



# **THE IMPACT OF LOCAL LABOUR ON ACHIEVING QUALITY STANDARDS IN LOW COST HOUSING**

## **Research Report**

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Submitted to the Faculty of Engineering and the Built Environment of the University of the Witwatersrand, Johannesburg in partial fulfilment of the requirements for the degree of  
Master of Science in Building

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## **DECLARATION**

I declare that the research report is my own work, submitted in partial fulfilment of the requirements for the degree of Master of Science Building to the University of Witwatersrand, Johannesburg. The work has not been submitted before for any degree or examination in any other university.



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Signed at Johannesburg

On the 28<sup>th</sup> day of September 2021

## **ABSTRACT**

The study seeks to establish the nature of the relationship between the use of local labour and the achievement of quality standards on the construction of low-cost housing. Poor quality of low-cost housing has been experienced gradually over the years, (Manomano and Tanga, 2018). Manomano and Tanga (2018), revealed that the low-cost houses that are being built have cracked walls, substandard doors and weak roofs and they pose a health risk to the intended inhabitants. In order to improve the quality in the construction of low cost houses this study conducted an investigation on how local labour impacts on the achievement of quality delivery of low cost houses. In the endeavours of establishing this relationship the study chose to conduct a case study on Ratanda housing project. The findings confirmed that the employment of local labour has an effect on the achievement of quality standards. The study also discovered that other factors that affect quality include inadequate material and lack of supervision. From the literature and the data gathered the study recommends that the contractor needs to improve quality communications in the project by keeping records of all activities that occur on site and any correspondence concerning quality issues and improve the supervisory skills of the management team. And in local housing projects there has to be a system that allows an intensive training of labour before they work on the project to equip them with the necessary skills to work productively and effectively. The problem of adherence to quality management and compliance, if not addressed, will continue to cause unhappy beneficiaries, therefore creating an environment for service delivery protests. Potential injuries to inhabitants of the low-cost houses and potential liability to the state will arise.

**Keywords** building, local labour, housing development, poor quality, structural defects, workmanship

# **DEDICATION**

To God, the creator of all things

To my entourage, my ancestors

My late father, you are my rock, always

My family

My children

My friends

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## **LIST OF ACRONYMS**

CIDB: Construction Industry Development Board

CLO: Client Liaison Officer

EPWP: Expanded Public Works Programme

GDHS: Gauteng Department of Human Settlements

IRDP: Integrated Residential Development Programme

ISO: International Organisation for Standardization

MEC: Member of the Executive Council

NBM: National Building Manual

NBR: National Building Regulations

NHBC: National House Building Council

NHBRC: National Home Builders Registration Council

PFMA: Public Finance Management Act

PMBOK: Project Management Body of Knowledge

RDP: Reconstruction and Development Programme housing (RDP)

RSA: Republic of South Africa

SABS: South African Bureau of Standards

SACPCMP: South African Council for Project and Construction Management Professions

SAICE: South African Institute of Civil Engineers

SANS: South African National Standards

SCCCA: Southern Cape Coastal Condensation Area

SCEM: School of Construction Economics and Management

SPWP: Special Public Works Programme

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# 1 INTRODUCTION

## 1.1 Background to the study

The study seeks to establish the nature of the relationship between the use of local labour and the achievement of quality standards on the construction of low-cost housing. Manomano and Tanga (2018) state that poor quality of low-cost housing has been experienced over the years. The authors further state that low-cost houses that are being built have cracked walls, substandard doors and weak roofs and they pose a health risk to the intended habitants (Manomano and Tanga, 2018).

The Construction industry is the most important employer of labour in the country. Semi-skilled and unskilled labour constitute 70% of those who are employed in the construction industry CIDB (2013). CIDB (2015) points out that the industry is the biggest employer in South Africa. Approximately 820 000 people are employed in the formal sector and about 340 000 in the informal sector and compared to other industries, construction workers accounts to 8% of formal employment and 17% of informal employment (CIDB, 2015).

These figures indicate why government policy has sought to use the industry to achieve several secondary objectives such as improved communication of quality standards and on the job training of which the use of local labour and local enterprises has been a key part. It is crucial that once the unskilled labour is trained, they graduate from unskilled to skilled labour. It is evident in the literature gathered so far that there has been recurring incidents of quality and growing concerns of huge expenditure on the rectification of some of the constructed low-cost houses (SAICE, 2014). According to Windapo (2016) the supply of skilled labour, continues to negatively affect the South African construction industry and aggravate the housing challenges. The government therefore foresee the contribution increasing the pool of skills by training artisans.

The design and construction of homes is regulated primarily by three statutes: The Housing consumers protection measures Act 95 of 1998, the national building regulations and building standards Act no 103 of 1977 and the occupational health and safety Act 85 of 1993. However the focus in this research will be on the Housing Consumer Protection Measures Act 95 of 1998 and the National Building Regulations and Building Standards Act no 103 of 1977 RSA (2014).

The Housing Consumer Protection Measures Act 95 of 1998 provides for the establishment of the National Home Builders Registration Council which leads a way in terms of the introduction of the standards and guidelines and the warranty scheme. Standards and guidelines are the specifications as contained in the home building manual RSA (1998) and the warranty scheme is a fund under which homeowners can access after lodging claims against home builders on poor workmanship (*ibid.*).

Despite the establishment of the standards and guidelines, Sisulu (2016), sets out that South Africa has over the years realised their shortcomings in terms of the provision of low-cost houses and wants to improve the lives of its residents. This is evident in the 2016 budget speech, where there is an announcement of the Draft White Paper on Sustainable Human Settlements. The proposed policy will amend the Housing Act for alignment and provision of a better policy framework for the improved quality of life of households and the realization of sustainable human settlements.

The state's duty of rapid housing delivery should not achieve the provision of houses that have cracked foundations, cracked walls, leaking roofs as this has serious implications for the government's reputation and unsatisfied beneficiaries and communities can cause havoc in terms of service delivery protests. It is in the best interest of all that the reduction of high levels of unemployment through the employment of local labour is done responsibly and in line with related prescripts such as compliance and conformance of quality principles in construction projects.

While contractors and subcontractors appointed for the construction of low-cost houses are required by NHBRC to be duly registered, (NHBRC, 2014) however it is not known, whether the local labour employed in the projects are bound by the same rules of registration.

The government of South Africa has over the years been trying to deal with matters of high unemployment rate and came with a number of government programmes. One such programme is the Special Public Works Programme (SPWP). Through its labour Code of good practice for employment and conditions of work, the Special Public Works Programme is a mandated government programme for 'short-term, non-permanent, labour intensive, funded either fully or partial from public resources to create public assets (RSA, 2002).

According to RSA (2015:5), 'the public body must implement EPWP projects not limited to the following types of infrastructure labour intensive projects: roads, sidewalks and non-

motorised transport, storm water drainage, water and sanitation, buildings, landscaping and electricity. The public body must be satisfied that sufficient local labour (willing to work) is available before proceeding with the project as a labour intensive project. The public body is expected to send its relevant managers on the applicable skills programme in labour intensive construction.’

Construction of low-cost housing, as projects falling under the labour intensive projects and involving water and sanitation, roads and storm water and buildings, find themselves encapsulated by the terms of the EPWP programme and its Code of Good practice under the Special Public Works Programme (RSA, 2002). The code encourages the optimal utilization of local labour, a focused approach on targeted groups such as women, female-headed households, youth, the disabled and households coping with HIV/Aids and the empowerment of communities through training (*ibid.*).

The employment of labour came with it, issues of poor quality which resulted in questions of training, skills, communication, poor workmanship, structural defects, cost, and time (Aigbavboa and Thwala, 2014). According to Zunguzane, Smallwood and Emuze (2012), workmanship is ranked the highest as one of the causes of poor standards of quality in the construction of low income housing supplied by the government, then followed by the appointment of emerging contractors.

The Minister of the National Department of Human Settlements has in the budget speech of 2016, indicated that South Africa is the global leader in the policies and implementation of integrated human settlements and has confirmed that since 1994, approximately 4,3 million houses have been delivered through the government housing subsidy (Sisulu, 2016). It was further mentioned that a budget of R33.4 billion was allocated to the portfolio of Human Settlements for the 2017/18 financial year. Even though the allocation of the budget will not meet the housing backlog however, it will address the need for housing. It has been indicated that the interpretation of housing delivery can be said that the country built 1200 houses per day over a period of 23 years (*ibid.*).

However this success is not unqualified. Mbambani (2017), reports that approximately 26 459 houses had to be rectified because of shoddy work of contractors and the National Department of Human Settlements had to spent R2 billion in the last 3 years for remedial work on subsidised houses in terms of the rectification programme. It is further stated that the statistics

conducted in the period of 2002 to 2010, revealed that 31% of 1.8million people who benefited from subsidised houses, were of the position that the houses are uninhabitable and substandard (*ibid.*). It should be noted that most beneficiaries of subsidised houses consider them as non-satisfactory and therefore not valued (Windapo and Goulding, 2013).

## **1.2 Substantiation of the problem.**

Ceric (2014), states that communication is one of the risks in construction projects and to minimise and mitigate it, a level of trust must be put in place. Kwofie *et al.*, 2015 mentions that the delivery of project information is crucial in the success of the project and a late delivery of such information will literally be detrimental to the success of a project. The proposition forwarded by Kwofie *et al* (2015) concurs with the guidelines presented by ISO 1900 (2008) which states that for an effective quality management system there should be appropriate education and training of workers to improve their competency. ISO 1900 (2008), further states that the management team needs to provide the appropriate information and documentation to enable the competent workers to perform their duties effectively and in return this would improve the overall effectiveness of the quality management system.

For an effective communication that will result in an effective quality management system, Ceric (2014) mentions that in construction projects there should be inter-firm, intra-firm and interpersonal relationships between the project parties. i.e., the project owner, contractor and their respective project managers. Ceric (2014) further states that the non-clarification of roles and responsibilities in projects can cause challenges with the flow of information, hence there should be a formal procedure and reporting lines from the onset of the project. The failure to follow the effective communication guidelines would result in the miscommunication and misunderstanding of information and as a result conflicting messages are implemented leading to the detriment to the project (Ceric 2014).

Following the ISO 9001(2015), the Brazilian construction companies have managed to come up with quality management policies which govern their operations, and they seem to be well communicated among from management to workers and this has translated into project success (Pearson *et al*, 2014). Whereas according to Keng and Hazmah (2011) in the Malaysian construction projects they employ tradesmen with qualifications for all the skilled labour requirements, but then there are no qualifications required for the general labour. Keng and Hazmah (2011) further mention that despite the engagement of these qualified skilled personal

the communication management is lacking and as a result the companies facing problems with their subcontractors and this is leading to projects time and cost overruns. A study by Theo *et al* (2004), shows that the middle managers find it difficult to implement quality management because of the tedious paperwork hence making some of the communication to be distorted in some instances and as a result, this end up causing projects to fail.

In the South African construction industry, there is little information on how the communication of quality standards has been undertaken. The existing literature has revealed that as a means mitigating the challenge miscommunication and misunderstanding in the South African construction industry, each construction project has a community liaison officer, (Aigbavboa and Thwala, 2014). Aigbavboa and Thwala (2014) further state that the community liaison officer is used to effectively communicate with the community to ensure a smooth running of the project without any civil disorder or riot acts. This is a measure to deal with external stakeholders but for the internal stakeholders there is little literature detailing how the quality standards are communicated in construction projects.

### **1.3 Research Problem**

In the previous subheadings it was highlighted that there have been recurring incidents of quality and growing concerns of huge expenditure on the rectification of some of the constructed low-cost houses. Aigbavboa and Thwala (2014), state that challenges of quality in the construction field, is not only a South African issue but a problem of the whole world. The costs arising as a result of poor quality are related to resolving of defects and a failure to prevent such defects during construction. The delivery of housing and the meeting of the annual target should not in any way encourage the compromise of quality of houses (Emuze and Mhlwa, 2015). The authors stated that, while compliance with employment of youth, and previously disadvantaged groups is high on the agenda, the roll out and the fast track of construction of houses should not leave a trail of defective houses such as leaking roofs, cracked walls and cracked foundations. The South African construction industry has existing standards and guidelines that detail how contractors and other players in construction should implement the construction of houses but the sector is plagued with defects, (Mbambani, 2017). According to Aigbavboa and Thwala (2014), the employment of labour came with it, issues of poor quality which resulted in questions of training, skills, communication, poor workmanship, structural defects, cost, and time. According to Zunguzane, Smallwood and Emuze (2012), workmanship is ranked the highest as one of the causes of poor standards of quality in the construction of

low income housing supplied by the government, then followed by the appointment of emerging contractors.

