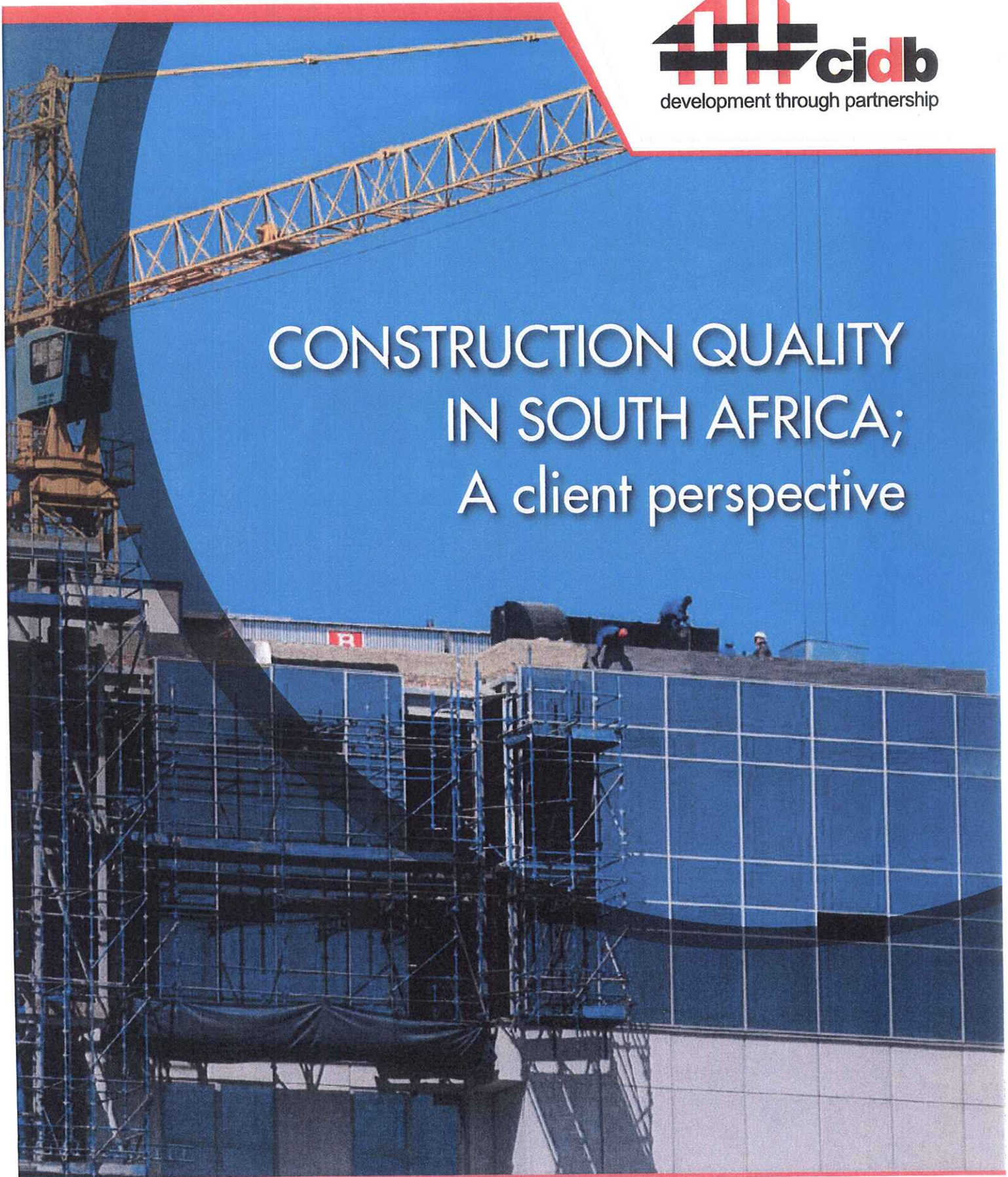


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CONSTRUCTION QUALITY IN SOUTH AFRICA; A client perspective



CONSTRUCTION QUALITY IN SOUTH AFRICA: A CLIENT PERSPECTIVE

CONSTRUCTION QUALITY IN SOUTH AFRICA: A CLIENT PERSPECTIVE

EXECUTIVE SUMMARY

The cidb was established by an Act of Parliament (Act 38 of 2000), with a mandate (amongst others) to:

.... promote the contribution of the construction industry in meeting national construction demand and in advancing:

- i) national, social and economic development objectives;*
- ii) industry performance, efficiency and competitiveness; and*
- iii) improved value to clients.*

Value to clients is a very complex and often subjective issue, but it is recognised that quality of construction is a key component of perceived value to clients. As noted by FIDIC, *"lack of quality in construction is manifested in poor or non-sustainable workmanship, and unsafe structures; and in delays, cost overruns and disputes in construction contracts"*. Value and quality of construction is of concern to both public and private sector clients.

Against this background, the cidb has undertaken this study on the quality of construction in South Africa. This investigation is undertaken largely from a client perspective (and largely from a public sector client perspective), and concludes by highlighting those actions that clients can implement to derive higher quality on their construction projects. The report investigates the factors impacting on construction quality through the value chain in creating new capital works, namely design, procurement and construction. (The impact of operation and maintenance on construction quality is not discussed here, and reference to this can be found in various documents dealing with the National Infrastructure Maintenance Strategy (NIMS)).

The report on construction quality draws on two key studies, namely the annual cidb *Construction Industry Indicators* (CIIs) which contains a significant amount of information on construction quality; together with a research report on the state of construction quality commissioned for this study. This latter study included surveys of clients, designers and contractors.

The report first presents an overview of the state of construction quality in South Africa, from which it is shown that clients are neutral or dissatisfied with the quality of construction on around 20% of all projects, and around 12% of the projects surveyed had levels of defects which are regarded as inappropriate. It is argued that clients should not be complacent with these levels of dissatisfaction, and that clients should strive to get better value for money.

The report also notes that client dissatisfaction is highest in the residential building sector, followed by special works and non-residential building. Specifically, low- and middle-income residential construction was ranked the lowest in terms of quality achieved (typically ranked poor to average quality), while the quality of upper-income residential was ranked as average to good. The report then notes that due to a regulatory constraint in which homebuilders are exempt from registering with the cidb, clients in fact do not have the flexibility to specify a requirement for using cidb registered contractors (in addition to the existing NHBC requirements).

Significantly, it is concluded that client dissatisfaction with the quality of completed work on around 2% of the projects surveyed in 2009 translates to dissatisfaction on completed work in the public sector to a value of around R3,5 billion per year!

The report then investigates the barriers to quality in construction, which include the traditional barriers within the design, procurement and construction processes. However, it is noted that corruption, political interference and institutional barriers are becoming increasingly more dominant in South Africa. It is then postulated that the majority of those cases in which clients are dissatisfied with construction quality could probably be attributed largely to procurement related barriers (including fraud and corruption) in the

The report also highlights local and international experience that suggests that greater attention also needs to be focused on the role of the client's agent in construction quality – for example using performance management systems similar to those advocated by the cidb for assessing the performance of contractors and design services.

In addition, this section presents a brief overview of the highly successful CONQUAS system developed by the BCA in Singapore, which is being used in Singapore as the basis for a construction quality bonus scheme, using merit and demerit points. The report notes that strong consideration should be given to introducing CONQUAS in South Africa – as a basis for 'absolute' measurements of construction quality.

