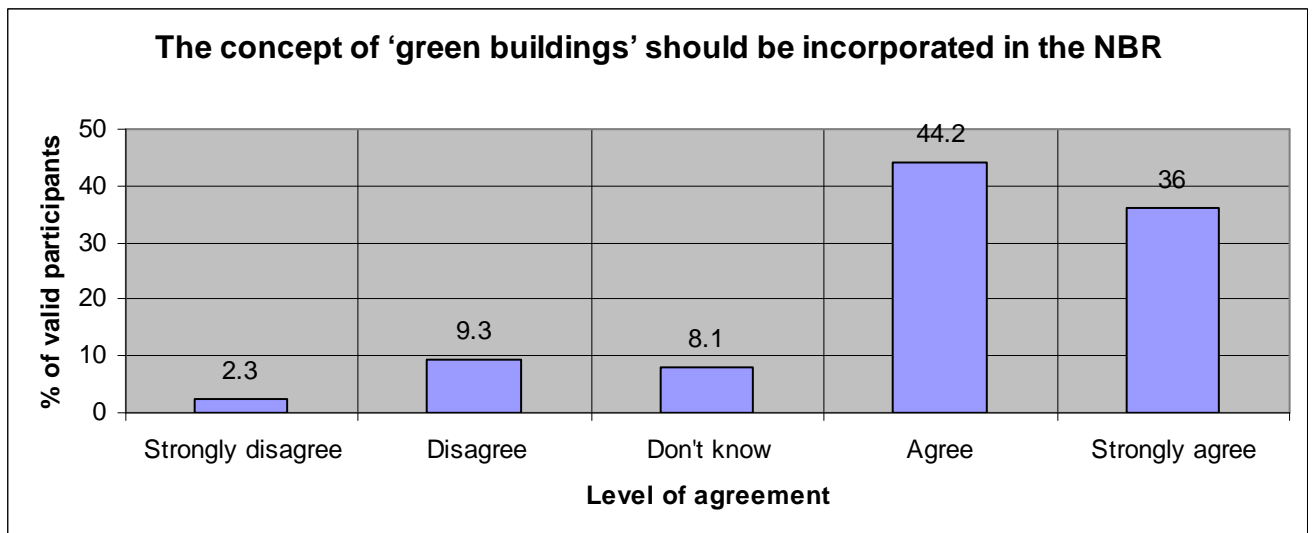


Figure 65: Graphic summary of responses to Question 14.4

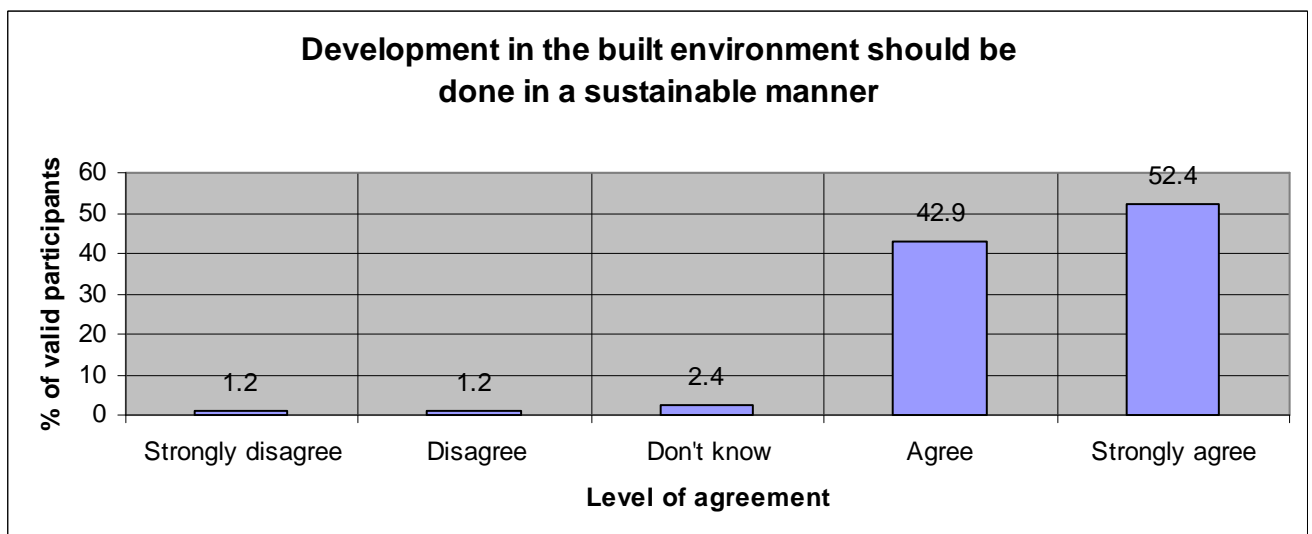
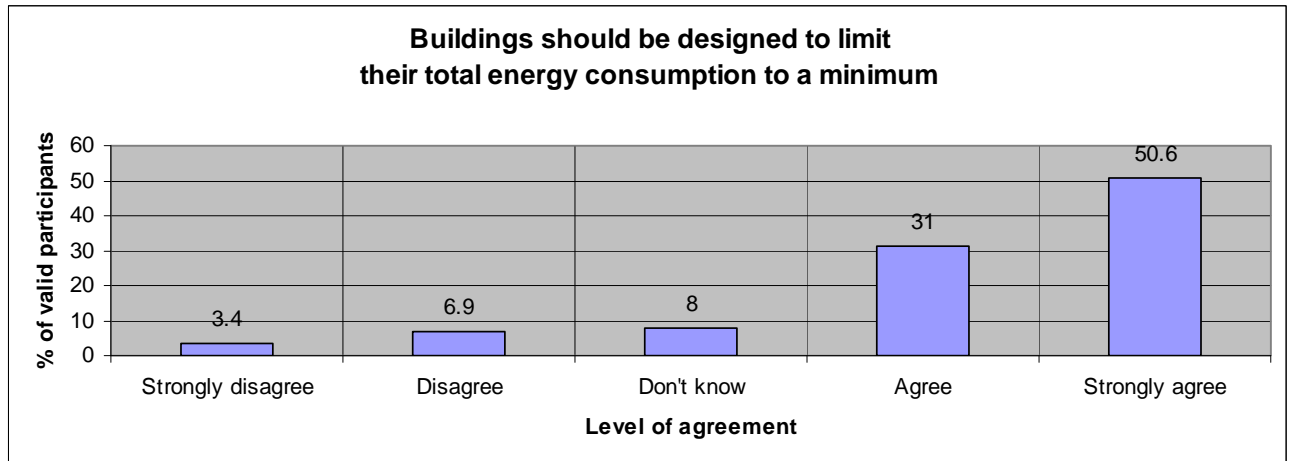


Figure 66: Graphic summary of responses to Question 14.5



4.4.15.3 **Question 14 (Part 2) extracted from questionnaire (with corresponding number of respondents)**

Table 60: Question 14 (Part 2)

14	<i>This question focuses on the <b>possible</b> inclusion of <b>criteria</b> that could <b>promote sustainability</b> in the built environment as <b>additional requirements of the NBR</b>.</i>	Number of valid responses	% of total population
<i>Please indicate your <b>level of agreement</b> with each of the following statements:</i>			
14.6	<i>The <b>building regulations</b> should <b>control and limit the energy consumption</b> of the <b>building sector</b>.</i>	88	99%
14.7	<i>The <b>building regulations</b> should address the <b>future impact</b> of <b>buildings</b> on the <b>natural environment</b>.</i>	85	96%
14.8	<i>The <b>building regulations</b> should address the <b>future impact</b> of <b>buildings</b> on the <b>man-made environment</b>.</i>	88	99%
14.9	<i>Minimum <b>passive design criteria</b> should be included as <b>additional requirements</b> of the <b>NBR</b>.</i>	85	96%
14.10	<i>The <b>existing administration methods</b> of the <b>NBR</b> could be <b>adapted</b> without difficulty <b>to include</b> additional minimum <b>passive design criteria</b>.</i>	85	96%