The literature gathered is pointing out that workmanship is the severest cause of poor-quality standards in the construction of low income houses. From the background of the problem we have also noted that communication is the key to an effective quality management system. Pearson *et al* (2014) mentioned that construction industries such as Brazil, have benefited by using an effective communication system as they have managed to improve the success rate of their projects. Unfortunately in Malaysia the communication management is lacking and as a result the companies facing problems with their subcontractors and this is leading to projects time and cost overruns.

These different scenarios concur with the statement postulated by Kwofie *et al*, (2015) that the delivery of project information is crucial in the success of the project and a late delivery of such information will literally be detrimental to the success of a project. In the South African construction industry there is a limited amount of literature on how construction companies manage their communication in the construction of low income housing. Taking into consideration that the low-income houses employ local labour to construct the houses and that there is a gap in literature as to why low income housing is experiencing poor quality. The research will investigate the relationship between the employment of local labour and the achievement of quality standards on low-cost housing.

### **1.3.1 Primary research question**

What is the nature of the relationship between the use of local labour and the achievement of quality standards on low-cost housing?

### **1.3.2 Secondary research questions**

- How do contractors communicate the standards and guidelines for the construction of low-cost houses to the local labour?
- What mechanisms have been put in place to ensure that local labour and contractors' work meet the standards and guidelines in the construction of houses?
- To what extent does the use of labour affect the quality of the construction of low-cost houses?

## **1.4 Research aim**

The aim of the research is to establish the nature of the relationship between the use of local labour and the achievement of quality standards on low-cost housing.

## **1.5 Research objectives**

The objectives for this study are:

1. To investigate how contractors communicate the standards for the building of low-cost houses to local labour;
2. To investigate how local labour ensure that their work meet the norms and standards in the construction of low-cost houses; and
3. To what extent does the use of labour affect the quality of the construction of low-cost houses.

According to Saunders, Lewis, and Thornhill (2016:174), 'exploratory study is a valuable means to ask open questions to discover what is happening and gain insights about a topic of interest'. This is said to be useful in trying to clarify an understanding of a certain problem (Saunders *et al*, 2016).

Considering the position of Kumar (2011) and Shields and Rangarajan (2013), an exploratory study is the most appropriate method of research as the study aims to clarify an understanding and establish the nature of the relationship between the use of local labour and the achievement of quality standards on low-cost housing. Therefore this study rests itself at the helm of an exploratory study.

## **1.6 Research proposition**

According to Kumar (2014), qualitative research is characterised by an emphasis on exploring and understanding a certain phenomenon using categorical and subjective measurements and as a result construction of a hypothesis is neither greatly advocated nor significantly practiced. The author further state that as a result of investigative methods used to obtain information, hypothesis are not used (*ibid*, 2014). Since this research is qualitative, no hypothesis will be tested.

As Plooy-Cilliers *et al* (2014:42) highlights that when two or more concepts are related, a theoretical statement or proposition is used to describe the relationship. A proposition must be

based on precisely defined and consistent concepts. Since this research is based on the assumption that there is defects on the construction of low-cost houses as a result of local labour, and the two concepts being related, a proposition will be used. Therefore the proposition is that *use of local labour is a significant factor to poor standard of construction of low-cost housing*.

### **1.7 Research constraints**

The research will not be investigating the following aspects:

- The research is not going to investigate the local subcontractor firms that are employed by the principal contractor.
- The research is not going to investigate the procurement and appointment of contractors

### **1.8 Assumptions**

In this research, it has been assumed that:

1. The non-monitoring of NHBRC after allocation of low-cost houses leads to non-reporting of defaults and as a result, poor quality of houses persist
2. Adults are regarded as persons aged 35 to 64
3. Local labour are workers residing in close proximity to the project.
4. Youth are regarded as persons aged 15 to 34 years

### **1.9 Contribution of the research**

The factors contributing to poor quality of houses/buildings has been extensively researched, however, little has been researched on the effect that the local labour has on the construction of poor quality of low-cost houses. Therefore, the study will contribute to literature and empirical body of knowledge in the industry and persuade government to refine their policy on the mandated employment of local labour. The monitoring of the on-the job training should be high on the agenda if the construction industry is to change especially on the construction of low-cost houses. The study will contribute to the improvement of quality standards in the construction of low-cost housing provided through the government subsidy.

## **1.10 The structure of the Research Report**

**Chapter 1 - Introduction:** The section on introduction will outline the background of the research, problem, question, objectives, rationale of the study and the assumptions made.

**Chapter 2 - Literature Review:** The section will outline the literature review and findings made from various studies.

**Chapter 3- Research Design and Methods:** The chapter will outline the research design: research philosophy, research approach, methodological choice, strategies, time horizon, techniques and procedures for data collection, techniques and procedures for data analysis, population, stratified sampling, context of the data, research instruments, constraints of the research, reliability and validity, ethical considerations and protocol.

**Chapter 4 - Data analysis and Presentation of results:** The section on data analysis and presentation of results will outline the analysis of the data collected and present the findings.

**Chapter 5 - Conclusions and Recommendations:** The section will outline conclusions and recommendations.

## 2 LITERATURE REVIEW

### 2.1 Introduction

There have been recurring incidents of quality and growing concerns of huge expenditure on the rectification of some of the constructed low-cost houses (SAICE, 2014). These concerns are brought to light by a report by Mbambani (2017) who states that approximately 26 459 houses had to be rectified as a result of shoddy work of contractors and the National Department of Human Settlements had to spent R2 billion in the last 3 years for remedial work on subsidised houses in terms of the rectification programme. It is further stated that the statistics conducted in the period of 2002 to 2010, revealed that 31% of 1.8million people who benefited from subsidised houses, viewed the houses as uninhabitable and substandard (Ibid.).

Clearly there is a significant number of individuals who have received houses that have poor quality. Hence the literature review intends to provide literature on;

- What are the government policies that exists in the construction of low-cost houses;
- What are the building regulations and standards that govern quality adherence in the construction of low-cost houses;
- How contractors communicate the standards for the building of low-cost houses to local labour;
- How local labour ensure that their work meet the norms and standards in the construction of low-cost houses, and;
- To what extent does the use of labour affect the quality of the construction of low-cost houses?

The literature review has particularly looked at the Constitution of the South Africa, various legislation such as Housing Act, Skills development, Employment Services and the Gauteng Department of Human Settlements building Standards and subsidies, National Home Builders Registration Council standards, labour & work conditions in the South African construction industry, project management body of knowledge guide, particularly on quality management, the ISO 9001: quality management, encompassing the National Housing Code, the Statistical release on the national and provincial labour market, a number of Journals, thesis, books, news clippings and articles on the issues of quality in construction and the employment of local labour.

The objectives of the literature review have addressed the topic ‘the impact of local labour on achieving quality standards in low-cost housing’. Different sources of information have been referred to, in support of the questions contained in the research. Several journals relevant to the topic has also highlighted an extent each author has looked in terms of the issues of the impact of local labour relating to quality in the construction industry.

## **2.2 Background**

Section 26 of the Constitution, RSA (1996:1255) stipulates that ‘everyone has the right to have access to adequate housing, the state must take reasonable legislation and other measures, within its available resources to achieve the progressive realization of the right and no one may be evicted from their home without an order of the court and no legislation may permit arbitrary evictions’. Housing development is a catalyst in terms of which other developments rests and its landscape has changed the spatial patterns of the country. A number of communities have realised their right of access to housing and therefore have applied as beneficiaries of the government subsidy scheme, called the low-cost housing or Reconstruction and Development Programme housing (RDP). However, most beneficiaries of such houses consider them non-satisfactory and therefore not valued (Windapo and Goulding, 2013).

The construction of the low-cost houses has been informed by the Supreme law of the country, the Constitution, policy on housing, Housing Act, Housing code and the policy on Breaking New ground. The Minister of Human Settlements has in the budget speech of 2016/17 financial year indicated that South Africa is the global leader in the policies and implementation of integrated human settlements and has confirmed that since 1994, approximately 4, 3 million houses have been delivered through the government housing subsidy (Sisulu, 2016).

Sisulu (2017) mentioned that a budget of R33.4 billion was allocated to portfolio of Human Settlements for financial year 2017/18. Even though the allocation will not meet the housing backlog, but it will address the need for housing. It has been indicated that the interpretation of housing delivery can be said that the country build 1 200 houses per day over 23 years, which means for every shack built, we have built ten houses.

Mbambani (2017), has reported that approximately 26 459 houses have been rectified as a result of shoddy work of contractors and the Department had to spent R2 billion in the last 3 years for remedial work on subsidised houses in terms of the rectification programme. (Ibid., 2017) further states that the statistics conducted in the period of 2002 to 2010, revealed that

31% of 1.8million people who benefited from subsidised houses, viewed the houses uninhabitable and substandard.

Despite the achievements in housing delivery, housing is still an emotive issue. According to the minister's budget vote, there are still communities who are still waiting for their houses. There are also those that have already received their houses, but their joy was short lived as their houses have defects and overall quality issues. As a result, most communities tend to express themselves in anger. The high levels of unemployment and grievances as result of access to job opportunities provided by local projects has not made the situation any easier and has caused a spike in service delivery protests.

According to News (2013), 'Flash floods in the Heidelberg area, in the South of Gauteng, left some houses and infrastructure damaged'. Crofts (2014) states that: 'on the evening of Sunday 2 October 2011, a tornado caused devastation in a section of Duduza, on the East Rand, resulting in major damage to infrastructure and houses. In an attempt to identify structural and building defects to be avoided in the provision of future housing. Even though the damage to housing and infrastructure is prompted by minor natural disaster, like storms, winds and rains, there is an underlying factor of quality management of the construction of low-cost housing. These incidents then leave the beneficiaries of low-cost houses with damaged houses.

While a number of research have been done on the quality of houses in the industry, few literature is available regarding the effect of local labour on the construction of low-cost houses. (Aigbavboa and Thwala, 2014), stated that challenges of quality in the construction field, is not only a South African issue but a problem of the whole world. The costs arising as a result of poor quality are related to among other things the resolving of defects and a failure to prevent such defects during construction.

The author indicated that it does not matter when such defects occur, it can be during the planning stages, manufacturing plants or when the actual construction takes place. Ten factors that contribute to the cost of poor quality have been identified as follows: (Ibid., 2014) defining objectives of quality, provision of leadership that is effective, quality control definition, development of the team and deploying the workforce to other areas, team efforts, compliance with health and safety matters, monitoring performance of activities as appears on the critical path, productivity improvement of resources and ensuring that accountable processes are available.

Service quality is said to have been studied in the construction industry, but not enough research has been done with regard to satisfaction of customers. Service quality and customer satisfaction have always been studied as separate entities and as a result a need arose to determine their relationship (Forsythe, 2015). The construction industry needs to ensure that the two merge so as to realise value for money for services provided to the communities.

### **2.3 Key concepts**

The following will be key concepts in the study:

- Building: NHBRC (2008:3) “includes any structure, whether of a temporary or permanent nature and irrespective of the materials used in the erection thereof, erected or used for or in connection with the accommodation or convenience of human beings”.
- Construction defects: Contractor (2017:1) “construction defect is generally defined as a defect in the design, the workmanship and or in the materials used on a project that result in a failure of a component part of a building or structure and causes damage too person or property, usually resulting in financial harm to the owner”.
- Employed persons: “Are those who were engaged in market production activities who worked for a wage, salary, commission or payment in kind, ran any kind of business, big or small on their own or with one or more partners and helped without being paid in a business ran by another household member” (Statistics SA, 2015:2).
- Housing development: Housing Act (1997:4) “means the establishment and maintenance of habitable, stable and sustainable public and private residential environments to ensure viable households and communities in areas allowing convenient access to economic opportunities and to health, educational and social amenities in which all citizens and permanent residents of the republic will, on a progressive basis have access to permanent residential structures with secure tenure, portable water, adequate sanitary facilities and domestic energy supply”.
- Labour force: “Comprises of people that are employed plus those who are unemployed” Statistics SA (2015:2)
- Major structural defects: “Means a defect which gives rise or which is likely to give rise to damage of such severity that it affects or is likely to affect the structural integrity of a home and which requires complete or partial rebuilding of the home or extensive repair work to it” Consumer Act (1998:5).