Finally, the report notes that a consistent underlying theme to improving the quality of construction in South Africa is the 'management of quality' – which must permeate across all stakeholders in the construction delivery chain (as well as, in fact, the operation and maintenance of infrastructure). Key to this is the need for adequate exposure to quality management in the course content at all levels of schooling in the built environment, and the CBE therefore needs to assess and, where appropriate, strengthen the requirements for 'quality management' in the course content within built environment academic institutions.

The report concludes with specific recommendations that the cidb and other stakeholders could action to support enhanced construction quality in South Africa, namely:

- i) In addition to the existing mandatory NHBRC requirements, clients should be able to have the flexibility to specify additional requirements for procuring from cidb registered contractors in the residential building sector, where appropriate.
- ii) The cidb should advocate for the maintenance of the necessary technical capacity for the development and maintenance of construction standards, codes and specifications – including that at the SABS and the CSIR.
- iii) Strong consideration should be given by the cidb to introduce requirements for integrity and transparency in construction procurement.
- iv) Strong consideration should be given by the cidb to advocate for procurement and delivery models promoting collaborative relationships and integrated supply teams (including design and build contracting strategies).
- v) The cidb needs to continue to advocate for and to strengthen requirements for the appointment of professional services and contractors based on quality criteria – supported by performance assessment reports for professional service providers and contractors.
- vi) The cidb should investigate the possible use of performance assessment reports for the client's agent in the public sector as a best practice.
- vii) The cidb must continue to advocate for a building and construction component to be incorporated into the South African World Skills activities – and should actively seek to incorporate a construction skills component into the South African delegation.
- viii) Strong consideration should be given by the cidb to piloting and testing the Singapore BCA CONQUAS system in South Africa.
- ix) The CBE should assess and (where appropriate) strengthen the requirements for 'quality management' in the course content within built environment academic institutions.



CONSTRUCTION QUALITY IN SOUTH AFRICA: A CLIENT PERSPECTIVE

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1 BACKGROUND AND INTRODUCTION

The cidb was established by an Act of Parliament (Act 38 of 2000), with a mandate (amongst others) to:

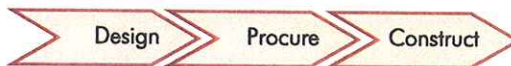
.... promote the contribution of the construction industry in meeting national construction demand and in advancing:

- i) national, social and economic development objectives;*
- ii) industry performance, efficiency and competitiveness; and*
- iii) improved value to clients.*

Value to clients is a very complex and often subjective issue, but it is recognised that quality of construction is a key component of perceived value to clients. As noted by FIDIC¹, *"lack of quality in construction is manifested in poor or non-sustainable workmanship, and unsafe structures, and in delays, cost overruns and disputes in construction contracts"*. Value and quality of construction is of concern to both public and private sector clients.

As the public sector accounts for around 80% of all civil works and around 20% of residential and non-residential building works, value and quality are particularly important to public sector clients. Furthermore, the public sector also has a role and responsibility towards the development and the transformation of the building and construction industry. This transformation, however, must be achieved within acceptable value and quality norms.

Against this background, the cidb has undertaken this study on the quality of construction in South Africa. This investigation is undertaken largely from a client perspective, and concludes by highlighting those actions that clients can implement to derive higher quality on their construction projects. The report investigates the factors impacting on construction quality through the value chain in creating new capital works, namely design, procurement and construction. (The impact of operation and maintenance on construction quality is not discussed here, and reference to this can be found in various documents dealing with the National Infrastructure Maintenance Strategy (NIMS)^{2,3}).



The report on construction quality draws on two key studies, namely the annual cidb *Construction Industry Indicators*⁴ (CIIs) which contain a significant amount of information on construction quality, together with a research report on the state of construction quality commissioned for this study⁵. This later study included surveys of clients, designers and contractors.

This report concludes by focusing on recommendations that the cidb could implement in support of the need to enhance quality in construction, and provides an assessment of those actions which the cidb has already begun to implement.

An overview of the report is given below:

- Section 2 presents an overview of the state of construction quality in South Africa, from which it is shown that, overall, clients are satisfied with the quality of construction. However, it is argued that clients should not be complacent, and clients should strive to get better value for money.

1 FIDIC. *Quality of Construction: Policy*. International Federation of Consulting Engineers, Geneva. <http://www1.fidic.org>

2 cidb, DPW & CSIR (2007). *The National Infrastructure Maintenance Strategy in Support of ASGISA and Government Growth Objectives*. Construction Industry Development Board, Pretoria. <http://www.cidb.org.za>

3 cidb & CSIR (2007). *The State of Municipal Infrastructure and its Operation and Maintenance: An Overview*. Construction Industry Development Board, Pretoria. <http://www.cidb.org.za>

4 cidb (2010). *The cidb Construction Industry Indicators Summary Results: 2009*. Construction Industry Development Board, Pretoria. <http://www.cidb.org.za>

5 CREATE (2010). *Status Report on Construction Quality in South Africa: Draft*. Construction Research Education and Training Enterprises, Port Elizabeth.

- Section 3 investigates the barriers to quality in construction, which include the traditional barriers within the design, procurement and construction processes. Corruption, political interference and institutional barriers are becoming increasingly more dominant in South Africa and these barriers are investigated in more detail in the sections that follow.
- Section 4 investigates designing for and specifying quality, and highlights concerns that are being observed regarding a deteriorating capacity necessary to develop and maintain technical standards, codes and specifications, as well as a deteriorating design capability in South Africa. This section then reviews international experience, which highlights the importance of adopting procurement methods that specifically provide for the selection of professional services for the appointment of design services based on quality criteria.
- Section 5 looks at the barriers to quality arising through the process of procuring contractors, namely that of matching a contractor's capabilities to the requirements of the project, as well as political interference, cronyism, and fraud and corruption. The section concludes with a review of local and international mechanisms that enhance procuring construction quality – including the *cidb Best Practice Contractor Recognition Scheme* that is currently under development, and internationally used integrity and transparency systems aimed at reducing corruption.
- Section 6 investigates the key construction site related barriers to quality, namely process issues and skills and competence issues, as well as the effectiveness of the client's representative in ensuring compliance by the contractor with the client's quality specification. This section also reviews *cidb* and international initiatives to enhance construction quality.
- Section 7 presents a synthesis of the preceding sections on the barriers to construction quality, together with local and international initiatives to strengthen construction quality. This section also puts forward recommendations that clients could focus on to enhance construction quality, as well as actions that the *cidb* could adopt.