#### 4.4.15.4 Graphic summary of responses to Question 14

Figure 67: Graphic summary of responses to Question 14.6

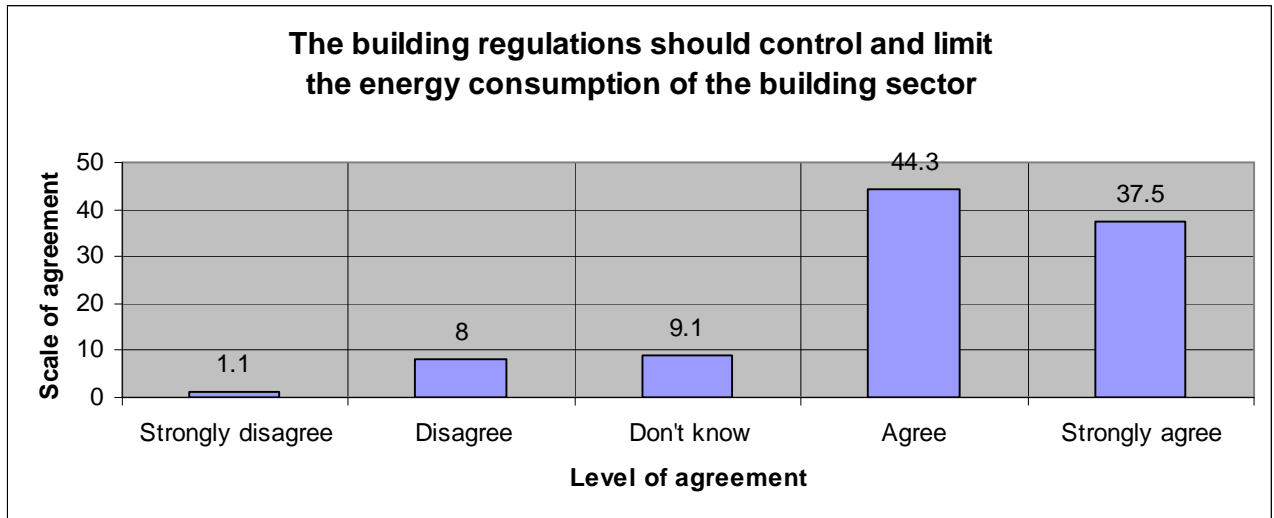


Figure 68: Graphic summary of responses to Question 14.7

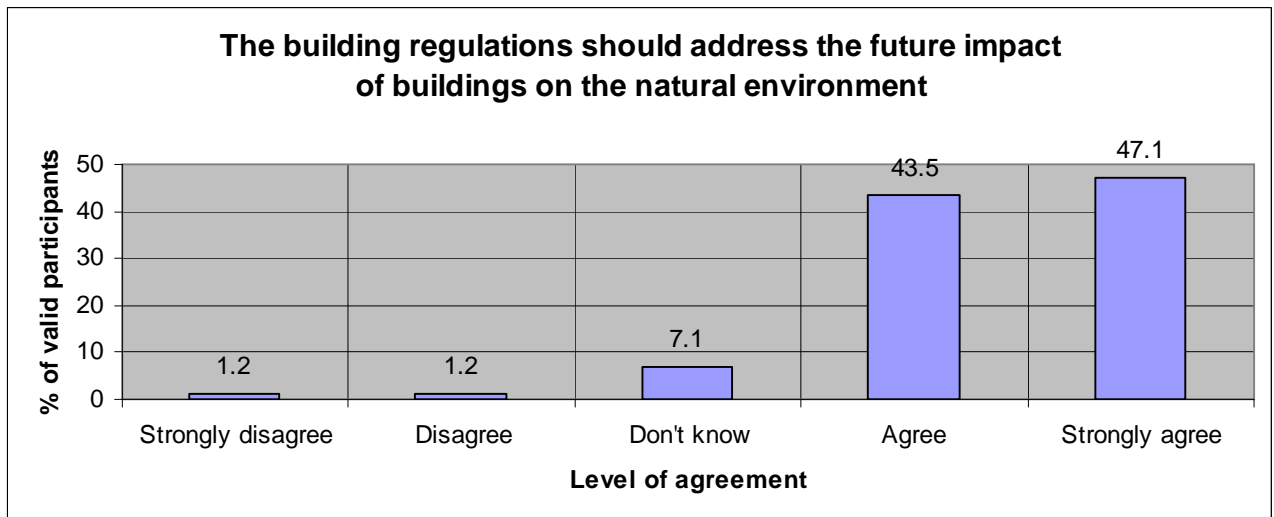


Figure 69: Graphic summary of responses to Question 14.8

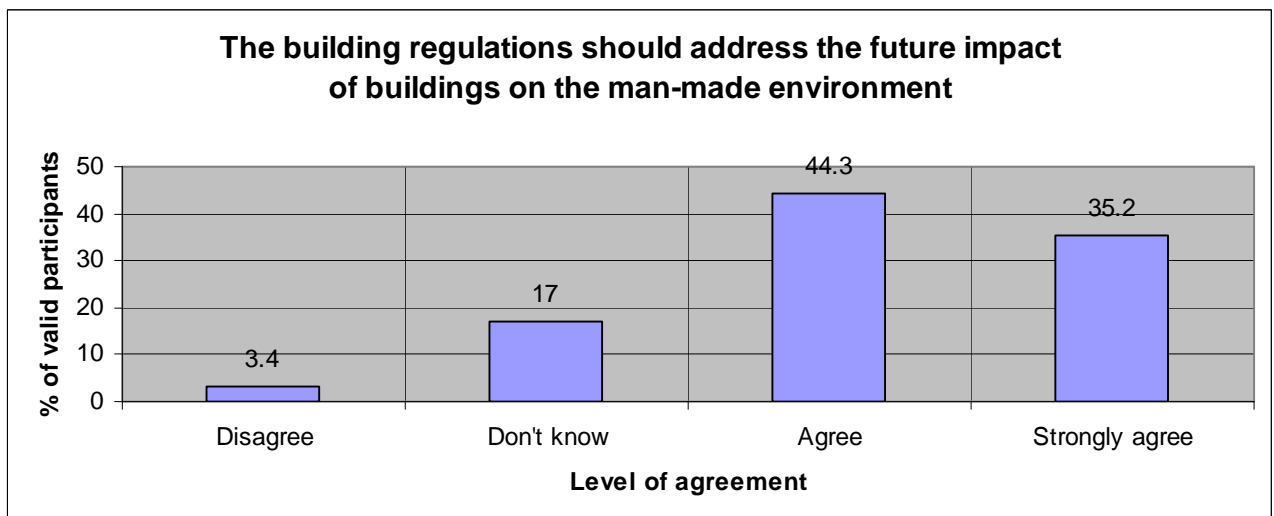




Figure 70: Graphic summary of responses to Question 14.9

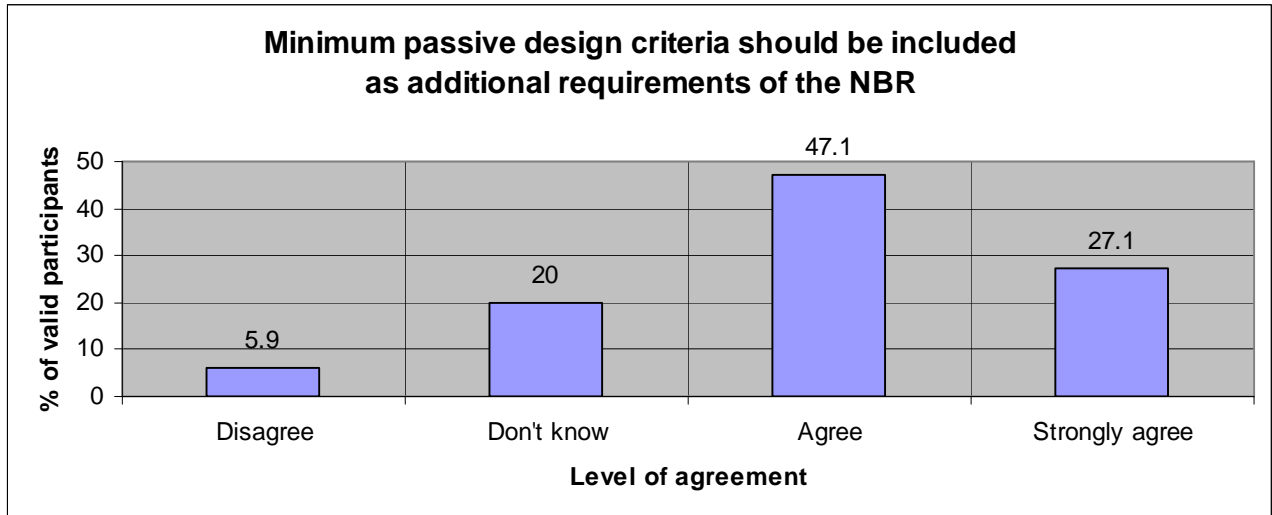
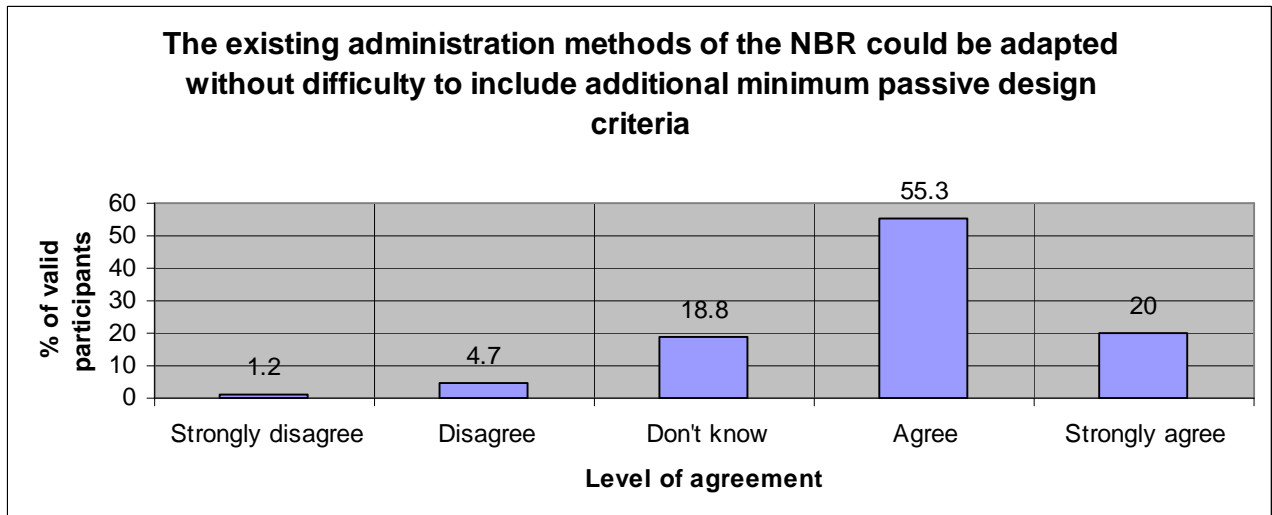


Figure 71: Graphic summary of responses to Question 14.10



#### 4.4.15.5 Ranking of responses to Question 14

The mean averages of the responses were calculated for Questions 14.1 to 14.10. This calculation allows the responses to be ranked from high to low, or most important to least important. According to the respondents, the order of importance for the inclusion of sustainable design criteria was as follows:

- *Development in the built environment should be done in a sustainable manner (Question 14.4)*
- *The building regulations should address the future impact of buildings on the natural environment (Question 14.7)*



- The concept of ‘sustainability’ should be incorporated in the NBR (Question 14.1)
- Buildings should be designed to reduce their total energy consumption to a minimum (Question 14.5)
- The building regulations should address the future impact of buildings on the man-made environment (Question 14.8)
- The building regulations should control and limit the energy consumption of the building sector (Question 14.6)
- The concept of ‘resource efficiency’ should be incorporated in the NBR (Question 14.2)
- The concept of ‘green buildings’ should be incorporated in the NBR (Question 14.3)
- Minimum passive design criteria should be included as additional requirements of the NBR (Question 14.9)
- The existing administration methods of the NBR could be adapted without difficulty to include additional minimum passive design criteria (Question 14.10)

#### **4.4.16 Question 15**

##### **4.4.16.1 Question 15 (Part 1) extracted from questionnaire (with corresponding number of respondents)**

**Table 61: Question 15 (Part 1)**

15	Please rate the following <b>passive design criteria</b> for possible <b>inclusion</b> as additional requirements in the NBR. This list has been specifically formulated to become part of the <b>plan checklist</b> .	Number of valid responses	% of total population
Please indicate your <b>level of agreement</b> for each of the following statements:			
15.1	The <b>majority of habitable rooms</b> should <b>face</b> in a <b>northerly direction</b> to avoid unnecessary heating/cooling loads.	87	98%
15.2	If a <b>habitable room does not face in a northerly or southerly direction</b> , <b>mitigating passive measures</b> (i.e. shading devices, heat reflective glass, screens) should be taken to reduce possible heat gain.	83	93%
15.3	All <b>exposed glass surfaces</b> , except those facing south, should have a <b>protective roof overhang and/or shading device</b> (i.e. canopy, shutters) to reduce possible heat gain.	83	93%
15.4	Where applicable, all building <b>entrances/exits</b> should be <b>shielded from prevailing winds</b> .	85	96%

15.5	Each <b>habitable room</b> should have a total window area of at least <b>10% of the floor area</b> (or 0,2m <sup>2</sup> ) for <b>natural lighting</b> .	84	<b>94%</b>
15.6	Each <b>habitable room</b> should have <b>openable windows of at least 5% of the floor area</b> (or 0,2m <sup>2</sup> ) for natural ventilation.	86	<b>97%</b>
15.7	<b>Cross ventilation</b> should be provided for the majority of <b>habitable rooms</b> .	86	<b>97%</b>
15.8	The <b>Zone of Space</b> outside any opening should not be less than 1,0m in length from the boundary line, or 0,5m from the building line, with a maximum requirement of 8m (with the exception of built-up urban areas).	85	<b>96%</b>