- Quality Assurance: (PMBOK, 2000:95) “evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards”.
- Quality Control: (PMBOK, 2000:95) “monitoring specific project results to determine if they comply with relevant quality standards and identifying way to eliminate causes of unsatisfactory performance”.
- Quality in construction: (Contractor, 2017) “meeting or exceeding the requirements of the client or owner, the specifications mentioned in the contract among other things”.
- Quality Planning: (PMBOK, 2000:95) “identifying which quality standards are relevant to the project and determining how to satisfy them”.
- Semi-Skilled occupations: “Clerks, sales, skilled agriculture, craft and machine operators grouped” (Statistics SA 2015:2).
- Skilled occupations: “Managers, professionals and technicians groups” (Statistics SA, 2015:2).
- Unemployment rate: “Measures the proportion of the labour force that is trying to find work” (Statistics SA, 2015:2).
- Workmanship: (Cotney, 2017: 1) defines workmanship as “the skill and quality put into making a product or completing a project, it is about quality, good or bad”.

## **2.4 Government policies that exists in the construction of low-cost houses**

### **2.4.1 Government policy on low-cost housing**

As pointed out by the NHBRC (2014), The preamble of the National Housing Act of 1997, recognises that parliament acknowledges that housing meets the requirements of a basic need and plays a major component of shaping developments that integrated in nature and shapes up the need for the creation of an economic hub for the social functioning of communities. The provision of the Housing Act created a vehicle for house construction through the Housing code. The provision of housing has indeed been achieved over the years. This is evident in figure 2.2 that since 1994 to 2013, a total of R 2 835 275 housing units were completed.



*Figure 2. 1 The history of low-cost housing: The Housing Code (2009)*

The Minister of the Department of Human Settlements has undertaken to reach 1.5 million houses within a period of 5 years (NHBRC, 2015). In terms of the Outcome 8 of the National Development Plan, by 2020, the vision of government in terms of the sustainable human settlements will break distorted spatial patterns and offering to the majority of the resident's access to adequate housing and affordable services (NDP, 2010). This report shows that the realisation of the provision of access to housing is dependent largely on good infrastructure, the quality of the houses and satisfied beneficiaries who can assist the state to realise their motto of value for money.

Coupled with sustainable human settlements, is the provision of improved living conditions of the majority of the residents of the country. In this breath, beneficiaries of the low-cost houses are at a disadvantage as they become owners of houses with defects. As part of its contribution to Outcome 8, the NHBRC 'ensures compliance to national norms, standards and quality within the building sector, assist the public and private sectors in improving programme and project management through training and skills transfers, assist in the protection of the interests of the public within the human settlements sector, assist government in the development of appropriate norms and standards in the provision of services, infrastructure and housing and assist the National Department of Human Settlements in the improvement of governance and performance in the sector' (NHBRC, 2013:35).

The Housing Code (2009), indicates that in the past, housing development was located in the outskirts of the urban areas and that prompted the shift in policy in line with the Breaking new

ground, which stipulated that housing development as a catalyst should shape the spatial patterns of development and ensure that they are developed on well located land closer to job opportunities, school, etc. The Housing code introduced a component of the (IRDP) which provides for land acquisition, internal reticulation of stands with internal services, and related land uses such as schools, clinics, parks. This programme is meant to be developed in two phases, through the housing subsidy scheme. The first phase involves the internal reticulation /servicing of stands and the second phase involves the construction of houses. This research will concentrate on the second phase: the construction of houses.

In line with (Ibid., 2009:13) the housing programme is meant to assist among others the following ‘persons meeting a particular qualification criteria’:

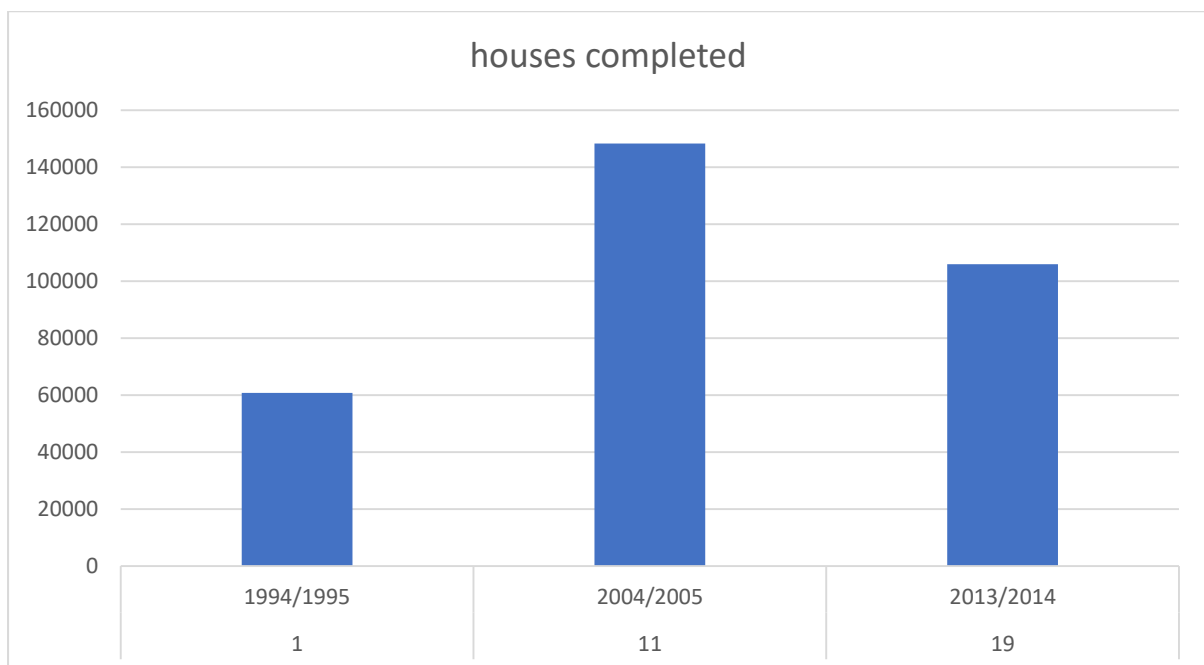
- ‘Citizens of the Republic of South Africa in possession of a permanent resident permit and residing in the country’;
- ‘Legally competent to contract’;
- ‘Neither the applicant nor his or her spouse has previously benefited from the government housing assistance’;
- ‘Have not owned fixed residential property’; and
- ‘Have previously owned fixed residential property but such a person may only qualify for the purchase of a vacant serviced site’.

Improvement of the housing delivery over the years prompted the introduction of the Breaking new ground policy which was meant for sustainable housing developments. BNG (2004) highlights a need for change and a new vision for housing development by committing to accelerated housing delivery as a poverty alleviation strategy, housing provision as a major strategy for job creation, access to property for empowerment and wealth creation, breaking barriers of first and second economy in the property market, planting the seeds of the economic growth, crime prevention and overall improvement of the quality of the lives of the poor and utilising housing as a vehicle for sustainable human settlement in support of the restructuring of the spatial patterns.

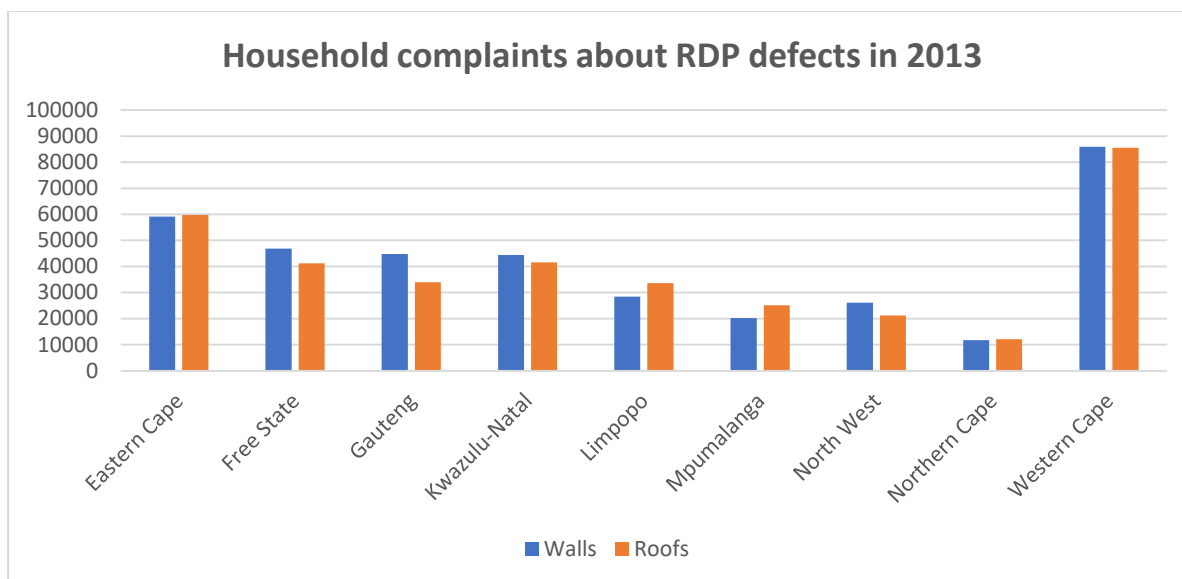
Figure 2.2, depicts that there has been a sharp increase in the housing delivery from approximately 60 000 housing units in 1994/1995 to 150 000 housing units in 2004/2005. However the sharp increase declined to approximately 105 000 in 2013/2014 when the sustainable housing development model, the breaking new ground was introduced.

BNG (2004) unpacks the job creation of the housing industry. The delivery of housing contributes to the alleviation of levels of poverty by ensuring that the construction industry provides for direct and indirect jobs. The Expanded Public Works Programme (EPWP) is a government intervention that intervenes nationwide in infrastructure, economic, social, environment and culture and the Department of Human Settlement's programme falls under the scope of infrastructure in line with the EPWP (Ibid., 2004).

The accelerated housing delivery brought with it challenges of low quality of houses. Figure 2.3 shows an exponential growth in the complaints of households on defects of houses. The complaints range from 20 000 to approximately 90 000. The government strategy on poverty alleviation through job creation in the construction industry had adverse results.



**Figure 2. 2 Housing units completed since 1994 to 2013: Department of Human Settlements, 2013**



*Figure 2. 3 Household complaints about RDP defects in 2013: the main problems being weak wall and roofs: Department of Human Settlements, 2013*

*Table 2. 1 Government spending on badly built houses: 2011/2012-2013/2014: Department of Human Settlements, 2013*

Province	No of houses	Expenditure
Eastern Cape	39228	R1 521 610 000.00
Free State	21467	R21 870 000.00
Gauteng	66093	R137 690 000.00
Kwazulu-Natal	77210	R206 000 000.00
Limpopo	28708	R7 620 000.00
Mpumalanga	23399	R12 090 000.00
North West	40119	R12 170 000.00
Northern Cape	8967	R68 820 000.00
Western Cape	36434	R42 080 000.00
<b>Totals</b>	<b>341625</b>	<b>R2 129 950 000.00</b>

It is seen in Table 2.1 that a total number of 341625 badly build houses had to be rectified with an amount totalling R2 129 950 000.00. This is a total loss to government as there is no progress moving forward but utilisation of resources on the same products. On the one hand funds are spent building the houses and on the other hand, funds are spend rectifying the same houses.

### **2.4.2 Government policy on local labour**

The Skills Development Act, 97 of 1998 was introduced after a concerted effort to improve the skills of the workforce and its purpose is ‘to develop the skills of the South African workforce, to increase the levels of investment in education and training in the labour market and to improve the return on that investment, encourage employers to use the workplace as an active learning environment, to employ people who find it difficult to be employed, to provide employees with opportunities to acquire new skills and to provide opportunities for new entrants to the labour market to gain work experience, to encourage workers to participate in learning programmes, to improve the employment prospects of persons previously disadvantaged by unfair discrimination and to redress those disadvantages through training and education, to ensure the quality of learning in and for the workplace and to assist work-seekers to find work, retrenched workers to re-enter the labour market, employers to find qualified employees and to provide and regulate employment services’.