2 STATE OF CONSTRUCTION QUALITY

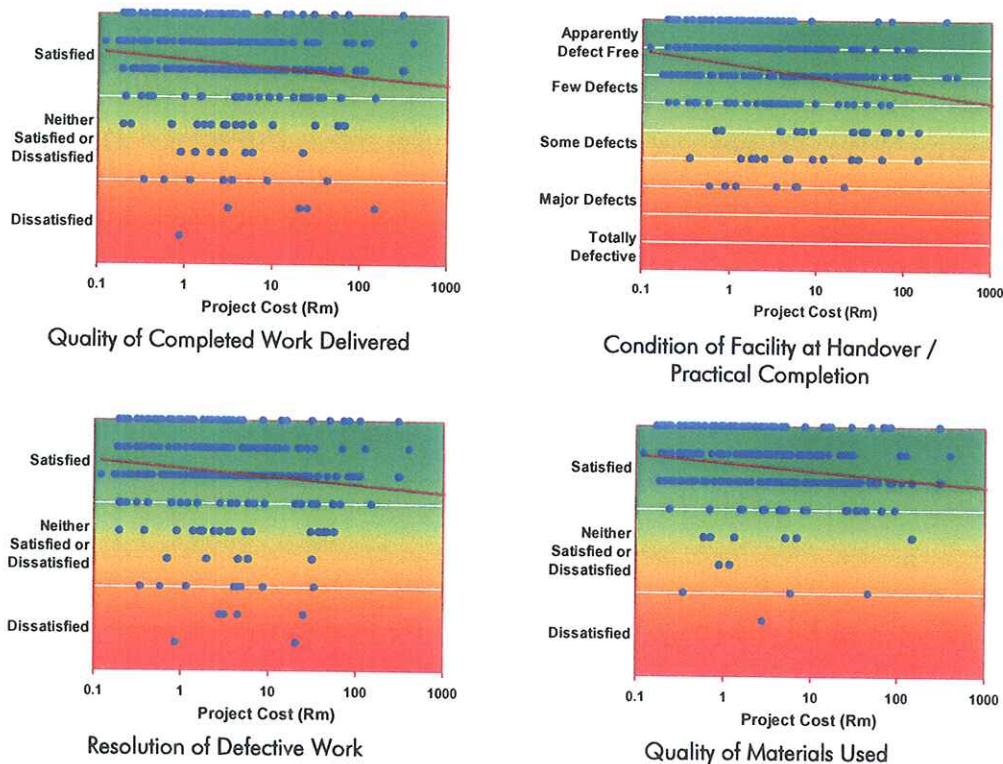
Quality: The degree to which a set of inherent characteristics fulfils requirements.
ISO 9000; 2000

2.1 Overview

The *cidb Construction Industry Indicators* (CIIs) have been captured annually since 2003, and contain a significant amount of information regarding construction quality, including⁶:

- client satisfaction with the quality of the completed construction work delivered;
- client satisfaction with the resolution of defective work during the construction period by the main contractor;
- the condition of the facility at the time of handover / practical completion with respect to defects; and
- client satisfaction with the overall quality of materials used.

The 2009 *cidb Construction Industry Indicators* drew on responses from 332 client departments and 1 169 contractors from across all nine provinces, and a summary of key quality related issues is given in the following figures:



From the above it can be seen that, overall, clients are satisfied with the quality of the completed work being delivered. However, while the overall quality performance indicators for the industry are satisfactory, the following key issues were observed:

- clients were neutral or dissatisfied with the quality of completed work on around 20% of the projects surveyed;

⁶ *cidb* (2009). *The cidb Construction Industry Indicators Summary Results: 2009*. Construction Industry Development Board. Pretoria. <http://www.cidb.org.za>

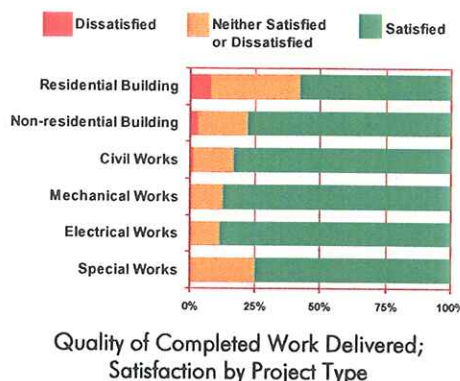
- around 12% of the projects surveyed had levels of defects which are regarded as inappropriate;
- clients were neutral or dissatisfied with the resolution of defective work on around 23% of the projects surveyed; and
- clients were neutral or dissatisfied with the quality of materials used on around 11% of the projects surveyed.

Client dissatisfaction with the quality of completed on around 2% of the projects surveyed in 2009 translates to dissatisfaction on completed work to a value in the public sector of around R3,5 billion per year!

2.2 The Residential Building Sector

While, overall, clients are satisfied with the quality of work delivered by contractors, of significance is the breakdown in the quality of the completed constructions works by type given in the adjacent figure – from which it is seen that client dissatisfaction is highest in the residential building sector, followed by special works and non-residential building.

Similar results were obtained in a survey undertaken for this report on construction quality, which investigated the perceptions of a range of stakeholders and various construction sectors. Again, low- and middle-income residential construction was ranked the lowest in terms of quality achieved (typically ranked poor to average), while the quality of upper-income residential, commercial, industrial and other infrastructure was ranked as average to good.



Perceptions of the Quality of Construction per Sector
Scale: 1 = very poor; 3 = average; 5 = very good
Mean Score

Sector	Clients	Designers	Project Managers	Contractors; Grades 2 to 4	Contractors Grades 5 to 9	Overall Mean	Rank
Commercial	3.5	3.1	3.7	3.9	3.5	3.5	2
Industrial	3.6	2.8	3.6	3.8	3.7	3.5	3
Infrastructure	3.6	3.0	3.3	3.0	3.5	3.3	4
Residential:							
Low-income	2.4	1.4	1.5	2.0	2.1	1.9	6
Middle-income	3.3	2.4	2.8	3.0	2.8	2.9	5
Upper-income	4.2	3.5	4.0	4.0	3.8	3.9	1

Of interest from the above survey is that contractors and clients typically rated quality as being higher than that rated by most other stakeholders.

The dissatisfaction with quality in the low-income residential housing sector is well publicised, as is illustrated by the following reports and investigations into subsidy-housing in the public sector:

- investigations and audits by the Department of Human Settlements have shown that it would cost South Africa R1,3-billion, or 10% of its 2009/10 year's budget, to rectify badly built Reconstruction and Development Programme (RDP) houses^{7,8};



Source: Dispatch Online;
<http://blogs.dispatch.co.za/brokenhomes>

⁷ Engineering News (2009). *Sexwale says he is ready to take tough action against fraudulent contractors*. Christy van der Merwe. 2 November 2009. <http://www.engineeringnews.co.za>

- a NHBRC forensic investigation estimated the rectification costs to be around R400 million to re-instate structural integrity and with NHBRC minimum technical requirements and the NBRs on around 41 000 houses investigated⁹;
- a report by the Department of Housing of the Province of the Eastern Cape (which is included in the NHBRC report above) noted that of around 20 000 houses assessed, the rectification costs were put at around R360 million¹⁰.

Although reports of poor quality appear to be dominant in the low-cost public housing sector, poor quality is also regularly observed in the private residential housing sector. For example, Brandon Abdinor, Director of KwaZulu's Masterbuilders Association, notes that:



Source: Dispatch Online;
<http://blogs.dispatch.co.za/brokenhomes>

"It is unfortunate that complaints about builders generally, as well as personal accounts of unhappy relations with builders, are all too common. Clients of all types often recount stories of how their various building projects have been fraught with difficulty and have ultimately caused financial and emotional hardship.

The truth is that the industry, and the standards to which various participants operate, is extremely varied. On the one hand you have sustainable and successful enterprises, regardless of the magnitude of projects undertaken, which are skilled, professional and conduct themselves in such a manner which leads to satisfaction on the part of clients and agents alike. On the other hand there are innumerable unscrupulous, unskilled and opportunistic operators whose conduct is totally unacceptable."

It should however also be noted that while the cidb does not regulate the homebuilding sector, due to a regulatory constraint in which homebuilders are exempt from registering with the cidb, clients in fact do not have the flexibility to specify a requirement for using cidb registered contractors in addition to the existing mandatory NHBRC requirements – which could enhance the procurement of contractors that are most suitable for requirements of the job. This constraint is particularly important when considering the potential benefits of the cidb *Best Practice Contractor Recognition Scheme* being developed (see Section 5.1 to follow). Strong consideration should therefore be given to removing this constraint.