4.4.16.2 **Graphic summary of responses to Question 15 (Part 1)**

Figure 72: Graphic summary of responses to Question 15.1

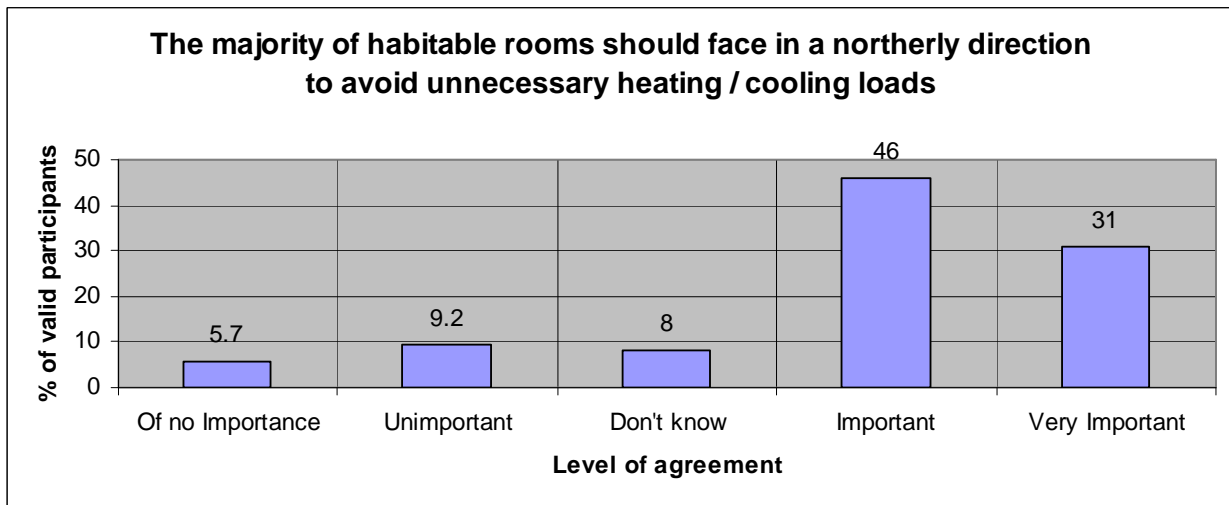


Figure 73: Graphic summary of responses to Question 15.2

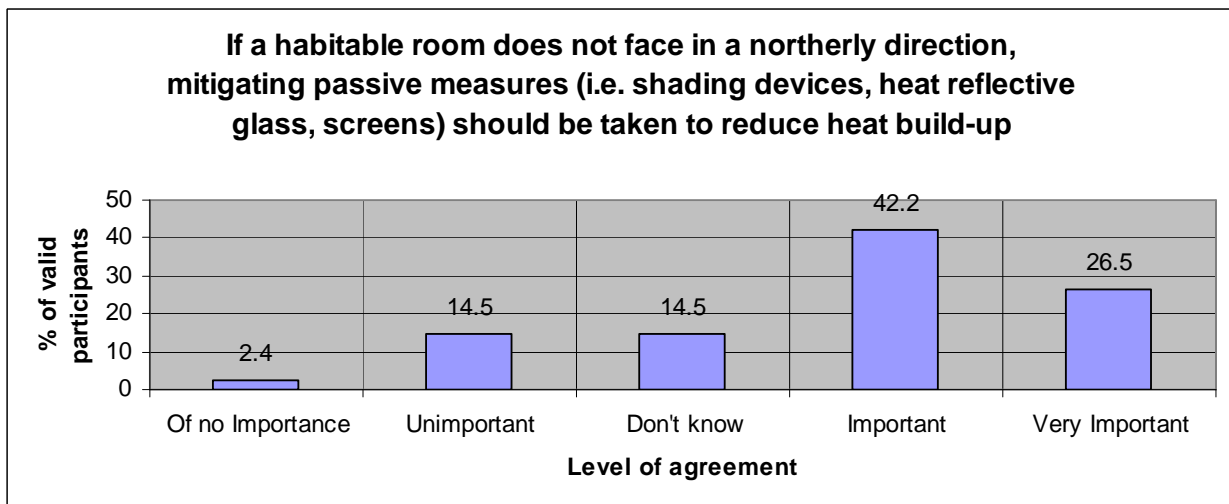


Figure 74: Graphic summary of responses to Question 15.3

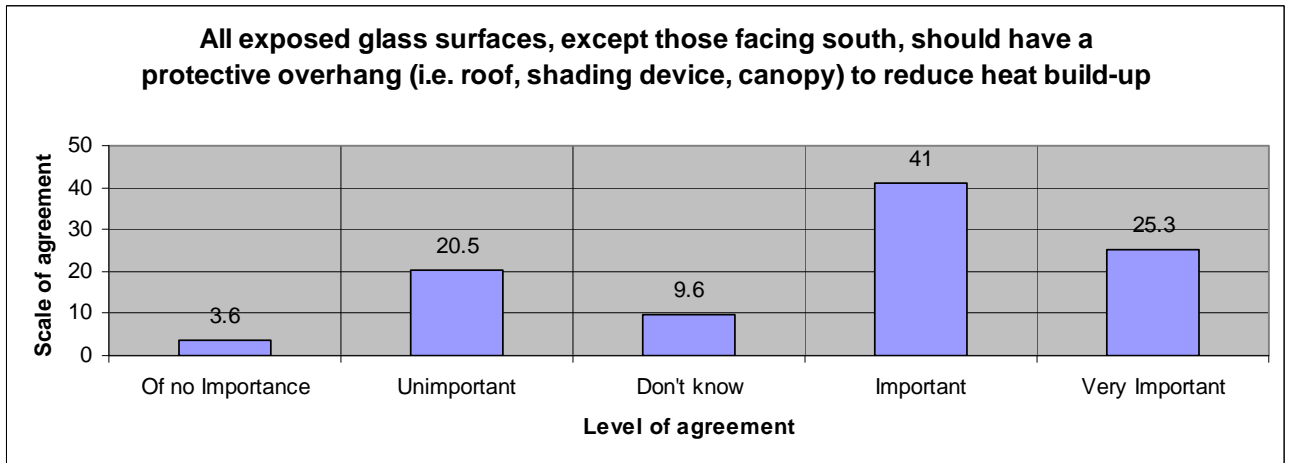


Figure 75: Graphic summary of responses to Question 15.4

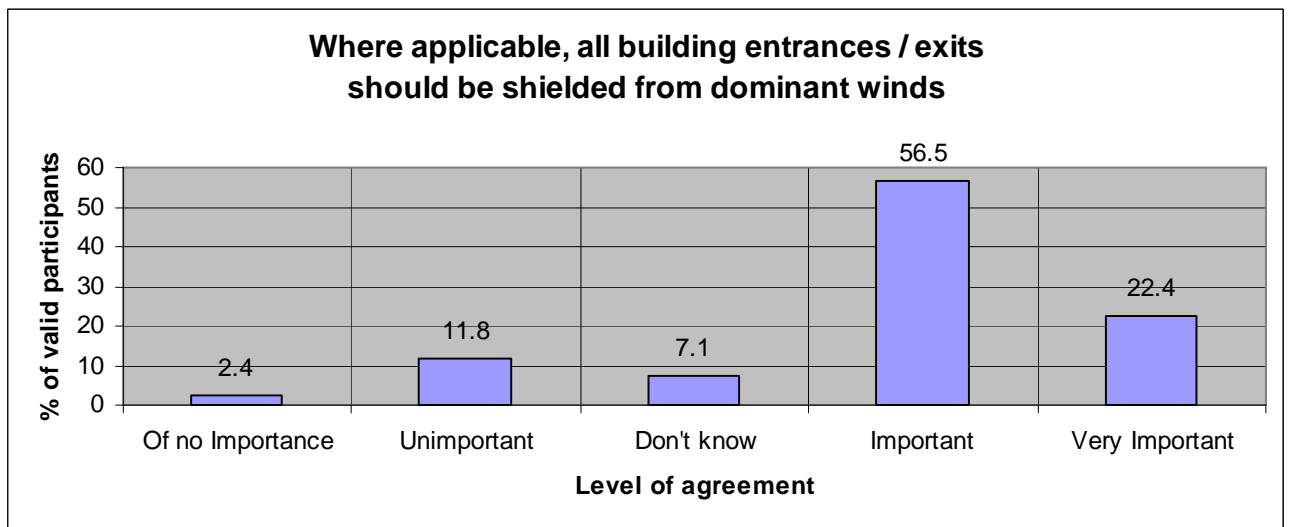


Figure 76: Graphic summary of responses to Question 15.5

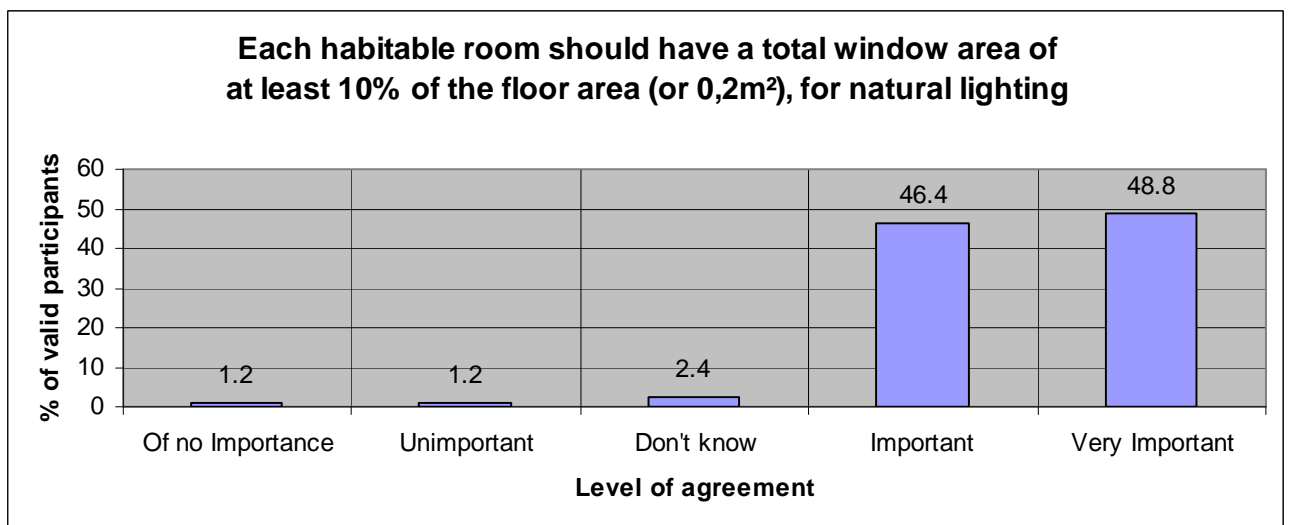


Figure 77: Graphic summary of responses to Question 15.6

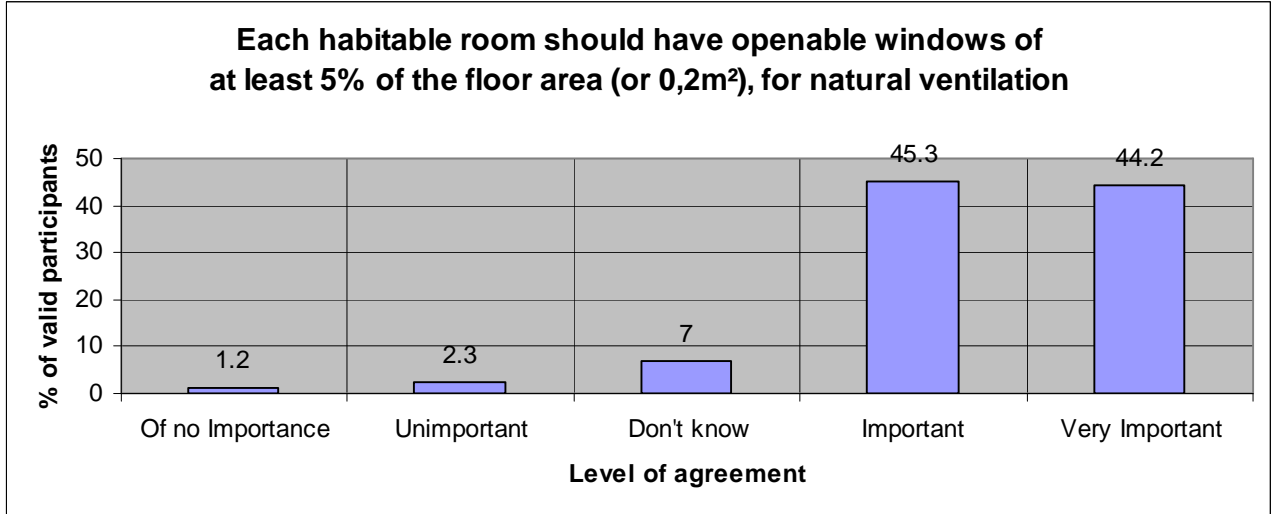


Figure 78: Graphic summary of responses to Question 15.7

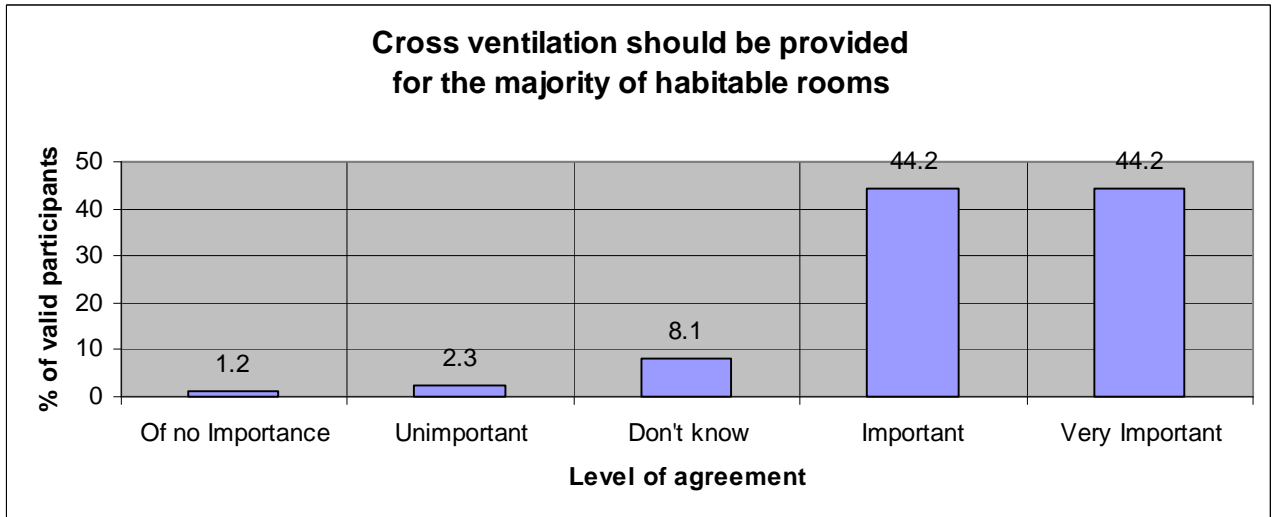
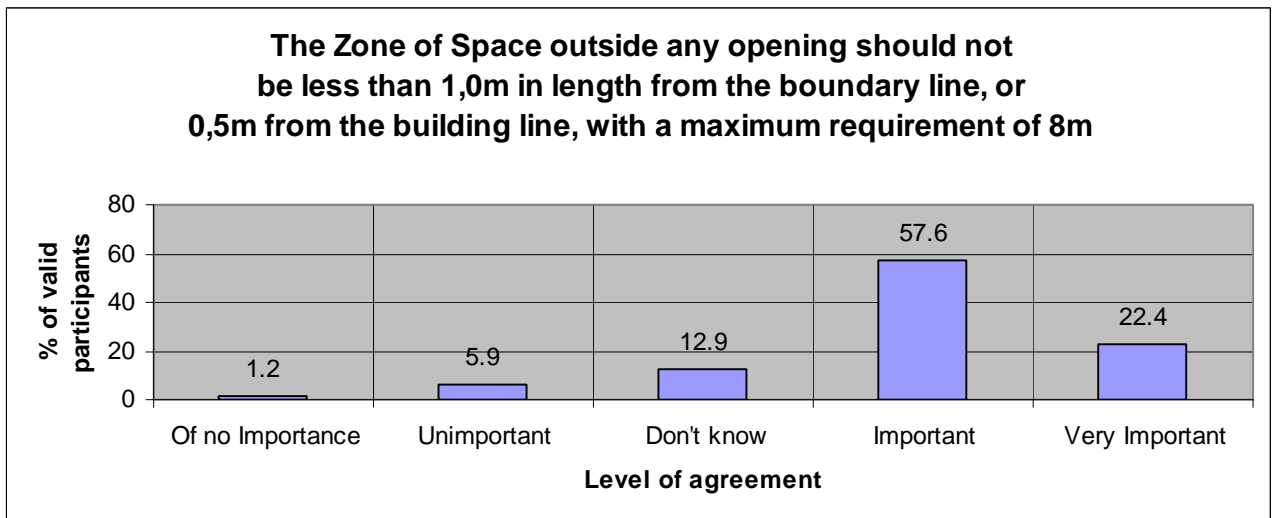


Figure 79: Graphic summary of responses to Question 15.8



**4.4.16.3 Question 15 (Part 2) extracted from questionnaire (with corresponding number of respondents)**

**Table 62: Question 15 (Part 2)**

15	Please rate the following <b>passive design criteria</b> for possible <b>inclusion</b> as additional requirements in the NBR. This list has been specifically formulated to become part of the <b>plan checklist</b> .	Number of valid responses	% of total population
	Please indicate your <b>level of agreement</b> with each of the following statements:		
15.9	If <b>under-floor heating</b> is installed, <b>under-floor insulation material</b> should also be provided to avoid unnecessary heat loss.	84	94%
15.10	Except where the <b>roofing material</b> conforms to a <b>minimum thermal resistance level (R-value)</b> , a ceiling should be installed in all habitable rooms to avoid unnecessary heat gain/loss.	85	96%
15.11	Where applicable, <b>water storage tanks</b> should be used to <b>harvest stormwater</b> from roofs for later use in cisterns, irrigation, etc.	86	97%
15.12	The <b>minimum number of ablution facilities required for males and females</b> in a development <b>should be reduced</b> from the current requirements.	79	89%
15.13	All <b>electric water heating</b> should be <b>supported by a renewable energy source</b> to limit electricity consumption for heating.	86	97%
15.14	All <b>electric water-heating cylinders</b> should be fitted with an <b>automatic timer</b> to limit electricity consumption for heating.	86	97%
15.15	Other (please describe briefly)	5	6%