According to (Statistics SA, 2015) the younger South African men and women, are mostly struggling with access to employment opportunities in the job market and as a result, the youth is disgruntled and the situation can lead to chaotic levels in the communities. The younger population accounts to a larger portion of the working age. In terms of the (CIDB, 2015), 70% of the workforce in construction is semi-skilled and unskilled. CIDB (2013) suggest that subcontracting in the construction industry is rife with 70% of building and 30% of civil construction projects subcontracted out. The prevalent types of subcontracting are labour-only, trade contracting in the building sector and specialist subcontracting in the building and civil sectors. The duration of typical subcontractors in the building industry is between three and six months with longer period of twelve months in the civil sector.

The Code of Good practice of SPWP, is an enabling government mandate for short-term, labour intensive, non-permanent funded from public resources (RSA, 2002). The programme was introduced with the aim of reducing unemployment as one of the major challenge of South Africa. The Code is informed by section 87(1) (a) of the Basic Conditions of Employment Act. All employers under the SPWP programme has to comply with the following legislations:

- Basic Conditions of Employment Act, 75 of 1997;
- Labour relations Act, 66 of 1995;
- Employment equity Act, 55 of 1998;
- Occupational Health and Safety Act, 85 of 1993;

- Compensation for occupational injuries and diseases Act, 130 of 1993; and
- Skills development Act, 97 of 1998

According to RSA (2002:2), ‘the Code is based on international best practice experience that wherever possible work should be task-based and the worker is paid a fixed rate in return for a fixed quantity of work and only work completed is paid for’. The SPWP recommends the following vulnerable groups for participation in projects: women, youth, people with disability, households coping with HIV/AIDS, people who have never worked and those in the long-term unemployment (Ibid., 2002).

In the employment of local labour in line with the SPWP programme RSA (2002:6) employers are mandated to do the following among other things:

- Ensure that all workers are informed of any risks and dangers associated with their tasks;
- Inform and train workers about the precautions and steps that must be taken to avoid or minimise risks and dangers to them or others; and
- Not permit workers to perform tasks for which they have not been trained.

## **2.5 Building regulations and standards that govern quality adherence in the construction of low-cost houses**

### **2.5.1 Established national norms and standards**

The construction of the low-cost houses falls in the armpit of the protection of the consumer in terms of the Housing Consumers Measures Act, Act 95 of 1998, herein referred to as the Consumer Act. NHBRC (2014) states that developers or contractors or anyone who undertakes the construction of low-cost housing, need to be registered with the National Home Builders Registration Council and may subcontract work relating to the construction of homes to registered home builders.

The RSA (1998) provides for the establishment of the National Home Builders Registration Council and a warranty scheme. The Act prevents developers, contractors or any home builder or contractor to construct houses without first being registered with the Council. The scheme stipulates that registered home builders should rectify and or repair defects on constructed houses at their own costs or they risk being deregistered if they fail to comply.

In terms of the Housing Consumers Measures Act, Act 95 of 1998 the mandate of the NHBRC is as follows:

- To represent the interest of housing consumers by providing warranty protection against defined defects in new homes;
- To regulate the home building industry;
- To provide protection to housing consumers in respect of the failure of home builders to comply with their obligations in terms of the Act;
- To establish and promote ethical and technical standards in the home building industry;
- To improve structural quality in the interests of housing consumers and the home building industry;
- To promote housing consumer rights and to provide housing consumer information;
- To communicate with and assist home builders to register in terms of the Act; and
- To assist home builders through training and inspection, to achieve and maintain satisfactory technical standards of home building.

Mitchel (2013), however highlights that a client will have no recourse under the Consumer Protection Act and a solution can be sought under the *voetstoots* clause by proving that the defects were deliberately concealed and the contractor and professionals such as the Architect and structural engineers will then be sued for negligence.

The NHBRC (2014), stipulations ‘the home builder undertakes to enter into a written agreement with the housing consumer, construct foundations and superstructure appropriate to the site class designation and degree of expected damage indicated on plans, inform the housing consumer of the contents of the risk management plan.’

## INSPECTION: PROCESS FLOW

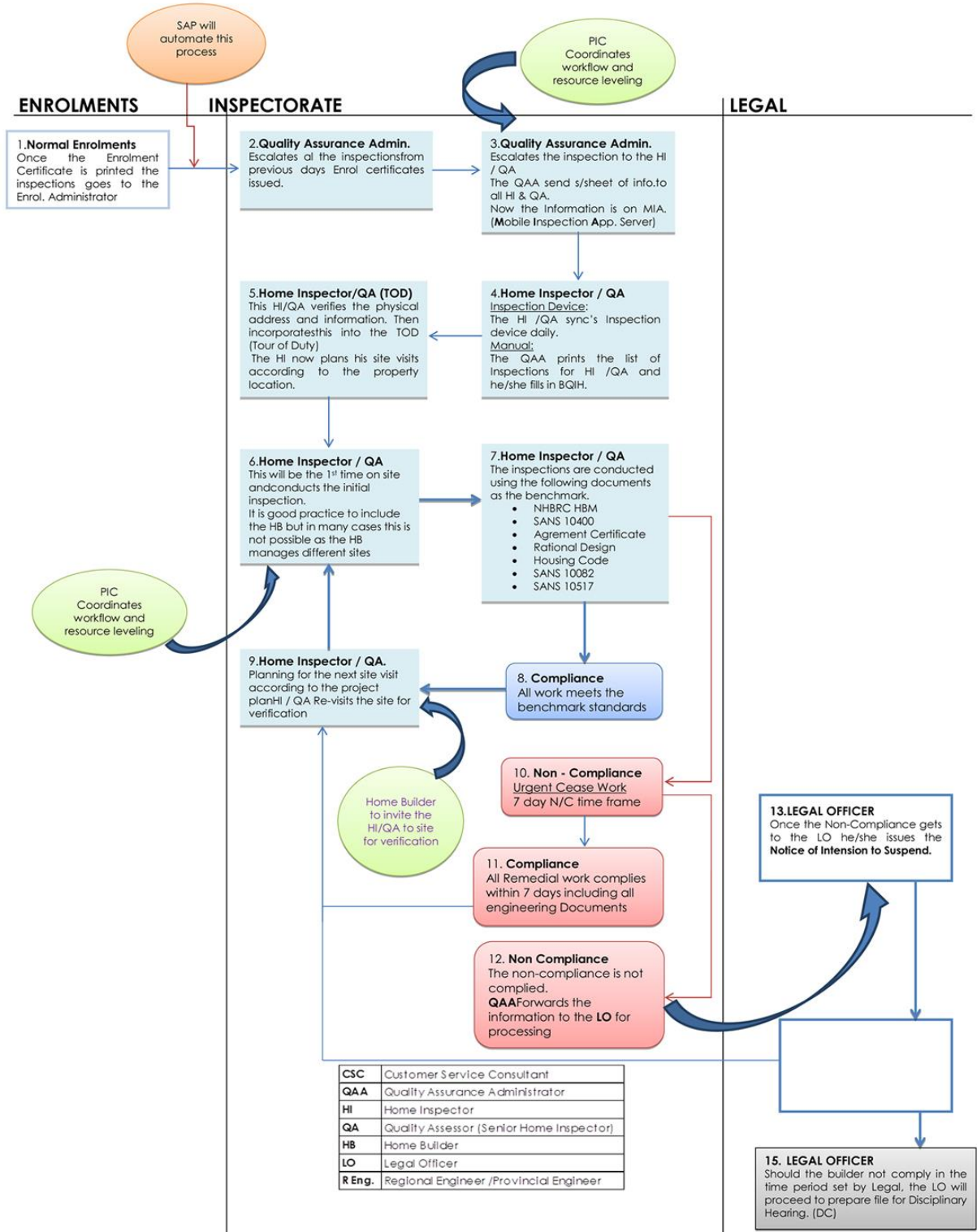


Figure 2. 4 The NHBRC inspection process flow: NHBRC (2013:32)

Where the site is underlain by dolomites, ensure that the home is constructed in a work man like manner and is fit for habitation, only subcontract the construction of the home to a builder who is registered as a home builder with the NHBRC, satisfy the NHBRC's technical requirements, not to proceed with the construction of the home without obtaining the necessary home enrolment certificate issued by NHBRC (*ibid*, 2014).

There is a rule that mandates the inspectors from NHBRC access to conduct inspections in all projects and recommend any remedial work at a cost to the contractor to avoid non-compliance. Compliance issues can also relate to deficiencies with the designs, the performed work or with the material used on the product. The contractor has a responsibility to comply with the recommended remedial works within 90 days of the inspection taking place. The contractor has to rectify any identified work, whether in part or in whole (*ibid*, 2014).

Figure 2.4 shows the process followed on the inspection of houses by NHBRC. The inspection of houses by NHBRC was given the necessary attention it required, hence the decline of housing delivery in 2013/2014 as appears in Figure, 2.2 and the rise of complaints on defects in 2013 as appears in Figure 2.4. The housing delivery shifted to a more proportional balance towards delivery of quality houses.

According to RSA (2008:24), Section 19 of the Housing Consumers Measure Act reads as follows:

*“The NHBRC shall for the purposes of this Act appoint inspectors in terms of section 6 and enter into agreements or liaise with local government bodies or other bodies or persons for the inspection of homes. An inspector may, for the purpose of inspecting a home during its construction, enter and inspect the premises constituting the site of the construction at any reasonable time. For the purposes of an investigation, an inspector may require the production of the drawings and specifications of a home or any part of a home, including plans approved by the local authority and plans and specifications prescribed in the Rules or the Home Building Manual, for inspection from the home builder and may require information from any person concerning any matter related to a home or any part of a home, be accompanied by any person employed or appointed by the Council who has special or expert knowledge of any matter in relation to a home or part of a home and alone or in conjunction with any other person possessing special*

*or expert knowledge, make any examination, test or enquiry that may be necessary to ensure compliance with the Home Building Manual.”*

In terms of the structural strength and serviceability, the NHBRC inspectors look for the following: foundations, floors, walls, glazing and roof assemblies. In terms of the foundations, the designs should be in accordance with SANS 10400-H and the construction of the foundation should be in accordance with the provisions of SANS 2001-CM2. In terms of floors, provisions of SANS 10400-J and SANS 2001-CC1 or SANS 2001-CC2 should be complied with. On the walls, SANS 10400-K should be complied with. On glazing compliance should be with the provisions of SANS 10400-N and finally of the roof assemblies, there should be compliance with SANS 10400-L.

#### **2.5.1.1 Foundations**

In NHBRC (2008:108) ‘The foundation of any building shall be designed and constructed to safely transmit all the actions which can reasonably be expected to occur from such building to the ground and in such a manner that any local damage including cracking, deformation or vibration do not compromise the efficient use of a building or the functioning of any element of a building’.

#### **2.5.1.2 Floors**

NHBRC (2008:109)‘Any floor of any building shall be designed and constructed to safely supports its own weight and any action which can reasonably be expected to occur and in such a manner that any local damage including cracking, deformation or vibration do not compromise the efficient use of the building. The floor of any laundry, kitchen, shower room, bathroom or room containing a toilet pan or urinal shall be water resistant’.

#### **2.5.1.3 Walls**

NHBRC (2008:110) ‘Any floor of any building shall be designed and constructed to safely sustain any actions which can reasonably be expected to occur and in such a manner that any local damage including cracking or deformation do not compromise the opening and closing of doors and windows or the weather tightness of the wall and in the case of any structural wall, be capable of safely transferring such actions to the foundations supporting such wall. Any wall shall be constructed that it will adequately resist the penetration of water into any part of

the building where it would be detrimental to the health of occupants or to the durability of such building.

#### **2.5.1.4 Glazing**

NHBRC (2008:113) ‘Any material used in the glazing of any building shall be of a secure and durable type and shall be fixed in a manner and position that will ensure that it will safely sustain any wind actions which can reasonably be expected, not allow penetration of water to the interior of the building and be apparent, in the case of clear glazing to any person approaching such glazing.