Clients in the residential building sector (including the subsidy housing sector) are presently effectively excluded from deriving any benefits from the cidb Register of Contractors.

8 Engineering News (2010). *Fight against housing corruption begins to gain traction with over 900 arrests*. Dennis Ndaba. 16 April 2010. <http://www.engineeringnews.co.za>

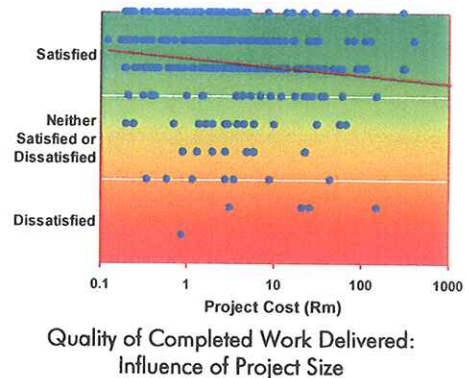
9 NHBRC (2008). *NHBRC Report to Confirm the Progress Made in Terms of Forensic Projects that were Undertaken and to Confirm the Estimated Rectification Costs on these Projects; Confidential report*. [http://blogs.dispatch.co.za/brokenhomes/wp-content/themes/Ghosttown/images/NHBRC Forensic Audit.pdf](http://blogs.dispatch.co.za/brokenhomes/wp-content/themes/Ghosttown/images/NHBRC%20Forensic%20Audit.pdf)

10 EC Housing (2009). *Rectification and Enrolment Progress Report as at end June 2009*. Province of the Eastern Cape: Housing. [http://blogs.dispatch.co.za/brokenhomes/wp-content/themes/Ghosttown/images/Rectification and Enrolment progress report.pdf](http://blogs.dispatch.co.za/brokenhomes/wp-content/themes/Ghosttown/images/Rectification%20and%20Enrolment%20progress%20report.pdf)

2.3 Client Perceptions

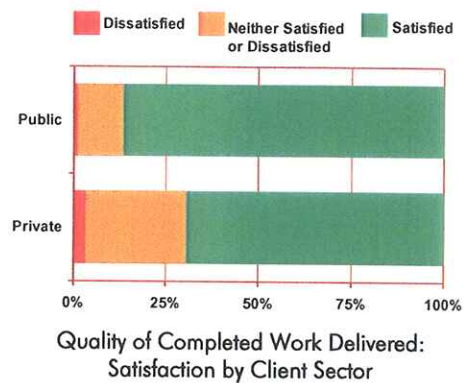
While clear conclusions and trends can be drawn from the *cidb Construction Industry Indicators* (Section 2.1), these results however also point to the need for further research to explain some trends and observations that are counter intuitive. One such specific issue that needs further investigation is the trend of mounting client dissatisfaction in relation to the increase in project size, which could be interpreted as:

- larger projects are typically more complex, require multi-disciplinary inputs, non-integrative, more time consuming, etc, and hence there could be a bigger likelihood of non-compliance with quality requirements; or
- clients involved in small projects are less discerning than clients with larger projects.



Similarly, a further issue of concern is the aggregated client satisfaction in the public and private sectors – and specifically that the private sector appears to be far less satisfied with the quality of work delivered than the public sector does. This could be interpreted as either:

- the quality of work delivered to private sector clients is less than that delivered to public sector clients; or
- public sector clients are less discerning than private sector clients.



2.4 International Trends

The issue of raising construction quality has received attention world-wide and was integral to the *Rethinking Construction* initiative in the UK that flowed from the Egan Report “on the scope for improving the quality and efficiency of UK construction”. Specifically, the Egan Report notes that¹¹:

“Under-achievement can also be found in the growing dissatisfaction with construction among both private and public sector clients. Projects are widely seen as unpredictable in terms of delivery on time, within budget and to the standards of quality expected.”

Enhancing construction quality has also been at the core of various initiatives in Singapore (see Section 6.5), Hong Kong¹², Malaysia, and other countries.

Along similar lines, the International Federation of Consulting Engineers (FIDIC) notes that¹³:

“The survey on Quality of Construction by FIDIC within Member Associations in 2001 confirmed that failure to achieve appropriate Quality of Construction is a problem worldwide. The pressure to reduce the initial costs of construction and supervision were found to have had an adverse effect on quality, as could be predicted. The problem is serious and is evident in both developed and developing countries. Lack of quality in

11 Egan (1998). *Rethinking Construction: The Report of the Construction Task Force to the Deputy Prime Minister, John Prescott, on the Scope for Improving the Quality and Efficiency of UK Construction*. Department of the Environment, Transport and the Regions, London. <http://www.construction.detr.gov.uk/cis/rethink/index.htm>

12 Coffey, V (1999). *Constructing Quality: the Hong Kong Housing Department Journey*. Proceedings of the 4th ICIT Conference: TQM and Innovation, 7–9 April 1999, School of Business, Hong Kong Baptist University, Hong Kong.

13 FIDIC. *Quality of Construction: Policy*. International Federation of Consulting Engineers, Geneva. <http://www1.fidic.org/about/statement20.asp>

construction is manifested in poor or non-sustainable workmanship, and unsafe structures, and in delays, cost overruns and disputes in construction contracts."

In response to the need for improving quality, FIDIC established a Quality of Construction Task Force, which has resulted in a range of quality management guides.

2.5 Summary

This section has shown that, overall, clients are satisfied with the quality of construction in South Africa, but that the quality of construction varies between projects and between contractors. Specifically, surveys have shown that clients are neutral or dissatisfied with the quality of construction on around 20% of all projects, and around 12% of the projects surveyed had levels of defects which are regarded as inappropriate.

Clients, and in particular public sector clients, should however not be complacent with not being satisfied with the quality of construction on 20% of their projects, nor should clients be complacent with around 12% of projects having levels of defects which are regarded as inappropriate. Rather, clients should strive for better value and higher quality construction.

Surveys, and media reports, also show that poor quality of construction is most prevalent in the residential building sector, in both the public and the private residential building sectors – which is not regulated by the cidb. In fact, due to a regulatory constraint in which homebuilders are exempt from registering with the cidb, clients do not have the flexibility to specify a requirement for using cidb registered contractors (in addition to the existing NHBRC requirements). It is therefore recommended that clients should be able to have the flexibility to make it a requirement to use cidb registered contractors in the residential building sector in addition to the existing NHBRC requirements.

Clients in the residential building sector (including the subsidy housing sector) should have the flexibility to procure from cidb registered contractors.

(Note that this will require a change to the cidb regulations, which currently states that "Any contractor who is registered as a homebuilder in terms of section 10 of the Housing Consumer Protection Measures Act is exempt from registration in terms of these Regulations for the purpose of construction works in relation to the provision of a home as contemplated in those Regulations." Rather, the regulations should place emphasis on that it is not mandatory for clients to appoint cidb registered contractors for homebuilding, but can specify requirements for procuring from cidb registered contractors (where appropriate).

A somewhat unexplained finding, however, is that these surveys also show that private sector clients are less satisfied with the quality of construction than public sector clients. A likely explanation for this is that public sector clients are less discerning than private sector clients.

Evidence suggests that public sector clients are less discerning than private sector clients.

Poor quality of construction is however not unique to South Africa, and the trends observed in South Africa are probably comparable with that observed in many developed and the newly industrialised countries. Specifically, the International Federation of Consulting Engineers (FIDIC) notes that:

".... failure to achieve appropriate Quality of Construction is a problem worldwide. The problem is serious and is evident in both developed and developing countries."