**4.4.16.4 Graphic summary of responses to Question 15 (Part 2)**

**Figure 80: Graphic summary of responses to Question 15.9**

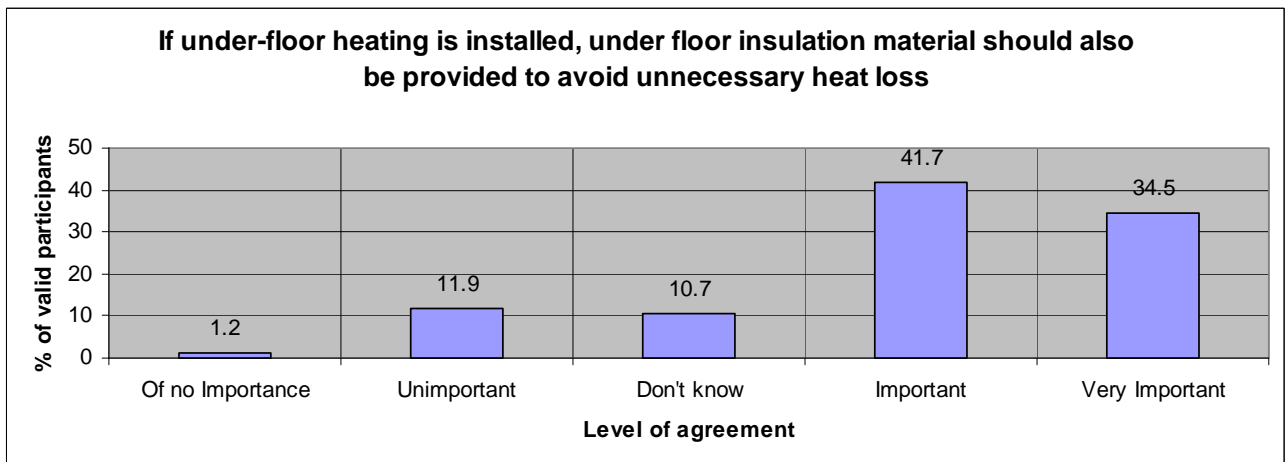


Figure 81: Graphic summary of responses to Question 15.10

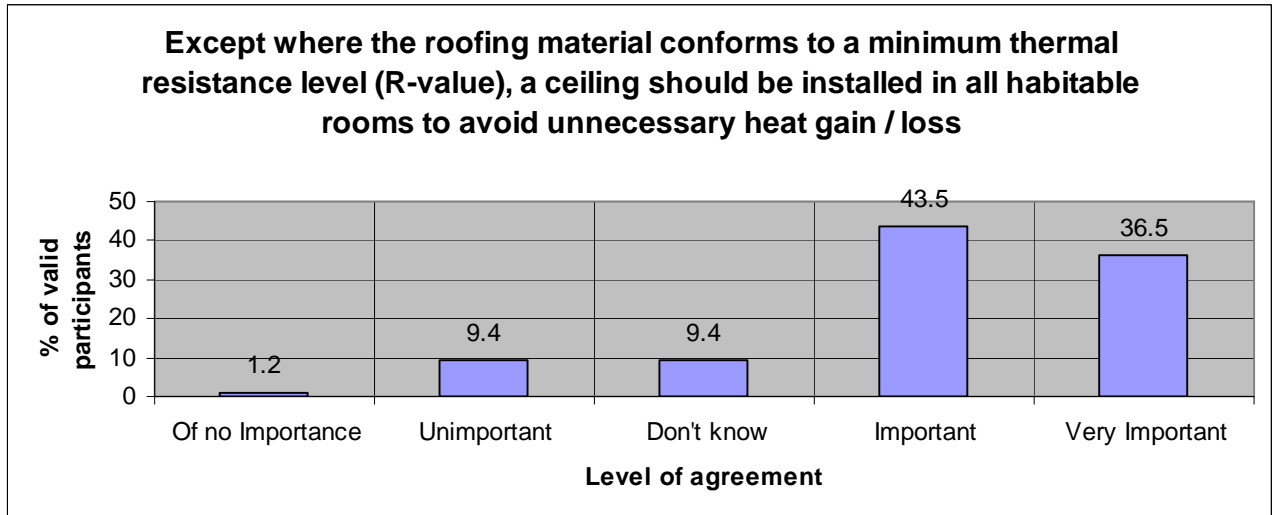


Figure 82: Graphic summary of responses to Question 15.11

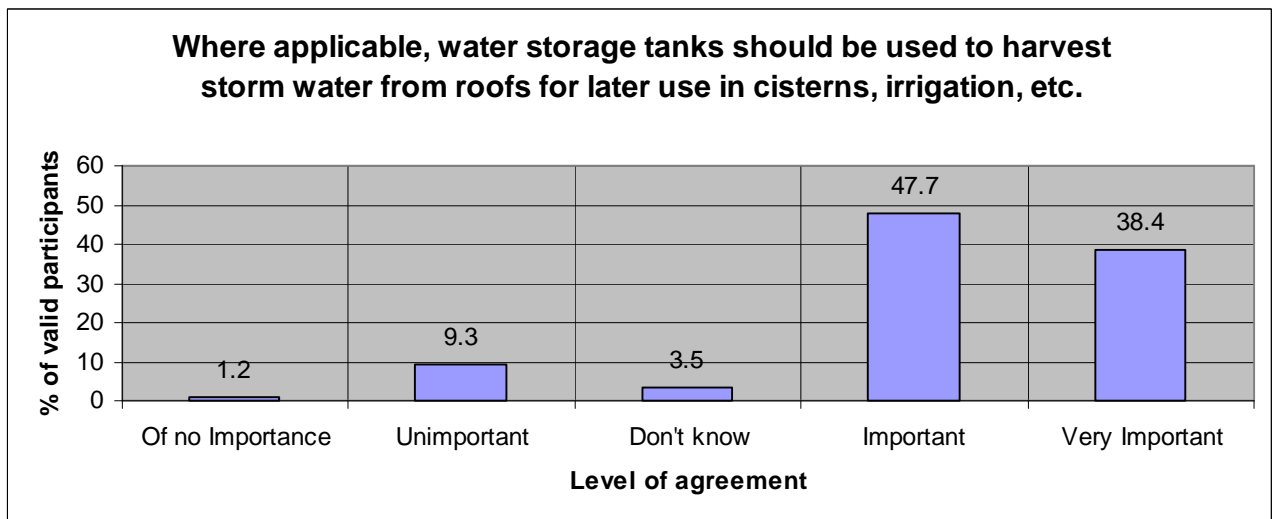


Figure 83: Graphic summary of responses to Question 15.12

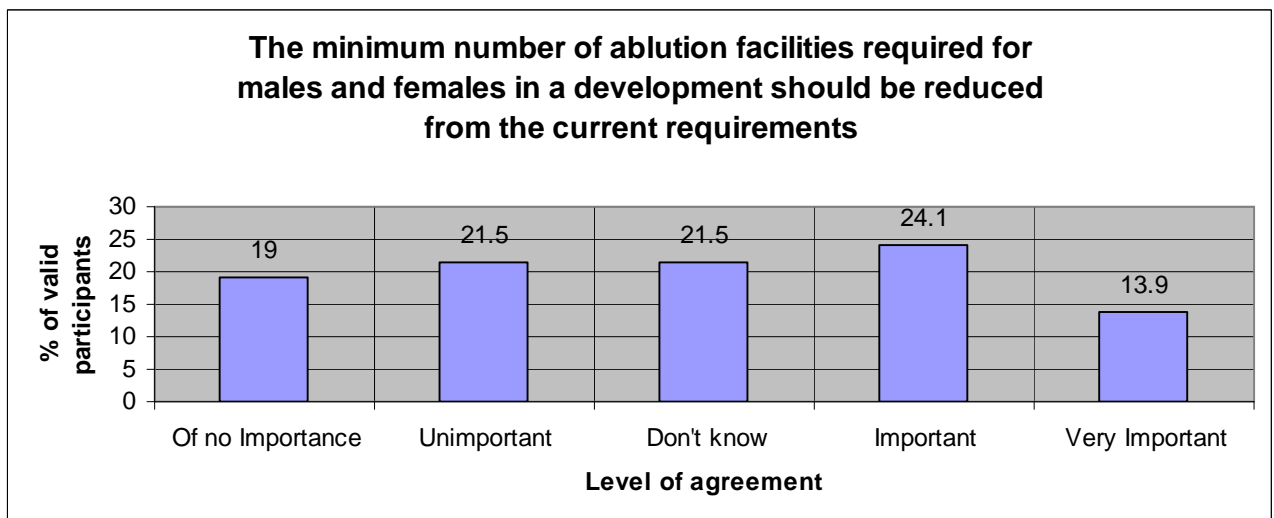


Figure 84: Graphic summary of responses to Question 15.13

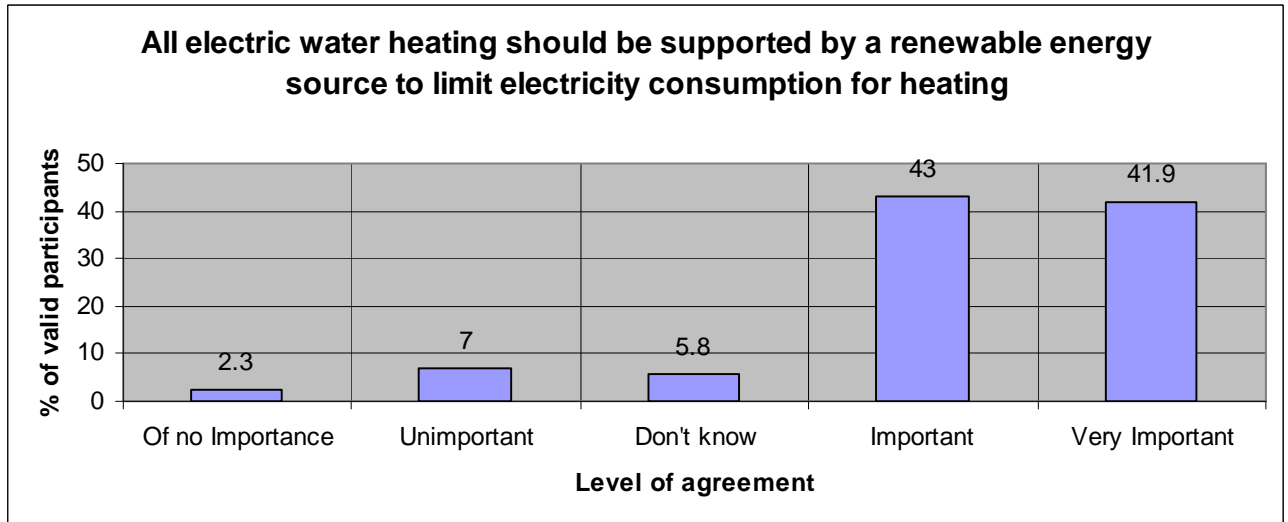
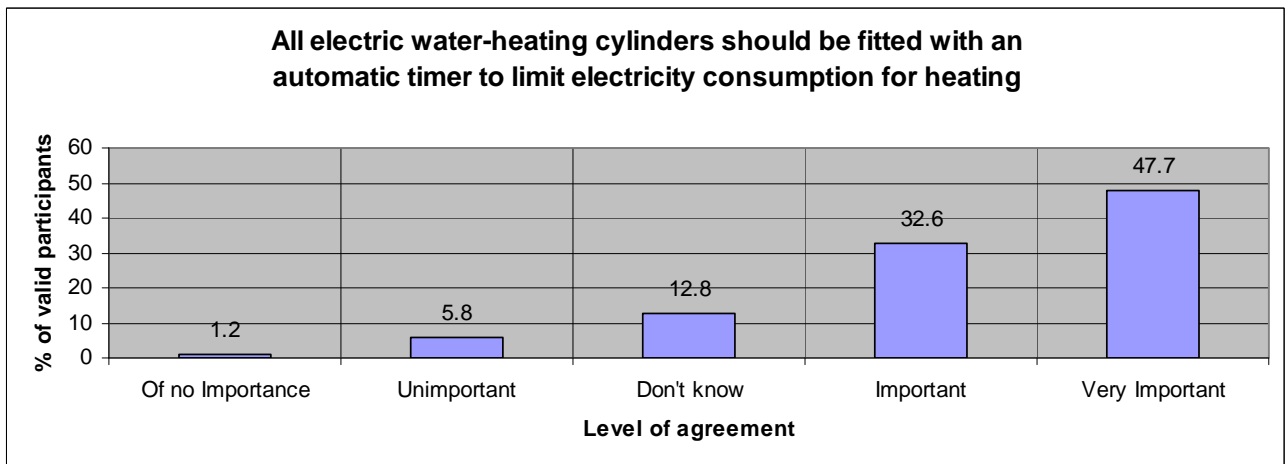


Figure 85: Graphic summary of responses to Question 15.14



#### 4.4.16.5 Ranking of responses to Question 15

The mean averages of the responses were calculated for Questions 15.1 to 15.15. This calculation allows the responses to be ranked from most important to least important. According to the respondents, the order of importance for the inclusion of passive design criteria was as follows:

1. Each habitable room should have a total window area of at least 10% of the floor area (or 0,2m<sup>2</sup>) for natural lighting (Question 15.5)
2. Each habitable room should have openable windows of at least 5% of the floor area (or 0,2m<sup>2</sup>) for natural ventilation (Question 15.6)
3. Cross ventilation should be provided for the majority of habitable rooms (Question 15.7)





4. All electric water-heating cylinders should be fitted with an automatic timer to limit electricity consumption for heating (Question 15.14)
5. All electric water heating should be supported by a renewable energy source to limit electricity consumption for heating (Question 15.13)
6. Where applicable, water storage tanks should be used to harvest stormwater from roofs for later use in cisterns, irrigation, etc. (Question 15.11)
7. Except where the roofing material conforms to a minimum thermal resistance level (R-value), a ceiling should be installed in all habitable rooms to avoid unnecessary heat gain/loss (Question 15.10)
8. If under-floor heating is installed, under-floor insulation material should also be provided to avoid unnecessary heat loss (Question 15.9)
9. The Zone of Space outside any opening should not be less than 1,0m in length from the boundary line, or 0,5m from the building line, with a maximum requirement of 8m (with the exception of built-up urban areas) (Question 15.8)
10. The majority of habitable rooms should face in a northerly direction to avoid unnecessary heating/cooling loads (Question 15.1)
11. Where applicable, all building entrances/exits should be shielded from prevailing winds (Question 15.4)
12. If a habitable room does not face in a northerly or southerly direction, mitigating passive measures (i.e. shading devices, heat reflective glass, screens) should be taken to reduce possible heat gain (Question 15.2)
13. All exposed glass surfaces, except those facing south, should have a protective roof overhang and/or shading device (i.e. canopy, shutters) to reduce possible heat gain (Question 15.3)
14. The minimum number of ablution facilities required for males and females in a development should be reduced from the current requirements (Question 15.12)

#### **4.5 INTERPRETATION OF DATA**

After the graphic summary and description of the data, the essence of research is to deal with the interpretation of the data (Vosloo, 2008: 154-155). The following section interprets the gathered data and formulates preliminary findings to assist in the preparation of the conclusions and recommendations presented in the next chapter.