#### **2.5.1.5 Roofs**

NHBRC (2008:111) The roof of any building shall be so designed and constructed that it safely sustains any actions which can reasonably be expected to occur and in such a manner that any local damage including cracking or deformation do not compromise its functioning, it is adequately anchored against wind uplift, is durable and does not allow the penetration of rainwater or any other surface water to its interior, does not allow the accumulation of any water upon its surface and as part of a roof and ceiling assembly, provides adequate height in any room immediately below such assembly.

### **2.5.2 Conformance with SABS material, CIDB and NHBRC**

The use of SABS compliant material in the construction industry is of utmost importance. NHBRC (2014) shows that the aim of the SABS as a statutory arm of government develop, promote and maintain the national standards, promote quality in connection with commodities, products and services and render conformity assessment services.

NHBRC (2014), indicates that ‘the Construction Industry Development Board Act, provided for the establishment of the Construction Industry Development Board (CIDB) to implement an integrated strategy for the reconstruction, growth and development of the construction industry. This Act is said to have a register of contractors linked to a best practise contractor recognition scheme and a register of projects linked to a best practice project assessment scheme. Both these registers are central to the implementation of the integrated strategy’.

NHBRC (2014), prohibits a contractor from doing any public sector work if they are not registered with the Construction Industry development Board(CIDB) and in possession of a valid registration certificate, require the state to apply the register of contractors whenever they

appoint contractors for the state sector work, requires the state to advertise tenders and report to the CIDB whenever the cost is R200 000 or exceed an amount of R200 000, requires the private sector to advertise and report to the CIDB whenever the cost is R3 000 000 or exceed an amount of R3 000 000. The State and the private sector have equal responsibility of also reporting the award, the cancellation or the termination of contracts.

As pointed out by NHBRC (2014), ‘the standard for uniformity in construction procurement establishes a uniform framework for procurement and minimum requirements for the solicitation of tender offers, the use of standard forms of contract and the formatting and compilation of procurement documents. The standard which confines the choices available to clients in the forms of contract that they may use, regulates the process of offer and acceptance and informs and shapes the development of standard documentation developed by industry stakeholders.

## **2.6 Contractors communication of the quality standards for the building of low-cost houses to local labour**

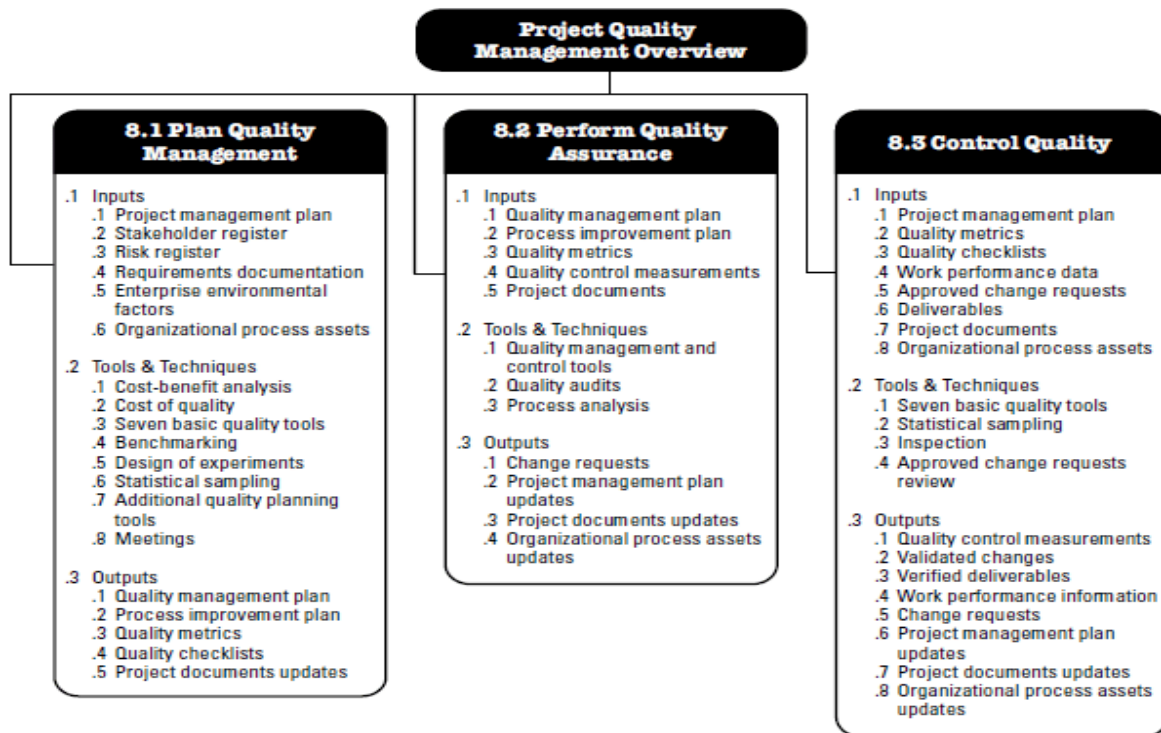
As previously mentioned at the beginning of the chapter, there have been recurring incidents of quality and growing concerns of huge expenditure on the rectification of some of the constructed low-cost houses (SAICE, 2014). In an endeavour to find a solution for these recurrences the chapter intends to unearth which are the relevant quality management process and standards and how the contractors communicate these quality standards and processes.

### **2.6.1 Quality management processes**

Project quality management is one of the project management knowledge area as determined by the Project management body of knowledge. It is found in the PMBOK (2013:227) that project quality management ‘includes the processes and activities of the performing organization that determine quality policy, objectives and responsibilities and implements them by means of quality planning, quality assurance, quality control and quality improvement, within the quality system’

ISO 9001(2015:2), ‘specifies requirements aimed primarily at giving confidence in the products and services provided by an organisation and thereby enhancing customer satisfaction. Its proper implementation can also be expected to bring other organisational benefits such as improved internal communication, better understanding and control of the

organisation's processes. The approach of quality management is intended to be compatible with that of the ISO 9001 in that it must address both management of the project on the one hand and the management of the product of the project on the other hand (PMBOK, 2013).



**Figure 2. 5 The Project Quality Management Overview PMBOK (2013:230)**

The project management handbook further states that 'organisations shall establish, implement, maintain and continually improve a quality management system. This includes the processes needed and their interactions, in accordance with the requirements of this international standard and determine the inputs required and the outputs expected from these processes. Followed by determining and apply the criteria and methods needed to ensure the effective operation and control of the processes. Then to determine the resources needed for these processes and ensure their availability, assign the responsibilities and authorities for the processes, address the risks and opportunities as determined in accordance with the requirements. And lastly to evaluate the processes and implement any changes needed to ensure that the processes achieve their intended results and improve the processes and the quality management systems' (Ibid., 2015:2).

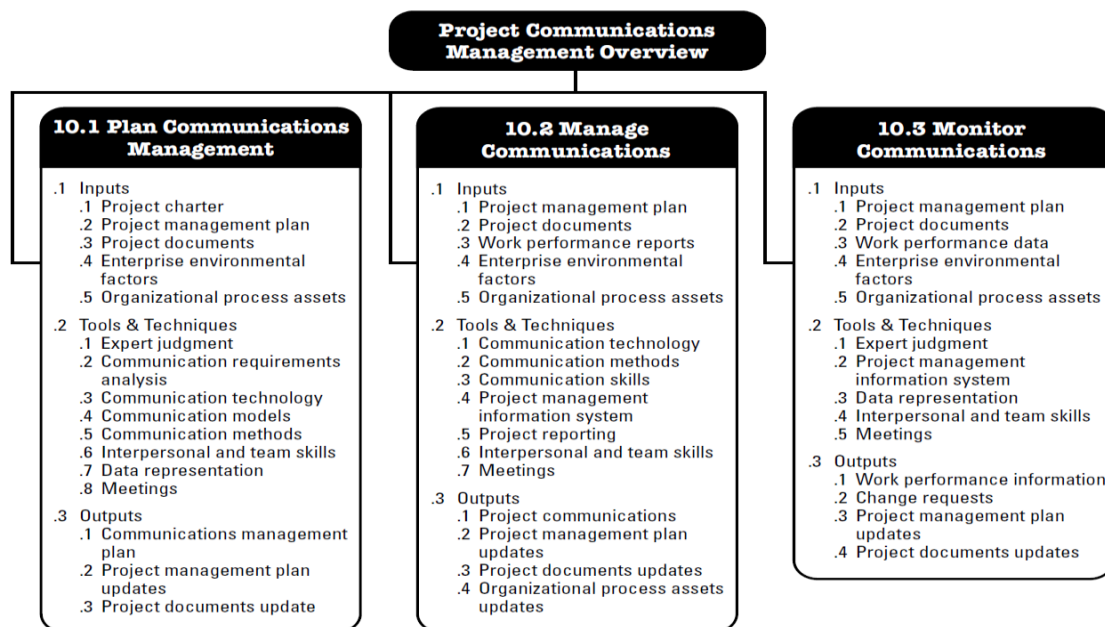
Emuze and Mhlwa (2015), has ascertained that projects in the construction industry still not conform to the quality requirements and as a result will not attain client's satisfaction. (*ibid*,

2015) has also attributed lack of skilled workers and artisans as one of the non-conformances to quality in construction.

The problem of adherence to quality management and compliance, if not addressed, will continue to cause unhappy beneficiaries, therefore creating an environment for service delivery protests. Potential injuries to inhabitants of the low-cost houses and potential liability to the state will arise. The government of South Africa, through its various departments have a responsibility to ensure that there is value for money in all infrastructure developments that are undertaken (*ibid*, 2015).

### 2.6.2 Project communications management

According to PMBOK (2013:287) ‘project communication management includes the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring and the ultimate disposition of the project information.’ Effective communication is said to include a variety of stakeholders who have diverse skills, knowledge, expertise, and different cultural and organisational background with the sole purpose of making the project work (*ibid*, 2013).



**Figure 2. 6 Project communications management overview PMBOK (2013:289)**

The ‘communication processes include the plan for managing communications, the management process of communication and the control of communication. There is a number

of communication activities highlighted and those include: internal and external stakeholders such as customers, organisations and the public, formal communication such as report, minutes of meetings, site briefings, informal communications such as emails, memorandums and *ad hoc* discussions, vertical(up and down the organisation and horizontal(with peers), official such as newsletters, annual reports and unofficial(off the record communications and written and oral and verbal and non-verbal communication(*ibid*, 2013).’

Communication is one of the cornerstone of project management. A communication plan is developed to set out stakeholder information needs, engagements, requirements and available assets, (PMBOK, 2013). The research done by (Butt et al, 2016) states that communication is critical to the success of a construction project, as a result one must include quality communication as part of his quality control plans. As part of the communication one will include the contact list of every stakeholder in the project, scheduled routine meetings and record keeping. There is an undertaking requirement for dialogues in the commonly known form of meetings and most of the meetings are mostly conducted face to face. Such meetings are more formal where stakeholders meet to make decisions and resolve problems. It is in this meeting where issues such as the norms and standards and the conformance thereto should be discussed (*ibid*, 2013).

### **2.6.3 Communication of quality standards**

Ceric (2014), states that communication is one of the risks in construction projects and to minimise and mitigate it, a level of trust must be put in place. Construction projects should apply the inter-firm, intra-firm and interpersonal relationships between the project parties. i.e., the project owner, contractor and their respective project managers Ceric (2014). Trust as the centre issue around relationships on construction projects requires relevant parties apply interdisciplinary efforts in which all disciplines are involved and those include economics, sociology and psychology stand to gain a deeper appreciation of each other’s means and ends.

Kwofie *et al.*,2015 elaborates access, flow and import of information as the main communication ineffectiveness experienced in project teams. The delivery of project information is crucial in the success of the project. Late delivery of such information will literally be detrimental to the success of a project. The non-clarification of roles and responsibilities in projects can cause challenges with the flow of information. Formal procedure and reporting lines needs clarity from the onset of the project. The import of information has

to do with the miscommunication and misunderstanding of information and as a result conflicting messages are implemented detriment to the project.