3 BARRIERS TO QUALITY

3.1 Overview

Several studies into the barriers to the achievement of construction quality have been undertaken in South Africa over the past 20 years or so. Although these studies are all not directly comparable, many commonalities have been observed – but new barriers to construction quality have also begun to be observed in recent years.

Various studies undertaken in 1989¹⁴, 1998¹⁵ and in 2000¹⁶ conducted among architectural practices and/or general contractors consistently identified construction and procurement related barriers as the dominant barriers to the achievement of quality, often together with design related factors as barriers, such as:

- **design related factors:** inadequate details and inadequate specifications, and poor design coordination;
- **procurement related factors:** including emphasis on time and budget, shortened project periods, lack of pre-qualification, competitive tendering and awarding of contracts primarily on price; and
- **construction related factors:** including skills shortages and insufficient workforce training, lack of management commitment, and lack of strict quality control.

However, more recently, in addition to these predominantly construction and procurement related factors, corruption is being identified as one of the major barriers to achieving construction quality in South Africa. This is illustrated in the key factors summarised below, obtained from a survey of clients, designers, project managers, Grade 2 to 4 contractors and Grade 5 to 9 contractors that was undertaken for the present study.

Corruption is currently identified as one of the major barriers to achieving construction quality in South Africa.

Stakeholder Perceptions of Barriers to Construction Quality

Scale: 1 = minor; 3 = average; 5 = major influence

Interventions / Situations	Mean Score					Overall Mean	Rank
	Clients	Designers	Project Managers	Contractors; Grades 2 to 4	Contractors; Grades 5 to 9		
Poor site management (planning, organising, leading, controlling, and coordinating)	4.4	4.6	4.3	4.7	4.0	4.4	1
Lack of contractor quality expertise	4.6	4.6	4.2		4.2	4.4	2
Corruption	3.7	4.1	4.5	4.9	4.2	4.3	3
Inadequate resourcing by contractors	4.0	4.1	4.3		4.1	4.1	4
Lack of understanding of quality	4.0	4.4	3.8	4.6	3.7	4.1	5
Level of subcontracting	4.0	3.9	4.2	4.6	3.7	4.1	6
Inadequate information	3.6	4.0	4.3	4.5	4.0	4.1	7
Detail	3.8	4.4	4.3		3.7	4.1	8
Focus on cost by contractors	4.3	4.1	3.8	3.8	4.1	4.0	9
Poor constructability	3.8	4.2	4.2		3.8	4.0	10

14 Alman, M (1989). *Barriers to Quality in the South African Building Industry*. MBA research paper, The Graduate School of Business, University of Cape Town.

15 Smallwood, J.J. and Rwelamila, P.D. (1998) *The Need for the Implementation of Quality Management Systems in South African Construction*. Proceedings of the CIB World Building Congress, Symposium D: Managing for Sustainability – Endurance Through Change, Gavle, Sweden, 2225-2234.

16 Smallwood, J.J. (2000). *A Study of the Relationship Between Occupational H&S, Labour Productivity and Quality in the South African Construction Industry*. Unpublished PhD Thesis. Department of Construction Management, University of Port Elizabeth, Port Elizabeth.

Furthermore, although not specifically identified in studies referred to previously or in the survey undertaken for the present study, as shown in Section 4.4 to follow, the procurement model itself has a significant impact on construction quality. Specifically, the studies drawn on in this section refer largely to the classical 'design by employer' procurement approach – whereas internationally (as well as increasingly so in South Africa) it is recognised that procurement and delivery models that favour an integrated design and construction approach on complex projects are more appropriate to deliver enhanced quality.

3.2 A Case Study: Low Income Housing

The barriers to quality are examined further here through a case study involving low cost housing – which illustrates the barriers highlighted previously, but also introduces the impact of institutional barriers to construction quality. The case study used was undertaken by the Public Service Accountability Monitor (PSAM) of Rhodes University¹⁷, which investigated the key challenges that have an impact on the structural quality of state-subsidised housing in 2007, drawing on the Ngqushwa Local Municipality as a case study.

The most common complaint obtained regarding the quality of the state-subsidised housing at the Ngqushwa Local Municipality was that when it rained, water would come in through the roof, along the bottom and top edges of the walls and around the doors. Beneficiaries said that they routinely needed to move all their furniture and possessions to the centre of the house when it rained to avoid water-damage.

Key structural quality defects which gave rise to these defects included:

- Roofs were not always firmly secured to the walls and/or trusses, causing them to rattle, or even blow off, when windy. Beneficiaries had taken to placing stones and tyres on roofs to prevent this.
- Doors did not fit securely into their frames and beneficiaries usually had to stuff material or newspaper along the frames, especially at the bottom, to stem the water that came in when it rained.
- Cracks in the walls developed soon after beneficiaries moved in, particularly around the windows, doors and corners.
- Foundations were often cracking where they met the top structure. In addition, some top structures did not align and square off with the foundations. The damp proof course appears to have been laid incorrectly in a number of homes inspected with some beneficiaries complaining of rising damp.



Source: Public Service Accountability Monitor; Rhodes University

When the beneficiaries were asked by PSAM in this case study if they had complained to the municipality or Department, most beneficiaries said no, adding that there was no point because officials seldom came to inspect the houses when other people had complained. Those who indicated that they had complained said that even when officials did come to look at the house, they never came back to tell beneficiaries if anything would be done about the poor quality of their homes.

One beneficiary said that some officials from the municipality came in 2005 and promised to renovate her house, but they had never returned. This particular beneficiary had a number of problems with her home, including numerous cracks on the inside and outside, water damage to the walls and floor, no



Source: Public Service Accountability Monitor; Rhodes University

¹⁷ de Nobrega, C (2007). *The Challenge of Delivering Quality Housing in the Eastern Cape*. Grahamstown: Public Service Accountability Monitor (PSAM), Rhodes University, Grahamstown.

handles on windows so they could not be opened and a rusting doorframe which had warped, leaving her door unable to close properly. Another beneficiary said that municipal officials had visited her house in 2006 and promised to come back – but by the time of writing the PSAM report in 2007, the beneficiary had not yet heard anything from them.

The quality of housing that the PSAM saw in this case study raised questions about why some houses are of such a poor quality, where the breakdown in the delivery process occurred and how service delivery in this regard can be improved. The PSAM report then identified the key challenges and the reasons for the poor quality housing, which are summarised below:

- i) **Weak capacity** at provincial and local levels was consistently noted as a contributing factor to quality concerns, including a lack of control and monitoring of standards in respect of housing projects due to the limited number of project managers and technical staff.

“Given the current severe capacity constraints in the municipality (with one person in the housing unit and one building inspector), the Department’s already strained human resources are likely to be stretched even more, even with the assistance of Thubelisha, which has been commissioned to manage the completion of these projects.”

- ii) **Emerging contractors:** The PSAM report also highlighted that the Municipality’s policy (in the terminology used in the report) “of using emerging contractors rather than established contractors” was repeatedly mentioned as a problem by the officials. The general consensus was that “political interference”, as one official termed it, has compromised the quality of state subsidised housing.

“..... sometimes such contractors cannot be contacted by the developer to arrange and confirm payment or discuss the progress of the projects because they do not have a reliable method of communication. In addition, emerging contractors often experience cash flow constraints. Because of weak capacity on the part of developers, payment is frequently delayed and emerging contractors usually lack the financial capability to continue construction until payment blockages are resolved at the local or provincial level. Emerging contractors also tend to produce the final product more slowly, because of a lack of skills and experience, resulting in delayed completion of projects. In addition, the lack of skills sometimes results in an inferior product.”