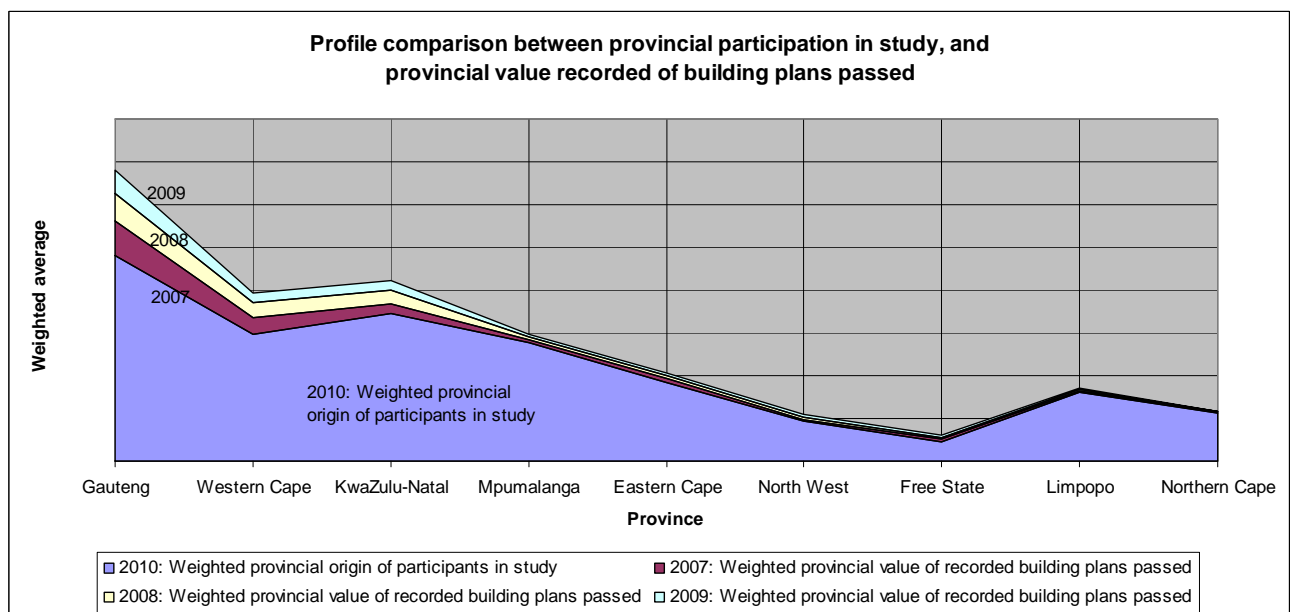
During its interpretation, each question is discussed separately with specific reference to

- the question's original purpose;
- what could be concluded from the responses;
- the question's background, by referring to earlier chapters, and lastly
- an indication of the recommendations to follow in Chapter 5.

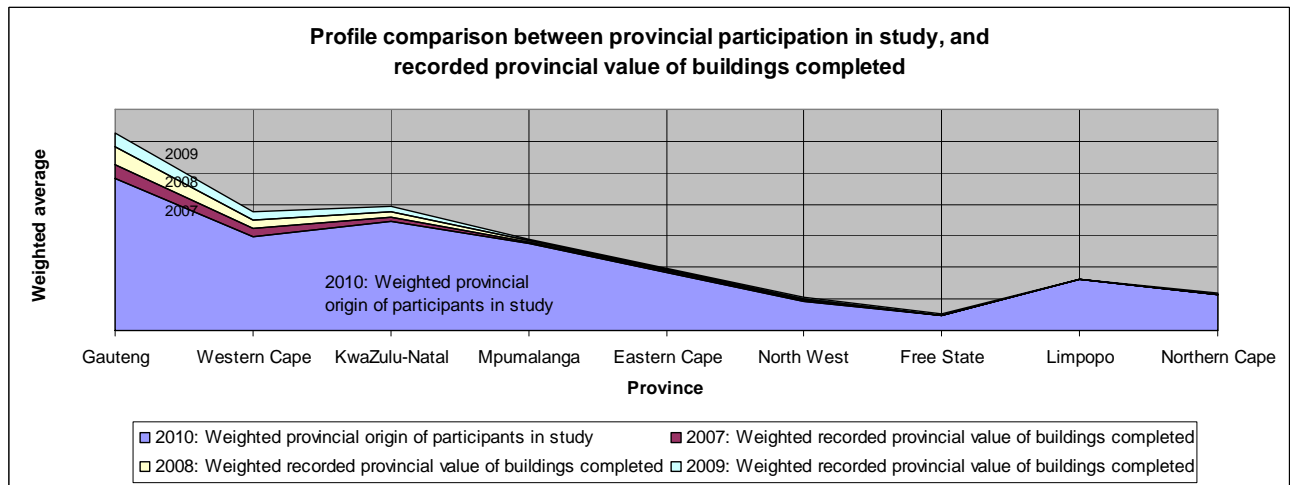
#### **4.5.1 Question 1**

The intention of Question 1 was to determine the provincial distribution of the participants in the study. However, since it was necessary to contextualise the study within the broader context of the South African built environment, the information obtained in Question 1 was compared with data from Stats SA on the recorded value of building plans passed and buildings completed, according to province. Report No. P5041.3 from Stats SA (Stats SA, 2010a: 1-2, 89-90) was used for this purpose. The profile comparison is presented in Figures 86 and 87. (Note that the sequence in which the provinces are listed relates to the explanation on p. 90 and to Figure 6 on p. 130.)

**Figure 86: Graphic summary of responses to Question 1 and recorded provincial value of building plans passed**



**Figure 87: Graphic summary of responses to Question 1 and recorded provincial value of buildings completed**



From Figures 86 and 87 it could be concluded that the specific profiles point to a correlation between provincial participation in the study and the relevant recorded values per province. There is no evident domination by (or neglect of) a particular province in the study, thereby rendering it representative of the built environment in South Africa.

However, the author is well aware that the above argument remains a post-rationalisation and feels it necessary to ascribe this resulting correlation to serendipity. It should be noted that the exact number of participants, and therefore their provincial origin, had been unknown to the researcher until the coding of the questionnaires was completed.

#### **4.5.2 Question 2**

The purpose of Question 2 was to determine the gender and age composition of the participants. The responses indicate that for every female participant there were 7.1 male participants, which implies a male-dominated regulatory environment, specifically for building control at the various LAs. This divergence was further compounded by the age difference in the respondents. The median age for males was 45,5 years, while for females it was 31 years.

The above observations possibly point to a female population with less experience in the built environment than their male counterparts. This hypothesis was proved in



Question 4 where the respondents indicated their work experience. The results revealed 9,5 years' work experience for the female contingent of the population, compared to the male contingent's 21 years of work experience.

Although the study did not set out to discover the above gender patterns, it is recommended that further studies be undertaken on the observed phenomenon. A detailed study could ascertain the particular challenges that the female BCO faces.

#### **4.5.3 Question 3**

The purpose of Question 3 was to determine the current occupation of the respondents. The majority of the participants indicated that they were BCOs (88%), which further validated the study because the respondents proved to be engaging actively with the subject matter (the NBR) on a daily basis. The remainder of participants held occupations within the built environment professions that would also be influenced by the requirements and application of the NBR.

#### **4.5.4 Question 4**

Question 4 determined the work experience of the participants in the built environment, at an LA and as a BCO. An additional option of '*other*' was provided for possible selection.

The median work experience of the participants in the built environment was 14,5 years. Respondents spent a median period of 12 years at an LA, and 6 years working as a BCO. Under *other*, a range of different occupancies in the built environment was listed, with a median experience of 5 years. This indicates a population that has extensive working experience, but is relatively inexperienced in the implementation of Act 103 of 1977.

As part of the recommendations in Chapter 5, the author will suggest an educational programme focusing on Act 103 of 1977 and its statutory requirements.



#### **4.5.5 Question 5**

The purpose of this question was to determine the educational background of the respondents. The Regulations have specific requirements regarding the educational background of the BCO. Regulation A16 in SANS 10400:1990 (SABS, 2010a: 32) states the following requirement:

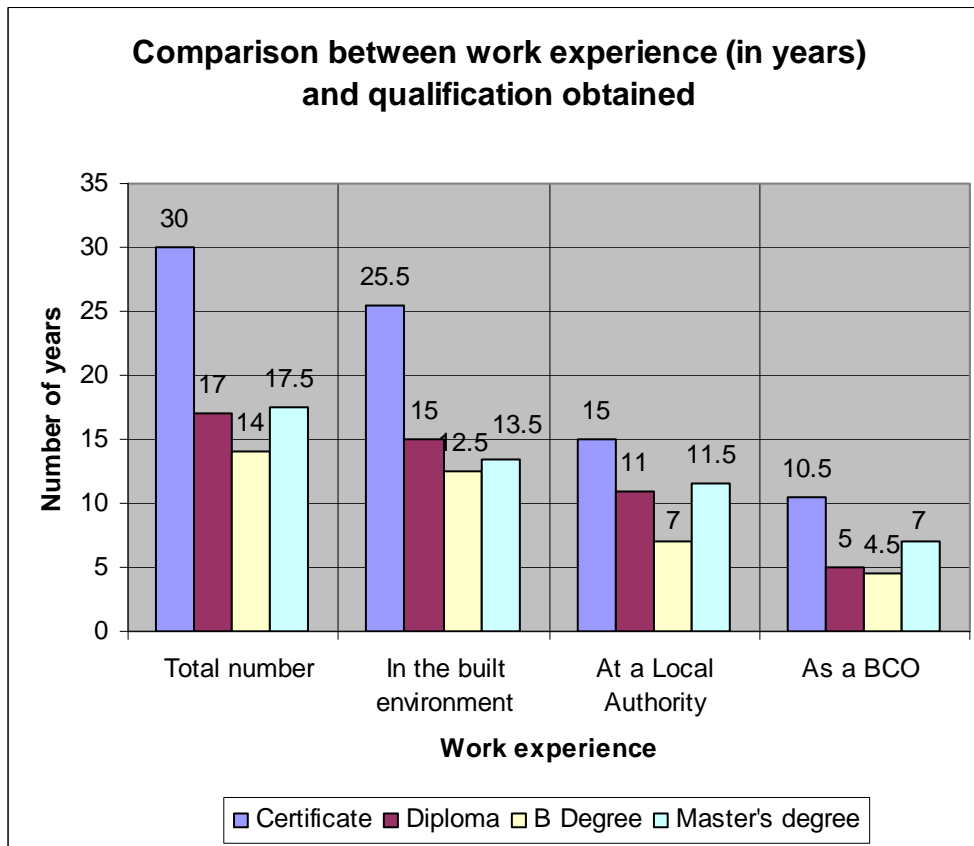
“The minimum qualification of any building control officer appointed in terms of section 5 of Act 103 of 1977 shall be of a standard equivalent to a senior certificate plus 3 years tertiary education, as evaluated by the Human Sciences Research Council, in one of the following building disciplines:

- (a) Civil engineering;
- (b) structural engineering;
- (c) architecture;
- (d) building management;
- (e) building science;
- (f) building surveying; or
- (g) quantity surveying.”