In construction industry one of the communication instruments that is used is tools box talks (Fapohunda and Chileshe, 2014). Fapohunda and Chileshe (2014) state that the tools box talk are a means of knowledge transfer where the skilled workers impart their knowledge on the best way to carry out the works. Whereas Richards et al (2017) mentions that in New Zealand, tools box talks are useful means of communicating the days plan and gives supervisors the opportunity to reiterate the quality requirements.

SAICE (2014), highlighted that communication and participation of the community in terms of illiteracy and language, as a challenge was overcome by using community liaison officers and some of the work had to be done during after-hours as occupants were not available during the day.

According to Pearson et al (2014), the Brazilian construction companies have managed to come up with quality management policies which govern their operations, and they seem to be well communicated among from management to workers. But on the other hand, in Malaysia Keng and Hazmah (2011) mentioned that the quality management policies are in place, but the workforce regard the policies as irrelevant. Studies by Theo et al (2004), show that the middle managers find it difficult to implement quality management because of the tedious paperwork hence making the some of the communication to be distorted in some instances.

ISO 9001(2015:8), also states that organisations will decide what the required competencies of persons doing the work under its control are and which ones affects performance and effectiveness of the quality management system. These organisations ensure that persons are competent on the basis of appropriate education, training or experience, where applicable, take action to acquire the necessary competence and evaluate the effectiveness of the actions taken and retain appropriate documented information as evidence of competence.

Following the ISO 9001(2015:8), in the Malaysian construction projects they employ tradesmen with qualifications for all the skilled labour requirements, but then there is no qualifications required for the general labour Keng and Hazmah (2011). But despite the engagement of these qualified skilled personal quality management is to be lacking as they regard the policies irrelevant. Also, as stated by Theo et al (2004), the middle managers that

should be managing these skilled workers view the management system as being too bureaucratic hence the skilled labour tend to not to follow the management policies to the letter.

## **2.7 How local labour ensure that their work meet the norms and standards in the construction of low-cost houses**

Around the world, in the public sector there are developmental projects such as irrigation and housing delivery which are meant to develop the society by providing the infrastructure and empowering the unskilled workforce (Thwala and Mofokeng, 2012). The use of local labour in the African continent started quiet early in the 1960 with North African countries namely Morocco, Algeria and Tunisia as emergency relief infrastructure projects (Thwala and Mofokeng, 2012). The most practised form of skills transfer to the unskilled labour was through in job training, where they observed what the skilled the labourers who do their work. Although according to Hassan (2009) this form of training is not as efficient as the unskilled labourer doesn't get to understand the concept of the process, hence the need for a vocational training where they are taught the concepts about the specific trade and all the technologies involved.

Similarly to the other African countries, the South African industry has taken up this initiative by the contractors giving priority to the employment of local labour in their projects and this is done through the community liaison officer, Nkotitshi (2013). Adebowale (2014) states that both the skilled and the unskilled labourers are being employed in construction projects in South Africa.

Macfarlane (2012), states that in the United Kingdom the local labourers first go through interviews and assessments before they are taken in. Once they have been recommended to be part of potential workers, they would be sent to a pre- vocational training which takes three weeks where they are taught the basics of construction. Thereafter the contractors can take the trainees on a six week trial period before they are given a contract to be workers on site.

Whereas Hassan (2009) mentions that in Malaysia there are 14 days that are put aside for training the labourers. But in as much as these days have been allocated, the author mentions that there is less amount of technological knowledge that is transferred. Hassan (2009) elaborates that the training does not consider the changing technologies, it fails to articulate the actual nature of work that exists in the construction industry and the training should allow for career enhancements to the trainees by equipping them with the ability to self-managed learning.

In Singapore the training of the workers has been a challenge. The top factors affecting the training of new labourers include difficulty with recruitment of supervisors who are meant to be training the local labour, high rate of labour turnover, where some of the labourers being trained are most of the time leaving the sites or being absent from the work site (Ibid 2013). Whereas in Iranian challenges in passing the knowledge of quality during project execution is due to the lack of materials adequate materials, weather and physical site conditions, lack of proper tools and equipment, design, drawing and change orders, inspection delays, absenteeism, safety, improper plan of work, repeating work, changing crew size. Then as for Thailand they include lack of materials, incomplete drawings, incompetent supervisors.’ (Ibid 2013).

ISO 9001(2015:8), also states that organisations will decide what the required competencies of persons doing the work under its control are and which ones affects performance and effectiveness of the quality management system. These organisations ensure that persons are competent on the basis of appropriate education, training or experience, where applicable, take action to acquire the necessary competence and evaluate the effectiveness of the actions taken and retain appropriate documented information as evidence of competence.

## **2.8 The extent to which the use of labour affects the quality of the construction of low-cost houses.**

The involvement of local labour in the construction of low-cost housing sparked an interest in this research. There is a view that suggest that structural defects as a result of the involvement of unskilled local labour is the major contributor to the low-cost housing questionable quality. In an endeavour to ascertain the reasons for poor quality with the construction of low-cost houses the researcher searched for literature that spoke to the causes of poor quality within the construction industry worldwide and it has been detailed below. The authors (Buys & Roux, 2013) reveals that inadequate artisan skills are a cause for concern and a major cause of defects of houses and it is suggested that cracks seems to be appearing more often. Projects fail in project management terms because of defects as the construction time of the projects is prolonged. The research found that cases of construction defects mainly centres on design issues. Buys & Roux (2013) indicates that there should be building regulations and target standards for buildings to qualify and considered to be suitable for human habitation. The standards include, structural stability, a lack of dampness, the provision of adequate heating, lighting and ventilation, adequate piped supply of water and an effective drainage system.

Whereas Windapo (2016) has done studies to the effects that skills shortage has been for some time a challenge for the construction industry and asked if there is a link between the quality of work produced and the levels of skills of those who are employed in construction project. It was found that while there is a shortage of skills in the construction industry, there is however no shortage of manpower, but a shortage of qualified or skilled tradesmen and hence this study on the relationship of the quality of low-cost houses and the employment of local labour in construction projects.

Adebowale and Ayodeji (2015), proceeded to find that site manager's ability to communicate, supervisor's construction skills and contractor's proper site planning abilities are the main contributors to construction related failures of construction labour. Contractors have to take charge of the construction activities for the overall construction productivity. Therefore the success rate of any contract depends on the selection of suitable construction contractors (Adebowale and Ayodeji, 2015).

Gashi (2018), highlights that the construction industry produces a product that is often constructed by low-skilled labour and as a result careful thought for the perfection of the final product should be done. If this is not done, there is possibility for hidden defects which decrease the value of the project and the satisfaction of the end user of such a final product. However, it is mentioned here that the major factors for defects are poor workmanship, deficiency in the designs, materials or systems used.

In the same breath Mahamid (2013) found that the top five factors affecting labour productivity in construction negatively are rework, lack of cooperation and communication between construction parties, financial status of the owner, lack of experience and lack in materials.

Mahamid (2013) points that 'poor communication, construction methods that are poor, wrong drawings, weather conditions, shortage of skills and work stoppages are some of the reasons why the construction industry is marred with quality issues' (*ibid.*,2013: 448). It was further pointed that labour productivity for Malaysian residential projects are: material shortage at site, non-payment to suppliers causing the stoppage of material delivery to site, change order by consultants, late issuance of construction drawing by consultants, and incapability of contractors' site management to organize site activities.

Kumar and Sriram (2017) found that 'major defects in buildings occur due to individual mistakes, poor workmanship in executing the work like the inadequate concrete cover,

improper use of formwork and substandard of the material and the majority of defects can be avoided if proper methodology, material and manpower are used’.

Forcada et al., (2016) reveals that structural defects are identified during construction and some are managed to be resolved, however most of the defects are identified at the stage of handover and they arise when the customers lodge complains. An analysis of 52 552 handed over flats in Spain had these challenges. The rework of such defects has a negative impact on efficiency, competitiveness and productivity of the construction industry.

Schultz et al., (2013) indicates that there are results of rework due to defects in construction. The rework is taken as counterproductive and contribute to cost increases in construction projects. It is said that ‘projects with a poor quality of performance also had a higher possibility of injuries’ (ibid, 2013:428).

Even when legislation to protect customers is in place in Spain, there is still a huge number of defects taking place in newly constructed houses. The said defects contribute to customer dissatisfaction, a tarnished reputation of the contractor. Even though some of these defects might not be solely the responsibility of the contractor but that of a subcontractor, emphasis of quality should be done at the beginning of construction Forcada et al .,(2013).

Hopkin et al (2015) suggest that a major role in the determination of quality of new homes is played by home builders themselves, however there are pressures in the UK to increase its margins as far as supply and compliance of the building regulations. There has been concerted efforts in encouraging collaborative work in relation to the National House Building Council (NHBC) on understanding defects of houses and their analysis procedures (Hopkin et al., 2015).

Ismail et al., (2015) mentions that defects in houses should be prevented so that the living environment of the beneficiaries has aesthetics and are sustainable and matched the price paid for the construction of such houses. On the other hand such defects should be prevented to minimize disasters that may arise in fatalities and injuries. If beneficiaries could experience injuries or fatalities, the reputation of the government will be at stake.

Various authors’ shows the correlation between defects in the building projects and other project information reported in the benchmarking system Schultz et al., (2013). They further state that quality problems in the construction industry have been investigated and often focus

on quality costs, cost of rework, cost of failure, etc (ibid., 2013). The trend of non-conformance is interrelated to errors and failures, human errors, defects, deficiencies, quality deviations, omissions and damage. The author further points that “poor communication, construction methods that are poor, wrong drawings, weather conditions, shortage of skills and work stoppages are some of the reasons why the construction industry is marred with quality issues” (Ibid.,2013: 448). It was further pointed that labour productivity for Malaysian residential projects are: material shortage at site, non-payment to suppliers causing the stoppage of material delivery to site, change order by consultants, late issuance of construction drawing by consultants, and incapability of contractors’ site management to organize site activities.

Georgiou (2013) stated that defined standards for acceptable workmanship, guide to standards and tolerance was first published in 1990 in Australia. The presence and incidence of defects has always been present in construction of new houses and this is the reason there are levels of dissatisfaction and discourse on residents of such houses. One of the main contentions is leading to a number of disputes is poor workmanship, poor quality. The introduction of the Building Act 1993 in Australia mandated the registration of builders and all other practitioners in the construction industry. This mandated registration is similar to the South African National Building regulations where contractors and subcontractors are mandated to be registered with the NHBRC, this mandated registration is however limited to the two stakeholders and not the labour or workers, hence the issues of quality are still experienced.

From the literature reviewed the major causes of inadequate quality in construction projects are lack of skills followed by lack of communication, Workmanship and costs of material and equipment, respectively as shown in Table 2, 2 below. Considering the literature gathered it is evident that to a greater extent the labour and communication in the project have an impact on the quality of the project.

**Table 2. 2 Conceptual framework showing the causes of poor quality within the construction industry**

<b>AUTHOR</b>	<b>SKILLS</b>	<b>TRAINING</b>	<b>COMMUNICATION</b>	<b>POOR WORKMANSHIP</b>	<b>COST</b>	<b>TIME</b>
Emuze & Mhlwa, 2015	X	X	X	X	X	X
Buys & Roux,2013	X			X		X
Windapo, 2016	X	X				
Mani.et al, 2017						
Odediran, 2014	X					
Pan & Thomas, 2013			X			
Kikwasi, 2016	X		X		X	X
Oke, et al.,2016					X	
Hamouda & Abu-Shaabab,2014	X					X
Adebowale & Ayodeji,2015	X		X		X	
Pearson, et al, 2014				X		
Kwofie, et al.,2015	X		X			
Kakitahi, et al.,2014			X	X		
Perrie, 2013	X		X			
He & Wu, 2016				X	X	
Forcada,et al.,2013						
Kisi, et al, 2017			X			
Mahamid, 2013	X		X	X	X	
Liao,2015	X					
Forcada,et al.,2014				X		
Schultz,et al.,2015				X	X	
George,2013	X		X	X	X	
Hopkin,et al.,2015	X					
Ceric, 2014			X			
Windapo & Goulding,2013			X			
Oni, et al, 2016	X					
Aigbavboa & Thwala,2014					X	X
Forsythe ,2015			X			
<b>Total</b>	<b>14</b>	<b>2</b>	<b>13</b>	<b>9</b>	<b>9</b>	<b>5</b>

The problem of adherence to quality management and compliance, if not addressed, will continue to cause unhappy beneficiaries, therefore creating an environment for service delivery protests. Potential injuries to inhabitants of the low-cost houses and potential liability to the state will arise. The government of South Africa, through its various departments have a responsibility to ensure that there is value for money in all infrastructure developments that are undertaken.