- iii) **Building 40m² with a 30m² budget:** The PSAM report notes that prior to the revision of the Housing Code, the national norm for top structures of state subsidised housing was a gross floor area of at least 30m². The Eastern Cape increased the minimum floor area to 40m², but still required that contractors complete the house to a budget applicable to a 30m² house.

In the case of ‘emerging contractors’, this underfunding resulted in a cutting into their profits, so they tend to cut corners instead. In the case of ‘established contractors’, this underfunding caused the established contractors to pull out of the low-cost housing sector, forcing government to continue using emerging contractors that were prepared to work under such cost pressures.

“We’ve gone too long providing 40m² from a 30m² budget and that has proved to be our biggest ...blunder, because I’m sure that the money we are going to use to go back and fix those houses, it’s even much higher than that 10m². We could have just provided that 10m² money and I’m sure we would be paying a lesser price today in terms of the rectification amounts that we’re going to require.”

- iv) **Department structure and monitoring systems:** Prior to 2006, the absence of a Chief Directorate dedicated to monitoring the technical aspects of housing delivery, combined with the lack of a monitoring system, impacted negatively on the quality of housing. Officials also cited the lack of a Department dedicated to housing as being problematic and hampering their performance.

“..... in the absence of a Chief Directorate for ... project management and quality assurance, there has been an uncoordinated quality assurance management. You find that you tended to manage the quality that you can see – even our systems were not there – coverage couldn’t

give us the effectiveness of picking up these things as we would have liked but we have since improved by implementing systems that actually make us ... go to each and every house that we have built in the province in terms of quality."

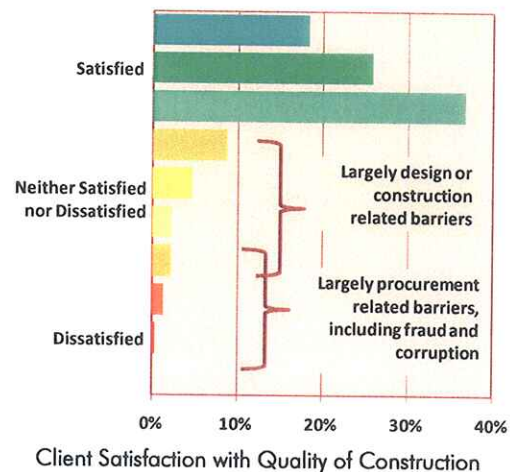
3.3 Summary

This section has first examined the barriers to attaining quality, drawing largely on surveys undertaken over the past 20 years or so. The dominant barriers identified were:

- **design related:** largely intricate and impractical details, poor design coordination and unrealistic specifications;
- **procurement related:** largely a lack of contractor prequalification, pressure due to shortened project periods, but also:
 - **fraud and corruption**, or 'political interference' (including cronyism and nepotism); as well as
 - **institutional barriers** (such as inadequate procurement and/or monitoring capacity);
 - **the procurement and delivery model** (such as the "design by employer" model) on complex projects; and
- **construction related:** largely an inability of the contractor to deliver the required quality.

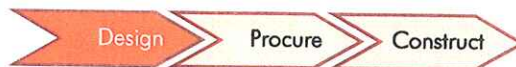
Drawing on the **cidb Construction Industry Indicator** survey results which show that clients are neutral or dissatisfied with the construction quality on around 20% of projects surveyed, it is postulated that the majority of those cases in which clients are **dissatisfied** with construction quality could probably be attributed largely to procurement related barriers in the appointment of contractors that were not capable of undertaking the necessary work.

It is further -assumed that the majority of those cases in which clients are neither satisfied nor dissatisfied (i.e. **neutral**) with construction quality could probably be attributed largely to design or construction related barriers, including barriers in the role of the client's agent in not ensuring quality.



4 DESIGNING AND SPECIFYING QUALITY

The ISO 9000 definition of quality is 'the degree to which a set of inherent characteristics fulfils requirements'. In construction related activities, a client's requirements are usually translated into a series of specifications that the builder or contractor undertakes to construct through a planning, briefing and design process. Appropriate specifications, and compliance with the specification, are therefore a key measure of construction quality.



In line with the above, it is useful to note that FIDIC defines quality as¹⁸:

"..... that Quality, which meets or exceeds the requirements of the Employer, as specified in the contract documents, whilst complying with law, codes, standards and regulatory policy, which apply to the contract."

The design and specification component as a barrier to the attainment of construction quality has already been introduced in Section 3.1, and is examined further in the following sections.

4.1 Standards and Specifications

South Africa has a well developed, but outdated, set of technical standards that can be used to describe the standards of materials and workmanship for construction works. These include a range of South African National Standards (SANS) and ISO standards, such as:

- the SANS 1200 and 2001 series of Construction Standards;
- the SANS 1921 series of construction and management requirements for works contracts;
- the SANS 10155 code of practice for accuracy in buildings; as well as
- numerous standards relating to products and processes, such as:
 - SANS 10107 for the installation of ceramic tiles;
 - SANS 10070 for the installation of plastic flooring;
 - etc.

The SANS and ISO standards are managed by the South African Bureau of Standards (SABS), and the SANS standards have largely been developed by industry task teams which have included the CSIR, volunteer support from the learned societies (including the South African Institution of Civil Engineering, SAICE), and trade associations. However, the capabilities of the SABS, the CSIR and these industry associations to support the development of standards and specifications are under strain, and volunteer support has decreased significantly. It is therefore important that this formal capability for the development and maintenance of technical standards and specifications is retained and strengthened for the future.

It is important that the capabilities of organisations such as the SABS, the CSIR and industry bodies for developing standards and specifications are maintained.

Various other technical standards and specifications also exist, including:

- in-house client standards and specifications, such as SANRAL, NHBRC, ACSA, and various government departments; and
- those of product manufacturers and associations.

Again, it is important that the in-house specification capability within these organisations is retained.

¹⁸ FIDIC (2004). *Improving the Quality of Construction: A Guide for Actions*. International Federation of Consulting Engineers, Geneva. <http://www.fidic.org>

A Case Study: Research at the CSIR in Support of Codes, Standards and Specifications

The CSIR has a long history of supporting the development of codes, standards and specifications for the construction industry, and were instrumental in supporting the development of the structural concrete, masonry, loading and other codes, as well as many materials specifications. In addition the CSIR has been instrumental in supporting a range of standards and specifications supporting the roads industry. However, other than the capacity to support the development of codes, standards and specifications in the roads and transportation sector, this capacity has all but been lost since the 1990s – due to changing research priorities and changes in funding streams for R&D, including the withdrawal of funding of R&D programmes by several national government departments¹⁹.

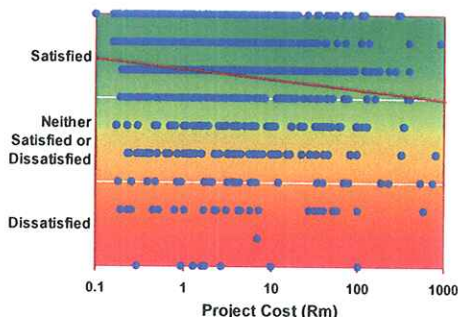
Some of this capacity has since been rebuilt at some Universities in South Africa, but overall, this capacity to support the development of codes, standards and specifications in South Africa is severely strained.