16% of the participants in the survey did not comply with the above requirement; with 1% in possession of a Grade 12 (Standard 10) qualification, and 15% holding a Certificate. A further 62% of the respondents indicated that they possessed a Diploma. This group could well be compliant with the regulation, but further investigation would be needed to determine the precise field of study for which the Diploma was issued. Altogether 17% of the participants had a Bachelor’s degree and 5% a Master’s degree.

Nonetheless, the author believes that the level of education should be evaluated within the context of the participants’ working experience. Figure 88 was compiled to compare the respondents’ years of work experience and qualifications.

Figure 88: Graphic summary of responses to Questions 4.1, 4.2, 4.3 and 4.4, depicting the relationship between experience and qualifications



From the responses it is evident that there was an inverse relationship between the experience and qualifications of the BCOs. In other words, the BCO with a lower qualification had more years of working experience as a BCO. This observation was evident up to the Bachelor's level. The remaining part of the population (5%) that held a Master's degree had a slightly larger number of years' working experience.

As mentioned in the discussion of Question 4, one of the recommendations in Chapter 5 will be the suggestion to establish an educational programme for BCOs.

#### **4.5.6 Question 6**

The purpose of this question was to determine the primary focus of the amended National Building Regulations and Building Standards Act (Act 103 of 1977). Six focus areas were provided for possible selection; and *other* was allowed as a seventh and eighth option.



From the responses it appeared that the focus of Act 103 of 1977 was (in order of importance):

- To ensure a healthy built environment (92% selection of *very important*)
- To ensure a safe built environment (86.4% selection of *very important*, and 12.5% selection of *important*)
- To ensure uniform regulations in the built environment (81.6% selection of *very important*, and 14.9% selection of *important*)
- To promote sustainability in the built environment (69.3% selection of *very important*, and 28.7% selection of *important*)
- To form a basis for future development of the built environment (66.7% selection of *very important*, and 28.7% selection of *important*)
- To limit inflation in the built environment (19.5% selection of *very important* and 41.5% selection of *important*). This option generated the highest selection of *unimportant* (13%) and *of no importance* (14.6%).

In addition, the respondents provided the following *other* possible focus areas of Act 103 of 1977:

- Energy efficiency
- Quality control
- Enforcement of contraventions (*sic*)
- Conservation of the natural environment
- Long-term impact of decisions (*sic*) should be taken into account
- Remuneration of the BCO
- Enforcement of Act 103 of 1977/addressing of compliance
- Consideration of neighbours to avoid buildings becoming a nuisance to them

The literature review of the original function of building regulations in Chapter 2 highlighted the importance of a safe built environment that is healthy and uniformly regulated. This role of the regulations was confirmed by the respondents. However, the specific rationale behind the introduction of the 1977 Act – to limit inflation – is not rated as important by the respondents.



Recommendations in Chapter 5 will include the probable redefinition and emphasis of the original goal of Act 103 of 1977.

#### **4.5.7 Question 7**

This question investigated the exact documents used by the BCO in the execution of his daily tasks. Some of these were drafted by the BCO/LA to supplement the NBR. In particular, the respondents were asked to indicate how often they referred to (or consulted) specific documents. Seventeen possibilities were listed for potential selection, and *other* was allowed as 18<sup>th</sup> and 19<sup>th</sup> options.

The purpose of Question 7 was to determine which documents are used most often and also to establish their origin. The responses could provide guidance for future intervention by highlighting which documents should be addressed first.

From the responses it was clear that the BCO mostly referred to the following documents:

- Plan submission application form (the valid percentage selecting *often* and *very often* for Question 7.6 was 80.7%)
- Checklist for plan approval (the valid percentage selecting *often* and *very often* for Question 7.7 was 77.6%)
- The amended National Building Regulations and Building Standards Act (Act 103 of 1977) (the valid percentage selecting *often* and *very often* for Question 7.1 was 77.3%)
- Notice of approval (the valid percentage selecting *often* and *very often* for Question 7.8 was 72.4%)
- The National Building Regulations promulgated in terms of the relevant sections of Act 103 of 1977 (i.e. Section 17(1), Section 20 read with Section 9, Section 20 read with Section 16, and Section 20 read with Section 17(5)a) (the valid percentage selecting *often* and *very often* for Question 7.2 was 70.1%)
- Guidelines for the preparation of building plans (the valid percentage selecting *often* and *very often* for Question 7.5 was 69%)
- The Deemed-to-Satisfy Rules as included in The Code of Practice for the Application of the National Building Regulations (SABS 0400-1990 or SANS





10400) (the valid percentage selecting *often* and *very often* for Question 7.4 was 65.1%)

- The amended Code of Practice for the Application of the National Building Regulations (SABS 0400-1990 or SANS 10400) (the valid percentage selecting *often* and *very often* for Question 7.3 was 60.9%)

From the responses it emerged that the BCO sometimes also refers to

- regulations for relaxing a building line;
- urban planning/zoning schemes, and
- Planning Ordinances.

From the responses it was clear that the BCO hardly ever refers to

- regulations for reducing (or relaxing) a height restriction;
- regulations for the departure from urban planning/zoning schemes;
- guidelines for heritage and conservation;
- guidelines for architectural design manuals, or
- 'green' building guidelines/by-laws.

Although the valid percentage selecting *often* and *very often* for Question 7.18 (*Other*) was 62.5%, it was decided to exclude the results from the above lists due to the low participation rate of 15.7%. The respondents provided the following list of *other* possible documents:

- Spatial Development Frameworks (SDFs), especially concerning densification
- By-laws in respect of problem buildings
- Human Settlement Guidelines (popularly known as the 'Red Book')
- Reviews of court cases
- Other local by-laws and policy documents
- Other SANS/SABS codes
- Other (no description)
- Comments from other departments in the LA
- Applications for advertisements in terms of local by-laws
- *Specifile* (although no rating is provided)
- Building by-laws (although no rating is provided)



From the responses it could be concluded that the following documents are of paramount importance to the BCO in performing his daily functions:

- The Plan submission application form
- The checklist for plan approval
- Act 103 of 1977
- The National Building Regulations
- Guidelines for the preparation of building plans
- The Deemed-to-Satisfy Rules
- The amended Code of Practice

As pointed out in Chapter 1, the current administration system of the NBR does not provide a formalised version of a *plan submission application form*, a *checklist for plan approval*, or *guidelines for the preparation of building plans*. These documents are drafted by the BCO (as the representative of the LA). They represent interpretations of the NBR, and are used to enforce its statutory requirements.

Recommendations in Chapter 5 will focus on the provision of a standardised version of the application form for plan submission and the Checklist for plan approval.

#### **4.5.8 Question 8**

The purpose of this question was to determine the different ways in which the BCOs interpret the requirements of the amended Code of Practice for the Application of the National Building Regulations (SABS 0400-1990 or SANS 10400). Two possible options were provided and the respondents were asked to indicate their *level of agreement* with each.

The responses seem to indicate a comparable level of agreement with each of the statements, with 41.2% of the respondents *agreeing* (and 35.3% *strongly agreeing*) that the Code represents the minimum requirement as far as the applicant is concerned. Similarly, albeit somewhat lower, 33.3% and 28.7% of the respondents respectively *agreed* and *strongly agreed* that the Code represents the maximum requirement that the LA, and therefore the BCO, could expect from a building project.



However, it should be noted that 20.7% of the respondents *strongly disagreed* with the last interpretation.

The literature review in Chapter 2 indicated that the SABS 0400-1990 (or SANS 10400) represents both the minimum requirement for a building project as far as the applicant is concerned and the maximum requirement that the LA and BCO could expect from a building project. Therefore this original assumption was proved correct from the responses.

Recommendations in Chapter 5 will properly convey the premises of the Code for the Application of the NBR (SABS 0400-1990 or SANS 10400) to the BCO.

#### **4.5.9 Question 9**

The purpose of this question was to determine the BCO's opinion on and implementation of *The Code of Practice for the Application of the National Building Regulations (SABS 0400-1990 or SANS 10400)*. Five statements were made and the respondents were asked to indicate their level of agreement with each.

From the responses it could be concluded that the Code (SABS 0400-1990 or SANS 10400)

- ensures uniform regulation of the built environment (43.8% of the respondents *agreed*, and 36.0% *strongly agreed* with this interpretation);
- is an appropriate administrative instrument (53.9% of the respondents *agreed*, and 25.8% *strongly agreed* with this interpretation);
- is an accessible document that is easily understandable (53.9% of the respondents *agreed*, and 22.5% *strongly agreed* with this interpretation), and
- is structured logically in accordance with all the necessary stages of a construction project (56.3% of the respondents *agreed*, and 21.8% *strongly agreed* with this interpretation).

However, the responses also seem to indicate that the Code (SABS 0400-1990 or SANS 10400) **does not** provide answers to all the questions/issues that a BCO has to address daily. Although 34.8% of the respondents *agreed*, and 14.6% *strongly agreed* with the interpretation that the Code **does** provide answers, 30.3% of the



respondents were *neutral* about this interpretation. The neutral response was the largest recorded under Question 9.

In his personal communication with the author, Opperman (13 May 2010) partially explained why the BCOs struggle to interpret *SABS 0400-1990* or *SANS 10400*:

“There are a number of BCOs in South Africa that operate in isolation. Without knowing about one another, the BCOs do not have a professional support base.”

Recommendations in Chapter 5 will centre on the Code’s limitations in assisting the BCO to answer questions that may arise on a daily basis. Additionally, the establishment of a forum for BCOs within the existing administrative structure of the NRCS will be recommended.

#### **4.5.10 Question 10**

The purpose of this question was to determine whether the following documents that are currently used by the BCO reflect the requirements of the Code (*SABS 0400-1990* or *SANS 10400*):

- Plan submission form
- Checklist for plan approval
- Notice of approval

In addition, the respondents were asked whether the Code (*SABS 0400-1990* or *SANS 10400*) should define a national standardised submission and approval pro forma. From their responses it was clear that the requirements of the Code (*SABS 0400-1990* or *SANS 10400*) was indeed reflected in

- the plan submission form – 48.8% of the respondents *agreed* and 22.1% of the respondents *strongly agreed* with this statement;
- the notice of approval – 48.8% of the respondents *agreed* and 22.1% of the respondents *strongly agreed* with this statement, and
- the checklist for plan approval – 51.7% of the respondents *agreed* and 20.7% of the respondents *strongly agreed* with this statement.



It could be concluded that the Code (SABS 0400-1990 or SANS 10400) should define a pro forma for the LAs, as 31.4% of the respondents *agreed* and 54.7% of the respondents *strongly agreed* with this statement.

The desk review in Chapter 3 highlighted the different methods and tools used by the LA and BCO to implement the requirements of the NBR. This observation was confirmed by the responses to Question 10.

Recommendations in Chapter 5 will focus on the possibility of defining a national standardised submission and approval pro forma for South Africa.

#### **4.5.11 Question 11**

The purpose of this question was to determine whether certain parts of the South African built environment should be exempt from the implementation of the *Code* (SABS 0400-1990 or SANS 10400).

The following was clear from the responses:

- All official government buildings should be subject to the full approval procedure – 62.8% of the respondents *strongly disagreed* and 16.3% *disagreed* with the current practice of only submitting a ‘courtesy application’ to the relevant LA.
- Government-subsided housing should fall under the mandate of SABS 0400-1990 and therefore under that of the BCO – 57.5% of the respondents *strongly disagreed* and 19.5% *disagreed* with its current position outside the jurisdiction of the Code (and therefore the BCO).
- As soon as any alterations or additions are made to a government-subsided house, it should fall under the formal sector<sup>59</sup>, conforming to all the relevant requirements of SABS 0400-1990 (or SANS 10400) – 45.8% of the respondents *strongly agreed* and 27.7% *agreed* with this statement.