## **2.9 Summary of the literature review**

The literature review section has covered the government policy on implementation and construction of the low-cost housing;

The chapter investigated the building regulations and standards that govern quality adherence in the construction of low-cost houses. One of the legislation that governs quality of houses built is the Housing Consumers Measures Act, Act 95 of 1998. The Housing Consumers Measures Act, Act 95 of 1998 which has mandated the NHBRC to represent the interest of housing consumers by providing warranty protection against defined defects in new homes, to regulate the home building industry; and to provide protection to housing consumers in respect of the failure of home builders to comply with their obligations in terms of the Act.

The chapter thereafter revealed that for public sector projects the contractors ought to be registered with the CIDB and this board gives out its registration to contractors meet the industry best practice guidelines. During construction the contractors need to construct the houses in accordance the SANS guidelines. For the foundations, the designs should be in accordance with SANS 10400-H and the construction of the foundation should be in accordance with the provisions of SANS 2001-CM2. In terms of floors, provisions of SANS 10400-J and SANS 2001-CC1 or SANS 2001-CC2 should be complied with. On the walls, SANS 10400-K should be complied with. On glazing compliance should be with the provisions of SANS 10400-N and finally of the roof assemblies, there should be compliance with SANS 10400-L.

Following the outline of the relevant standards used in the construction industry the chapter went on to investigate the means in which quality is effectively communicated. Butt et al (2016) mentions that for an effective communication of quality there has to be three steps to be taken, there should be a contact list with every stakeholder in the project, there scheduled routine meetings and lastly record keeping of all information and activities onsite. Such routine

meetings ought to be conducted face to face and all relevant stakeholders must attend to make decisions and resolve all issues. Another means of communication used is tools box talks which a means of knowledge transfer from the skilled to the unskilled labourers as well as means of communicating the days plan and gives supervisors the opportunity to reiterate the quality requirements.

After revealing how quality is communicated the chapter went further to study how the local labourers ensure that their work meet the norms and standards in the construction of low-cost houses. The most practised form of skills transfer to the unskilled labour was through in job training, where they observed what the skilled the labourers who do their work. Although according to Hassan (2009) this form of training is not as efficient as the unskilled labourer doesn't get to understand the concept of the process, hence the need for a vocational training where they are taught the concepts about the specific trade and all the technologies involved.

Having considered how the quality is communicated to the labourers the literature review went on to investigate the causes of poor quality in construction projects. The major causes of inadequate quality in construction projects are lack of skills followed by lack of communication, Workmanship and costs of material and equipment, respectively. Considering the literature gathered it is evident that to a greater extent the lack of skills and communication in the project have an impact on the quality of the project. But it is still unknown if whether the use of local labour is affecting the quality standards in the South African construction industry.

Hence the study intends to proceed and gather and analyse data on these topics on the Ratanda construction project so as to establish the nature of the relationship between the use of local labour and the achievement of quality standards on low-cost housing. The following chapter will detail the methods of gather the data thereafter it will be followed by the presentation and analysis of the data.

### 3 RESEARCH DESIGN AND METHODS

The research design and methods section details a research design followed in this study and those as highlighted as follows: research philosophy, research approach, methodological choice, strategies, time horizon, techniques and procedures for data collection, techniques and procedures for data analysis, population, stratified sampling, context of the data, research instruments, constraints of the research, reliability and validity, ethical considerations and protocol.

A research design is one of the components of research. According to Sekaran & Bougie (2016:95) ‘A research design is a blueprint or plan for the collection, measurement and analysis of data, created to answer the research questions’. The issues relating to decisions regarding the research strategies, the extent to which the study is manipulated and controlled by the researcher, the location of the research, and the level at which data will be analysed and temporal aspect (the time horizon)’.

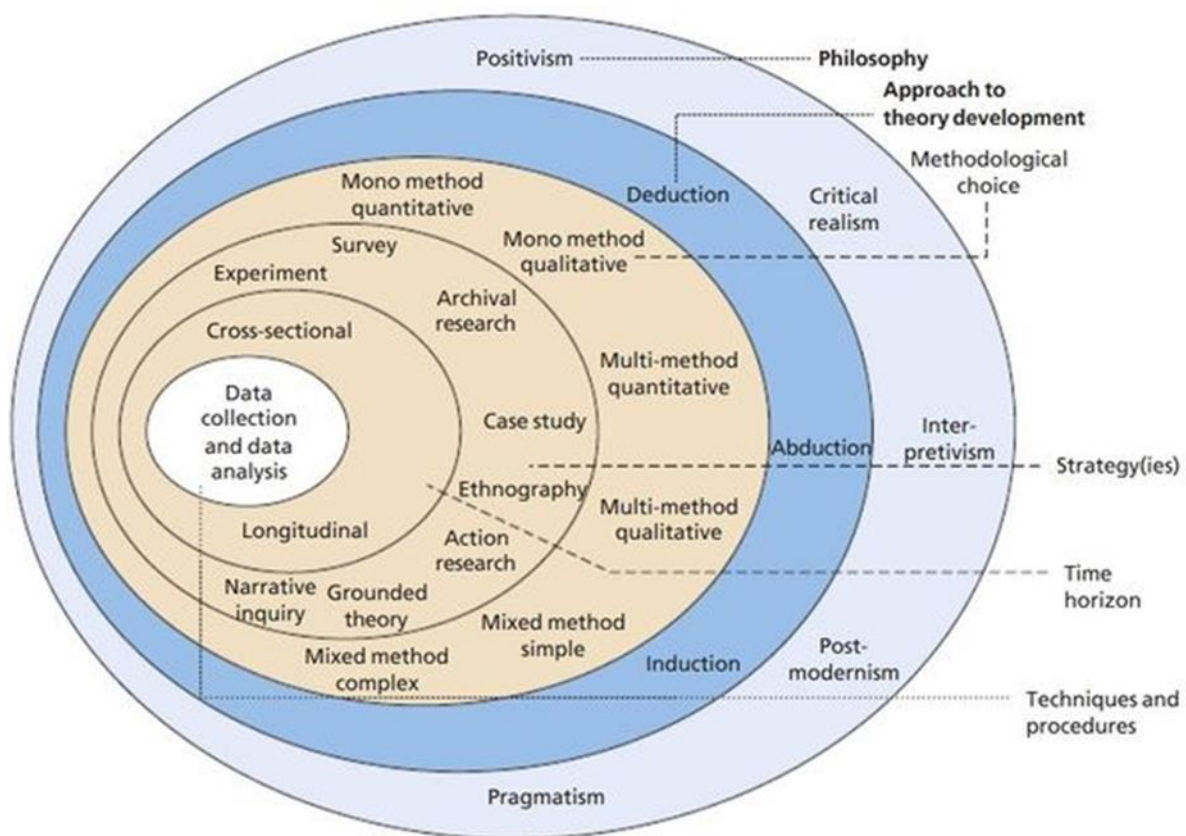


Figure 3. 1 The research onion: the peeling effect: Saunders et al.,(2016:164)

Saunders et al (2016:168) a research design is a plan on how one goes about doing their research, answering the research questions, stipulate which sources one used to collect data, how data was collected, how data was interpreted and analysed, indicate ethical considerations and constraints one foresees in the research. This research followed a descriptive research. Ibid (2016) states that the purpose of descriptive research is to get the precise chain of events, people or circumstance and related questions for data collection which will begin with words such as who, what, where, when, how.

### **3.1 Research philosophy**

Saunders et al (2016:168) 'qualitative research is often associated with an interpretive philosophy. It is interpretive because researchers need to make sense of the subjective and socially constructed meanings expressed about the phenomenon being studied. Qualitative research may also be used within realist philosophy'. Ibid (2016), further state that 'many varieties of qualitative research commence with an inductive approach to theory development, where a naturalistic and emergent research design is used to build theory or develop a richer theoretical perspective than already exists in the literature'.

Plooy-Cilliers et al (2014) mentions that there are various traditions in research, namely positivism, interpretivism and critical realism. The study has rested itself in the interpretivism space. According to the author, interpretivism was developed because of the limitations of the positivist approach, in its application to social sciences and interpretivists 'merely wants to understand human behaviour' Ibid (2014:28). The author further states that 'interpretivism is to understand and describe meaningful social action and experience' Ibid (2014:28). Following the description stated by Ibid (2014) interpretivism philosophy were ideal for the research because the researcher intends to understand the social experience of the Ratanda community project and thereafter put a meaning to these experiences.

The scholars' states that 'interpretivism is said to have been influenced by several intellectual traditions such as hermeneutics, phenomenology and symbolic interactionism. This discussion will focus only on the first two: hermeneutics, phenomenology: hermeneutics is concerned with the theory and method of the interpretation of human action while phenomenology looks at the way in which individuals make sense of the world around them. Phenomenologists maintain that human action is meaningful, and that people therefore ascribe meaning both to their own and other people's actions. Therefore, the task of the researcher is to interpret and gain an

understanding of human actions and then to describe them from point of view of the person or group being studied' Plooy-Cilliers et al (2014).

The research is reliably following the peeling effect of the research onion indicated above, however, the depiction of the peeling of the onion lacks the explanation of the dominant research traditions, namely the epistemological and the ontological which are crucial in the understanding of the philosophy of research. The first component is the epistemology, which according to Plooy-Cilliers et al (2014:23) 'is the study of knowledge. It deals with the counts of knowledge and the related limits'. The second components which is ontology is the study of what is real and this includes certain assumptions that are made by certain phenomena' Plooy-Cilliers et al (2014:23).

In terms of the epistemological position of interpretivism: interpretivists dispute the view of the positivists that say scientific knowledge is the only knowledge that is valid and disagree totally with the notion that common sense is a form of knowledge. The interpretivists argue that for something to be seen as knowledge, it should feel right to those being studied and common sense guides people in their general daily living and 'this is an essential source of information for understanding people' Plooy-Cilliers et al (2014: 29). Interpretivists further challenge the 'idea of objective knowledge and objective truth, they see facts as fluid and embedded within a meaning system. Therefore interpretivist believe that the truth is dependent on people's interpretation of facts and the research methodologies they use are sensitive to the specific context and never generalised beyond the context in which the study was conducted' Plooy-Cilliers et al (2014: 29).

The ontological position of interpretivism: 'Interpretivists do not believe in an objective, external reality that is experienced in the same way by everyone. They believe that reality is a social construction and that it is dependent on the meanings that people ascribe to their own experiences and interactions with others. The social world is what people perceive it to be, it is fluid and fragile and changes as people's perceptions change. Interpretivists believe that, depending on circumstances, culture, experiences and so on, people may or may not experience reality in the same way' Ibid (2014:29).

Johnson and Rasulova (2016) mentions that the philosophy in qualitative research points to the effect that no single truth exists and that phenomena depends on the subjective interpretations. Therefore the nature of the truth relatively formed by the subjective interpretations. The truth

presented is then a result of the interaction and relationship between the researcher and the researched rather than simply of the research design as it is constructed by individuals under particular conditions and in a particular context and consequently cannot be generalised.

### **3.2 Research approach**

The approach that was utilised is the inductive approach which fits well with the qualitative methodological choice in this study. Sekaran and Bougie (2016:26) points out that ‘inductive research is a process where we observe specific phenomenon and arrive at a general conclusion. Hence in inductive reasoning researchers work from a more specific to a more general’. Inductive research processes are extensively used in exploratory and qualitative studies. As mentioned by Saunders et al (2016), inductive theory is when you establish a theory of the information collected to inform the exploration of a certain topic and code patterns and same themes to formulate a framework of conceptualisation. Taking this definition into account, inductive approach was the most suitable as the study also seeks to unveil a theory through exploration of a certain topic. Where the study investigates the impact of using local labour in achieving quality standards in the delivery of low-cost house, with the anticipation to come up with a theory as to what causes poor quality standards in the delivery of low-cost houses.