However, while South Africa has a well developed set of technical standards that can be used to describe the standards of materials and workmanship for construction works, some materials are often not supplied to these standards, and in many cases this is very difficult to detect. Furthermore, there is an increasing trend of overseas sub-standard products entering the South African market.

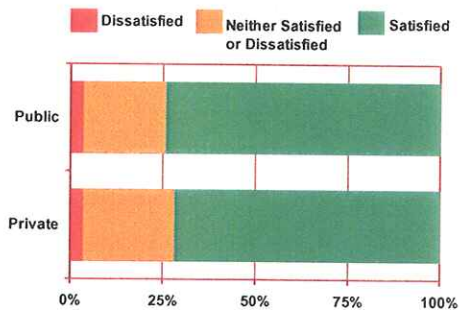
4.2 Designing for Quality

Notwithstanding that adequate reference can be made to quality standards for materials and workmanship, adequate quality requires that such standards for materials and workmanship are translated into design specifications, and appropriately implemented – including through construction specifications.

One measure of the impact of design specifications on quality is shown in the following figures, in which the satisfaction of contractors with client documentation is shown. This information has been obtained from the 2009 *cidb Construction Industry Indicators*. Overall, contractors were neutral or dissatisfied with the quality of the client's documentation on 26% of the projects surveyed, which is a reflection of the contractor's dissatisfaction with the design specifications.



Contractor Satisfaction with Client Documentation:
Influence of Project Size



Contractor Satisfaction with Client Documentation:
Satisfaction by Client Sector

Furthermore, the increasing dissatisfaction of contractors with contract documentation and with increasing project size is clearly seen from above, which (again) is likely to be due to the increasing complexity with increasing project size. In fact, on projects of R100m and larger, contractors were neutral or dissatisfied with the quality of client documentation on 44% of the projects surveyed!

On projects of R100m and larger, contractors were neutral or dissatisfied with the quality of the client's documentation on 44% of the projects surveyed.

In addition, the results suggest that the quality of the client documentation is marginally better from private sector clients than public sector clients.

¹⁹ Milford, R V, Rust, C and Qhobela, M (2001). *Innovation in Construction: An International Review of Public Policies, Chapter 16; South African Public Policy Instruments Affecting Innovation in Construction*. Edited by André Manseau & George Seadon. Spon Press, 2001.

The perceptions of project managers and Grade 5 to 9 contractors as to design related barriers to quality are given in the following table, in which the barriers have been rated on a 5-point scale. Specifically, inadequate information, construction details, poor constructability and inadequate specifications are seen to be rated as having a significant influence on poor quality.

Influence of Design Related Factors as Barriers to Construction Quality

Scale: 1 = minor; 3 = average; 5 = major influence

Interventions / Situations	Mean Score		Overall Mean	Rank
	Project Managers	Contractors; Grades 5 to 9		
Inadequate information	4.3	4.0	4.2	1
Detail	4.3	3.7	4.0	2
Poor constructability	4.2	3.8	4.0	3
Specification	4.0	3.8	3.9	4
Focus on time by clients	3.8	3.8	3.8	5
Lack of designer quality expertise	3.8	3.8	3.8	6
Focus on cost by clients	3.5	3.8	3.7	7
Design	3.8	3.4	3.6	8
Variations	3.7	3.4	3.5	9
Contract documentation	3.3	3.4	3.4	10

Similarly, construction details, appropriate specifications, appropriate design and contract documentation have all been identified by project managers and contractors as factors that could result in a significant influence on improving construction quality.

Influence of Design Related Factors as Improvements to Construction Quality

Scale: 1 = minor; 3 = average; 5 = major influence

	Mean Score			Overall Mean	Rank
	Project Managers	Contractors; Grades 2 to 4	Contractors; Grades 5 to 9		
Details (Appropriate)	3.7	4.3	4.2	4.0	1
Specification (Appropriate)	3.8	4.1	4.2	4.0	2
Design (Appropriate)	3.7	4.0	4.1	3.9	3
Contract documentation	3.3	4.1	3.8	3.7	4

The impact of poor quality documentation on construction quality, and the potential for client documentation to support improvements in construction quality is clear from the above. However, because of skills shortages and lack of capacity in certain sectors, concerns are increasingly being raised that the quality of client documentation could deteriorate further in the future.

Concerns are increasingly being raised that the quality of client documentation could deteriorate further in the future.

4.3 Procuring Design Quality

The *cidb Standard for Uniformity in Construction Procurement (SFU)*²⁰ establishes minimum requirements within the public sector that:

- promote cost efficiencies through the adoption of a uniform structure for procurement documents, standard component documents and generic solicitation procedures;
- provide transparent, fair and equitable procurement methods and procedures in critical areas in the solicitation process;
- ensure that the forms of contract that are used are fair and equitable for all the parties to a contract; and
- enable risk, responsibilities and obligations to be clearly identified.

²⁰ *cidb* (2010). *Standard for Uniformity in Construction Procurement: Board Notice 86 of 2010*. Construction Industry Development Board, Pretoria. <http://www.cidb.org.za>

The SFU provides specifically for the selection of professional services for the appointment of design services based on quality criteria, and further guidance on the application of the SFU in the appointment of professional services, is given in cidb Practice Note 9: *Evaluation of Quality in Tender Submissions*²¹.



However, the application of the recommended procurement methods for the selection of professional services for the appointment of design services based on quality criteria is not always applied appropriately due to, for example:

- lack of capacity and capability amongst clients, and in particular public sector clients;
- inadequate information in assessing, or a lack of consistency in applying, quality criteria in relation to the appointment of consultants; and
- political interference in the appointment of consultants.

One of the mechanisms currently being considered by the cidb in support of providing consistent information to evaluate quality criteria of consultants is the introduction of consultant performance reports (see Section 4.4 to follow) as part of a possible cidb *Register of Professional Services Providers*.

The appointment of design services based on quality criteria is often constrained by a lack of capacity amongst clients; inadequate information in assessing quality criteria; and political interference.

(The capacity and capability of clients to appropriately procure professional services as well as political interference in the appointment of professional services is not discussed in this section, but analogues can be drawn with the appropriate appointment of contractors in Section 5.2 to follow.)

4.4 International Trends

Internationally, many of the trends observed here of a well developed set of technical standards (but possibly a decreasing capacity to maintain these standards), conformity of materials to these standards and the impact of design on quality in South Africa is similar to those being observed in most developed economies. Developing countries, on the other hand, are often characterised by weak technical standards, lack of conformity of materials to standards, and weak design capabilities – all contributing to lower construction quality.

i) Design Quality

Of importance to note is the 1998 *Rethinking Construction* report on the scope for improving the quality and efficiency of UK construction, which specifically identified the need for improving construction quality through design.

Quality must be fundamental to the design process. Defects need to be designed out before work starts.

The central message of *Rethinking Construction* was that the construction industry's main clients must take the view that the construction industry does not deliver consistent quality and value for money. Too often the performance of the industry is unreliable, projects run neither to time nor budget and too much effort and resource is invested in making good defects, premature repair and replacement and in litigation.

One of the key messages developed in *Rethinking Construction* is that of 'Design for Construction in Use' – specifically that "suppliers and contractors have to be fully involved in the design. Quality must be fundamental to the design process. Defects need to be designed out before work starts".

Various initiatives were developed in the UK in response to the theme and messages of improving construction quality through design within the *Rethinking Construction* report. These initiatives include the

21 cidb (2007). *Practice Note 9: Evaluation of Quality in Tender Submission (Version 1, November 2007)*. Construction Industry Development Board, Pretoria. <http://www.cidb.org.za>

Achieving Excellence in Construction (AEC) initiative of UK Office of Government Commerce (OGC), the establishment of the UK *Better Public Building* initiative, the *Commission for Architecture and the Built Environment* (CABE) and the development of *Design Quality Indicators* (DQIs).