---

<sup>59</sup> At present the construction of government-subsidised housing is exempt from the requirements of the NBR. Strictly speaking, this building typology falls in the ‘formalised’ sector of the built environment, but it does not adhere to its requirements. This becomes problematic when the owner of a house wishes to make alterations and additions to the original structure. See par. 2.10 and the responses of the BCOs to Questions 11.2 and 11.3 on pp. 159-161.



- There is uncertainty among the BCOs whether there should be two different codes under SABS 0400-1990 (or SANS 10400) – one applicable to the formal segment of the South African built environment and another separate code for informal settlements. Although 23.0% of the respondents *agreed* and 29.9% *strongly agreed* that there should be two different codes, 25.3% of the respondents *strongly disagreed* with this statement. In addition, 13.8% were uncertain.

The literature review in Chapter 2 referred to the current requirements for planning approval pertaining to official government buildings and government-subsidised housing. The current system only requires a submission to the LA for information purposes, thereby excusing a substantial part of the formal built environment from approval requirements of the NBR. The BCOs' uncertainty about whether two different codes should exist indicates that there is a need for further research, and this would be recommended as such.

Recommendations in Chapter 5 will also suggest the inclusion of official government buildings and government-subsidised housing as special categories for planning approval.

#### **4.5.12 Question 12**

The purpose of this question was to determine the BCOs' awareness of (and participation in) the various *imminent changes to the NBR*, which are currently envisioned by the regulating authorities (NRCS and SABS).

From the responses it seems that the majority of the respondents (70.1%) were aware of the publication of the respective standards for SANS 10400 (Parts A-H, J-W), which will replace the amended Code for the Application of the NBR (SABS 0400-1990). However, very few of the BCOs actually commented on the proposed change and 88.4% of the respondents indicated that they had not submitted a formal comment.

More than half of the respondents (65.5%) were aware of the voluntary standard SANS 204: 2008 (Parts 1, 2 + 3) that focuses on energy efficiency in buildings. Sixty



per cent of them knew that the standard SANS 10400-XA: 2010 (Energy usage in buildings) had been published for public comment on 15 June 2010. However, 86.2% of the BCOs had not submitted a formal comment.

Just more than half of the respondents (54.1%) were aware that the standard SANS 10400-O: 2010 (Lighting and ventilation) had been published for public comment, and again many of the respondents (86.0%) admitted that they had not submitted a formal comment.

It may be concluded from the above that the existing communication channels are inadequate, or perhaps non-existent. Recommendations in Chapter 5 will include the potential establishment of a reiterative consultation process between the Department of Trade and Industry (DTI), the South African Bureau of Standards (SABS), the National Regulator for Compulsory Specifications (NRCS), and the BCOs through the relevant LAs.

#### **4.5.13 Question 13**

The purpose of this question was to determine how envisioned changes to the NBR would impact on (influence the daily operation of) the BCOs.

From the responses it could be concluded that the majority of respondents *agreed* that changes to the NBR will have a significant impact on their daily operation.

The specific replies included the following:

- 43.5% of the respondents agreed and 34.1% strongly agreed that the implementation of the new standards as set out in *SANS 10400 (parts A-H, J-W)* would have a significant impact. On the other hand, 18.8% of the respondents remained neutral.
- 36.5% of the respondents agreed and 43.5% strongly agreed that the implementation of the new standards as set out in *SANS 10400-XA: 2010 (Energy usage in buildings)* would have a significant impact. However, 18.8% of the respondents disagreed with the statement.
- 32.9% of the respondents agreed and 38.8% strongly agreed that implementation of the new standards as set out in *SANS 10400-O: 2010*



(*Lighting and ventilation*) would have a significant impact. In contrast, 23.5% of the respondents remained neutral.

In Chapter 2, the role of the BCO as primary agent responsible for implementing the requirements of the NBR was emphasised.

The recommendations in Chapter 5 emphasise the participatory role of the BCO in identifying existing shortcomings of the NBR and suggesting possible solutions to these.

#### **4.5.14 Question 14**

The purpose of this question was to determine the possible inclusion of criteria that would promote sustainability in the built environment as additional requirements of the NBR.

The following could be concluded from the responses:

- Development in the built environment should be done in a sustainable manner – altogether 95.3% of the respondents actively supported the statement (42.9% *agreed* and 52.4% *strongly agreed* with this notion).
- The building regulations should address the future impact that buildings will have on the natural environment – 90.6% of the respondents actively supported the statement (43.5% *agreed* and 47.1% *strongly agreed*).
- Buildings should be designed to reduce their total energy consumption to a minimum – 81.6% of the respondents actively supported the statement (31.0% *agreed* and 50.6% *strongly agreed*).
- The concept of ‘sustainability’ should be incorporated into the NBR – 88.6% of the respondents actively supported the statement (50.0% *agreed* and 38.6% *strongly agreed*).
- The concept of ‘resource efficiency’ should be incorporated into the NBR – 85.2% of the respondents actively supported the statement (51.1% *agreed* and 34.1% *strongly agreed*).
- The building regulations should control and limit the energy consumption of the building sector – 81.8% of the respondents actively supported the statement (44.3% *agreed* and 37.5% *strongly agreed*).





- The concept of 'green buildings' should be incorporated into the NBR – 80.2% of the respondents actively supported the statement (44.2% *agreed* and 36.0% *strongly agreed*).
- The building regulations should address the future impact that buildings will have on the man-made environment – 79.5% of the respondents actively supported the statement (44.3% *agreed* and 35.2% *strongly agreed*).
- The existing administration methods of the NBR could be adapted without difficulty to include additional minimum passive design criteria – 75.3% of the respondents actively supported the statement (55.3% *agreed* and 20.0% *strongly agreed*).
- Minimum passive design criteria should be included as additional requirements in the NBR – 74.2% of the respondents actively supported the statement (47.1% *agreed* and 27.1% *strongly agreed*).

The literature review in Chapter 2 highlighted the necessity of rendering the NBR more sustainable under the Constitution of South Africa<sup>60</sup>. The responses indicate that the participating BCOs also place a high premium on sustainability issues in the built environment. Chapter 5 will include recommendations to address this matter by utilising the plan approval process and associated skills of the BCOs.

#### **4.5.15 Question 15**

The purpose of this question was to determine whether certain ***passive design criteria*** could be included in the NBR as additional requirements, specifically as part of the plan checklist.

The responses confirmed the inclusion of the following aspects as part of the 'plan checklist':

- Each habitable room should have a total window area of at least 10% of the floor area (or 0,2m<sup>2</sup>), for natural lighting – altogether 95.2% of the respondents reacted positively (46.4% considered it *important* and 48.8% *very important*).

---

<sup>60</sup> See par. 2.7.1.



- Each habitable room should have openable windows of at least 5% of the floor area (or 0,2m<sup>2</sup>), for natural ventilation – 89.5% of the respondents reacted positively (45.3% considered it *important* and 44.2% *very important*).
- The Zone of Space outside any opening should not be less than 1,0m in length to the boundary line, or 0,5m to the building line, with a maximum requirement of 8m (with the exception of built-up urban areas) – 80% of the respondents reacted positively (57.6% considered it *important* and 22.4% *very important*).

The responses also suggested that the following proposals should be included as additional requirements to the NBR, specifically as part of the plan checklist:

- Cross ventilation should be provided for the majority of habitable rooms – altogether 88.4% of the respondents reacted positively (44.2% considered it *important* and 44.2% *very important*).
- Where applicable, water storage tanks should be used to harvest stormwater from roofs for later use in cisterns, irrigation, etc. – 86.1% of the respondents reacted positively (47.7% considered it *important* and 38.4% *very important*).
- All electric water heating should be supported by a renewable energy source to limit electricity consumption for heating – 84.9% of the respondents reacted positively (43.0% considered it *important* and 41.9% *very important*).
- All electric water-heating cylinders should be fitted with an automatic timer to limit electricity consumption for heating – 80.3% of the respondents reacted positively (32.6% considered it *important* and 47.7% *very important*).
- Except where the roofing material conforms to a minimum thermal resistance level (R-value), a ceiling should be installed in all habitable rooms to avoid unnecessary heat gain/loss – 80% of the respondents reacted positively (43.5% considered it *important* and 36.5% *very important*).
- Where applicable, all building entrances or exits should be shielded from prevailing winds – 78.9% of the respondents reacted positively (56.5% considered it *important* and 22.4% *very important*).
- The majority of habitable rooms should face in a northerly direction to avoid unnecessary heating/cooling loads – 77% of the respondents reacted positively (46.0% considered it *important* and 31.0% *very important*).



- If under-floor heating is installed, under-floor insulation material should also be provided to avoid unnecessary heat loss – 76.2% of the respondents reacted positively (41.7% considered it *important* and 34.5% *very important*).

The responses indicate that the following components could be included as additional requirements to the NBR, specifically as part of the plan checklist:

- If a habitable room does not face in a northerly or southerly direction, mitigating passive measures (i.e. shading devices, heat reflective glass, screens) should be taken to reduce possible heat gain – altogether 68.7% of the respondents reacted positively (42.2% considered it *important* and 26.5% *very important*).
- All exposed glass surfaces, except those facing south, should have a protective roof overhang and/or shading device (i.e. canopy, shutters) to reduce possible heat gain – 66.3% of the respondents reacted positively (41.0% considered it *important* and 25.3% *very important*). However, 20.5% of the respondents considered it unimportant.

It seems that the respondents deemed it unnecessary to include the proposal to reduce the *current minimum requirements for the number of ablution facilities for males and females in a development* as an amendment to the existing NBR requirements. A large number of the responses (40.5%) were negative (21.5% viewed it as unimportant and 19.0% of no importance), with only 38% of the respondents reacting positively (24.1% considered it *important* and 13.9% *very important*).

The literature review in Chapter 2 listed the following passive design measures for possible incorporation in the NBR:

1. Orientation
2. Shading of openings in northern walls
3. Natural light
4. Ventilation
5. Zone of Space
6. Cross ventilation
7. Roof / ceiling construction



8. In-slab heating
9. Stormwater harvesting
10. Solar energy
11. Services

It is the opinion of the researcher that the inclusion of the above aspects as additional requirements to the NBR will not result in unnecessary additional cost. The recommendations in Chapter 5 will list the proposed passive design measures to be included. However, the cost implication of these measures warrants further research and falls beyond the scope of this study.

#### 4.6 SUMMARY OF CHAPTER 4

Chapter 4 started off with a review of the research design. The proposed questionnaire put to the BCOs was subsequently introduced, highlighting the method, measurement and target population.

This was followed by a graphic presentation of data, after which the 15 questions were briefly described and analysed. Finally the data was interpreted in preparation for Chapter 5, where the conclusions reached through the study will be indicated and recommendations will be made.

To assist the reader, a summary of the research design is provided in Table 63, and the aspects that were addressed in Chapter 4 are highlighted.

**Table 63: A summary of the research design highlighting the completed phases**