The OGC's Achieving Excellence in Construction initiative was introduced in March 1999 by the Chief Secretary to the Treasury to improve the performance of Government as a client of the construction industry. The AEC was launched as a three-year initiative and its key aspects include:

- partnering;
- the development of long-term relationships;
- reduction of financial and decision-making approval chains;
- improved skills development and empowerment;
- the adoption of performance measurement indicators; and
- the use of tools for value and risk management and whole life costing.

Specifically, building on the *Rethinking Construction* theme that "*suppliers and contractors have to be fully involved in the design*", the OGC has mandated minimum construction procurement standards, which state that²²:

- procurement strategies and contract types must support the development of collaborative relationships between the government client and its suppliers, and shall facilitate the early appointment of integrated supply teams (each part of which should incorporate an integrated supply chain); and that
- traditional, non-integrated procurement approaches should not be used unless it can be clearly shown that they offer best value for money (this means, in practice they will seldom be used).

Traditional, non-integrated procurement approaches should not be used for UK construction procurement.

The UK *Better Public Building* initiative was initially launched in the UK in 2000, when the then Prime Minister demanded "*a step change in the quality of new public buildings in Britain*". The *Better Public Building* initiative aimed to ensure that high standards of design, construction, delivery and performance were being widely achieved in public buildings and infrastructure projects. The initiative is currently being resourced and driven by CABE, and supported by initiatives within the OGC.

CABE is the UK government's advisor on architecture, urban design and public space, and its aim is to influence and inspire the people making decisions about the built environment. CABE champions well-designed buildings, spaces and places, runs public campaigns and provides expert, practical advice, and works directly with architects, planners, designers and clients. The DQIs are promoted extensively by CABE for achieving better design.

Internationally, advocacy and advisory programmes have played an important role in promoting design quality.

The DQI applies a structured approach to assess design quality in terms of^{23, 24}:

- functionality: the arrangement, quality and interrelationship of spaces and how the building is designed to be useful to all;
- build quality: the engineering performance of the building, which includes structural stability and the integration, safety and robustness of the systems, finishes and fittings; and
- impact: the building's ability to create a sense of place and have a positive effect on the local community and environment.

DQI is completed by a range of stakeholders in the briefing and design stages of a building project, or on a completed building. Stakeholders who participate include²⁵:

22 OGC (2010). Common Minimum Standards for the Procurement of Built Environments in the Public Sector. Office of Government Commerce, UK, London. http://www.ogc.gov.uk/documents/Common_Minimum_Standards_PDF.pdf

23 Gann et al. (2003). *Design Quality Indicator as a Tool for Thinking*. Building Research and Information, London: Spon Press

24 Wikipedia. *Design Quality Indicator*. http://en.wikipedia.org/wiki/Design_Quality_Indicator

- building users (or potential users);
- building clients;
- facilities managers (or future facilities managers);
- architects;
- structural and building services engineers;
- quantity surveyors; and
- project managers.

DQI is applied in a facilitated workshop that is led by a certified DQI facilitator.

The DQIs are endorsed by, and recommended for use, in the UK Office of Government Commerce (OGC) *Achieving Excellence in Construction Procurement Guide*²⁶, and in the OGC *Gateway Process*.

The DQI is available on-line in both the UK and the USA.



ii) Procurement of Design Services

The recognition that quality must be fundamental to the design process is incorporated into most internationally accepted procurement models for the appointment of design services. For example, FIDIC stresses the pre-eminence of quality in the selection process, and recommends the *Quality Based Selection* (QBS) method as the preferred selection method for consultancy services, particularly for nationally funded projects where the competition is between national consulting firms of more or less similar characteristics²⁷. FIDIC also recognises the QBS method as the only method for those projects where there is a multiplier effect, or significant complexity or significant potential damage if the project fails.



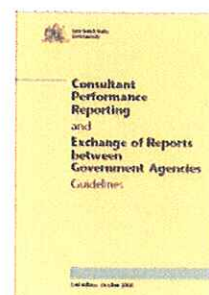
In line with the above, an important client driven approach to the performance of consulting services is the *Consultant Performance Reporting and Exchange of Reports between Government Agencies* in New South Wales, Australia²⁸.

The guidelines for *Consultant Performance Reporting* were developed by the Construction Policy Steering Committee (CPSC) and arose from the identified need to enhance the level of quality management in the industry. Arising from this, *Consultant Performance Reporting* was developed and introduced in NSW Australia to obtain a measure of a consultant's performance under the terms of its agreement with an agency, namely:

- to help both the agency and the consultant to reach a common understanding of the expectations of both parties about the work; and
- to identify areas where the consultant is excelling and any areas that need improvement.

Quality management and systems are one of several standard criteria against which consultants are assessed within the performance reports.

These performance reports are used by infrastructure agencies in NSW in the



²⁵ ibid

²⁶ OGC (2007). *Achieving Excellence in Construction Procurement Guide; Design Quality*. UK Office of Government Commerce, London. <http://www.ogc.gov.uk>

²⁷ FIDIC (2006). *Quality Based Selection for the Procurement and Consulting Services*. International Federation of National Associations of Independent Consulting Engineers. Geneva. <http://www.fidic.org>

²⁸ DPWS (2000). *Consultant Performance Reporting and Exchange of Reports Between Government Agencies; Guidelines*. NSW Department of Public Works and Services, New South Wales. <http://www.nswprocurement.com.au>

assessment of a consultant for future engagements (registration, pre-qualification, expressions of interest or approving a consultant engagement). Reports indicating unsatisfactory performance may also support the termination of a consultancy engagement.

4.5 Summary

The previous sections firstly highlighted two potential areas of concern impacting on construction quality in South Africa, namely:

- indications of a deteriorating capacity necessary to develop and maintain technical standards, codes and specifications; and
- the quality of client documentation on larger projects in particular appears to be negatively impacting on construction quality – and concerns are being raised that the quality of client documentation could deteriorate further in the future.

The following sections then expanded on the quality of design and of documentation on construction quality, by drawing on international experience that highlights that quality must be recognised as being fundamental to the design process, and that quality is therefore influenced by the procurement of the appropriate design team. Internationally and in South Africa, preferred procurement methods are recommended that specifically provide for the selection of professional services for the appointment of design services based on quality criteria.

However, it is noted that the application of the recommended procurement methods for the selection of professional services (for the appointment of design services based on quality criteria in South Africa) is not always applied appropriately due to, for example:

- lack of capacity amongst clients, and in particular public sector clients;
- inadequate information in assessing, or a lack of consistency in applying, quality criteria in relation to the appointment of consultants; and
- political interference in the appointment of consultants.

The challenge therefore lies in the procurement of professional design services appropriate to the needs and demands of the particular project on hand – and international experience suggests that consultant performance reports are a useful instrument to support this.

Internationally, government and non-government advocacy and advisory initiatives and programmes promoting design quality have been established, which have played a very important role in promoting and enhancing design quality. Tools have also been developed and promoted to assess design quality, which have been incorporated into these design quality initiatives, programmes and processes.

Specifically, in support of enhanced quality, the OGC in the UK has mandated minimum construction procurement standards, which has mandated that procurement strategies and contract types must support the development of collaborative relationships between the government client and its suppliers and shall facilitate the early appointment of integrated supply teams.