Saunders et al (2016: 52) further indicates that ‘an inductive approach is intended to allow meanings to emerge from data as one collects it in order to identify patterns and relationships to build a theory, but it does not prevent one from using existing theory to formulate your research question and even to identify concepts that one wishes to explore in the research process. An inductive approach therefore does not rely on identifying an existing theoretical position but it is likely if one is to adopt this approach, they still will need to familiarise themselves with the theory in the chosen subject area’.

### **3.3 Methodological choice**

This is an exploratory research which follows a qualitative mixed research methodology. Kumar (2011) states that an exploratory study is undertaken with the objective of either exploring an area where little is known or to investigate the possibilities of undertaking a research study. Shields and Rangarajan (2013) view an exploratory study as a valuable means to ask open questions to discover what is happening and gain insights about a topic of interest and does not necessarily intends on solving the problem. Considering the views from Kumar (2011) and Shields and Rangarajan (2013), an exploratory is the most appropriate method of

research as the study aims to establish the nature of the relationship between the use of local labour and the achievement of quality standards on low-cost housing.

Plooy-Cilliers et al (2014) 'points that qualitative researchers often refer to a whole world experience, because they are interested in the depth of human experience, including all the personal and subjective peculiarities that are characterised of individual experiences and meanings associated with a particular phenomenon'. (Ibid., 2014) 'states that in direct opposition to quantitative research, qualitative researchers do not convert their observations or participants' observations into numerical form, nor do they separate out or isolate part of the interaction from the whole, instead, they explore how a participant experiences, perceives and attach meaning to the content gathered.'

The aim is to explore, understand and describe and not to explain, measure, quantify, predict and generalise as quantitative researchers do'. Ibid (2014:174) further states that 'the goal of qualitative research is to gain an understanding of the subjective experiences of participants but the process of data analysis and interpretation are systematic and rigorous. The researcher will interpret phenomena subjectively and express it symbolically.

Following the idea set by Plooy- Cilliers et al (2014) the research is compelled to use qualitative research method as the findings of the research are interested in the depths of human experience and his subjective peculiarities. And as a result, the study explores participants' experiences and perceptions to attach meaning to the content that has been gathered, therefore making it a qualitative research.

### **3.4 Research strategies**

Sekaran and Bougie (2016:96), states that a plan to achieve your goals in research is through your research strategy. The choice of a research strategy is of importance as it will depend on the research objectives and the type of research questions of the study. Saunders et al (2016) indicates that qualitative research consists of several strategies such as, action research, case study, ethnography, grounded theory and narrative research. This study does not fall under any of the mentioned strategies, however it falls under the non-contrived setting. Sekaran and Bougie (2016:100), states that 'descriptive studies are invariably conducted in non-contrived settings and those studies are called field studies.

The study is placed within a context of a case. This is where construction of low-cost housing has taken place in the past and is still taking place. A case may mean several things, but in this case, it will refer to an event that is taking place on a project site. The case depicts a real-life scenario of a project. In this instance, the case was used in line with the interpretivist philosophy and descriptive studies.

### **3.5 Time horizon**

Saunders *et al* (2016) points with importance that it is crucial for a researcher to determine whether their study involves data collection of a single event or of events that has built up and formulated a certain scenario over time.

Longitudinal studies according to Sekaran and Bougie (2016:105) are ‘studies where data on the dependent variable are gathered at two or more points in time to answer the research question.’ In this case a longitudinal time horizon was employed as the researcher was interested in establishing quality issues overtime in the construction industry. The time horizon is also called the ‘the diary perspective’ as pointed out by Saunders *et al* (2016).

Sekaran and Bougie (2016) states that since longitudinal studies take more time, cost and effort, if they are planned well, they can help to identify cause and effect relationships and can offer some good perspective.

### **3.6 Techniques and procedures for data collection**

Data collections consist of both the primary and the secondary methods. The primary being the empirical that was undertaken on site with various participants and the secondary being the literature review that was done and analysed in line with the formulated conceptual framework.

The empirical data collection was done through face to face interviews with structured questions to several randomly selected participants who has through the participation information sheet and the signing of the consent form engaged. The data collectors have audio-taped the interviews and transcript what was said into writing to mitigate the risk of clear interpretation of the given data. It must be indicated however that some participants were not comfortable into being audio-taped and their request was honoured.

It has been mentioned by Saunders *et al* (2016: 391) that ‘in the structured interviews, the researcher has a list of themes and possibly some key questions to be covered. The order of the

questions may also be varied depending on the flow of the conversation with the interviewee and additional questions may be required to explore the research question and objectives given the nature of events within organisations.

The literature data collection consisted of various documentation such as the National Home Builders Registration Council standards, the Norms and Standards and subsidies, , labour & work conditions in the South African construction industry, project management body of knowledge guide, project quality management, the ISO 9001: quality management, a guide to the Home Building Manual, encompassing the National Housing Code, the statistical release on the national and provincial labour market, a number of Journals, thesis, news clippings and articles on the issues of quality in construction and the employment of local labour. The research question was eventually answered by the data collected and will also be confirmed by the analysis and interpretation of such data.

### **3.7 Techniques and procedures for data analysis**

The presentation and analysis of data has made use of an inductive approach. Saunders et al (2016:570) suggests that ‘an inductive approach will prove to be a challenge to follow and may not lead to success for someone who is an inexperienced researcher. The use of inductive approach may involve a researcher in a lengthy period of concurrent data collection and analysis to research an issue or topic adequately or to derive a well-grounded theory’.

When analysing data, Saunders et al (2016:570) states that ‘if one has used an existing theory to formulate the research question and objectives one may also use the theoretical framework to help organise and direct data analysis. This matter has not been settled and that there is still a challenge for using deductive approach to qualitative research analysis, as the theoretical framework may be too restrictive to the issues revealed in the data and fail to allow the meanings expressed by research participants to be explored adequately’.

The aids that has assisted with the analysis of data has been the audio recordings and the transcript of such recordings. However, all participants were informed of this arrangement prior to the interview. Some participants accepted the use of the audio recordings and some requested that the audio recording is not utilised. The instrument to be used for data analysis is content analysis.

As dictated by Saunders et al (2016:608), 'content analysis is a research technique for the objective, systematic and quantitative description of the manifest content of communication'. The authors further mention that content analysis allows the research to code and categorise the qualitative data which allows the qualitative data to be analysed qualitatively and quantitatively. Content analysis is ideal for this research because it allows the researcher to analyse qualitative data quantitatively and qualitatively.

The researcher formulated the interview questions in categories that followed the scope and purpose of the research. This allowed the researcher to have categories of data during analysis and each category was now analysed qualitatively and quantitatively. For quantitative the researcher decided to utilise descriptive statistics. Descriptive statistics is necessary for this research as it enables the researcher to describe and compare variable numerically, (Saunders et al, 2016). Hence this allowed the researcher to describe quantitatively the response gathered from the respondents on the impact of local labour on achieving construction standards. The researcher was interested in knowing the perceptions of respondents hence the research used mean and mode to ascertain which views are more pronounced from the set of the responses received.

### **3.8 Population**

Sekaran and Bougie (2016:236) point that 'a population refers to the entire group of people, events or things of interest that the researcher wishes to investigate and make inferences from'. The population of this research was a low-cost housing construction project situated in Ratanda Township, in the Jurisdiction of Lesedi Local Municipality. This case was chosen as it has a structure that fairly represents a typical low-cost housing project that is rolled out by the department of human settlements around the country. The construction project is focused on delivering low-cost houses, following the government policy on low-cost houses, where there is the employment of local labour. Hence the case is relevant for the purposes of understanding the nature of the relationship between the use of local labour and the achievement of quality standards on low-cost housing within the South African construction industry.

### **3.9 Stratified sampling**

According to Sekaran and Bougie (2016:236) 'a sample is a subset of the population. It comprises some members selected from it. By studying the sample, the researcher should be able to draw conclusions that are generalizable to the population of interest'. There was a

random sampling of the participants in the project. The sample is a representative of the whole population as it has the stakeholders that are in direct contact the delivery of the low-cost houses, which are the workers, the owners being the houses beneficiaries and participants in the supply of the houses. The sample caters for the demographics of the research, where there is an equal number of male and females and allowing for equal number youths and adults. The randomly selected population sets as follows:

Set: 1: Participants who work on site and do the actual construction

- Local labour: 2 Females of the age of 25 to 34
- Local labour: 2 Males of the age of 25 to 34
- Local labour: 2 Females of the age of 35 to 50
- Local labour: 2 Males of the age of 35 to 50

Set: 2: Owners of low-cost houses allocated in the last 3 years

- 2 Females of the age of 40 to 60
- 2 Males of the age of 40 to 60

Set: 3: Participants in the supply

- Contractor
- Sub-contractor
- Site agent
- Municipal Building Inspector
- Departmental Building Inspector: GDHS

### **3.10 Context of the data: Overview of Ratanda Township as a case study**

The township is situated in the south of Heidelberg in Gauteng, it comprises of twenty three extensions. The research focused on extension twenty third which has the latest low-income houses. Extension twenty-three has a batch of houses that were handed over to the owners in 2014, and currently there are 1500 houses low-cost houses that are still under construction adjacent to the completed house. These are the two areas the research focused on, since they have low-cost houses that have been recently built and are being occupied, hence there were owners that were able to inform the researcher about the state of the houses. Also, the part

where there is a construction site availed us with the labourers and participants in the supply of the low-cost houses.

### 3.11 Research instruments:

The research instruments for this project have been detailed in these three tables below, where the tables are divided into each population that was interviewed. Within the table the researcher has attempted to link the research instrument question to each research question as shown below.

**Table 3. 1 Participants who work on site and do the actual construction**

1	<b>How do contractors communicate the standards and guidelines for the construction of low-cost houses to the local labour?</b>
1.1	Describe the practice utilised to brief local labours on quality issues
1.2	What is your understanding regarding standards and guidelines for the construction of low cost housing in this project
1.3	How does local labour ensure that their work meet the standards and guidelines for the construction of low cost housing in this project
2	<b>What mechanisms have been put in place to ensure that local labour and contractors' work meet the standards and guidelines in the construction of houses?</b>
2.1	Explain the training process you underwent in this project
2.2	What documentation did you get as proof of the training
2.3	What qualification/s do you possess
2.4	What documentation did you produce when you were hired for this job
2.5	What is your understanding regarding standards and guidelines for the construction of low-cost housing in this project
2.6	How does local labour ensure that their work meet the standards and guidelines for the construction of low-cost housing in this project
3	<b>To what extent does the use of labour affect the quality of the construction of low-cost houses?</b>
3.1	What is your view on the cause of poor quality in the construction of low-cost houses

### 3. 2 Participants in the supply

1	<b>How do contractors communicate the standards and guidelines for the construction of low-cost houses to the local labour?</b>
1.1	Describe the relationship between the local labour and the contractor
1.2	Describe the practice utilised to brief local labours on quality issues
1.3	What is your understanding regarding standards and guidelines for the construction of low cost housing in this project

2	<b>What mechanisms have been put in place to ensure that local labour and contractors' work meet the standards and guidelines in the construction of houses?</b>
2.1	Explain the training process you provided to local labour in this project
2.2	What documentation did you issue as proof of the training
2.3	What qualification/s did local labour possess
2.4	What documentation did local labour produce when they were hired for this job
2.5	How do you ensure that local labour' work meet the standards and guidelines for the construction of low cost housing in this project
3	<b>To what extent does the use of labour affect the quality of the construction of low-cost houses?</b>
3.1	What is your view on the cause of poor quality in the construction of low cost houses

*Table 3. 3 Research Questions asked to Owners of low cost houses*

3	<b>To what extent does the use of labour affect the quality of the construction of low-cost houses?</b>
3.1	What is your view on the cause of poor quality in the construction of low-cost houses
3.2	Are you happy with the quality of your house
3.3	Are there any quality problems on your house
3.4	What are those quality problems
3.5	How soon after allocation did your house deteriorate
3.6	Did you use your own money to fix your house
3.7	Was there anyone ever injured as a result of the quality of the house
3.8	What do you think is the cause of the poor quality
3.9	How has the poor quality of your house affected you
3.10	How do you think quality of future houses should be improved
3.11	How can this situation be improved so that it does not occur in future projects

### **3.12 Constraints of the research**

The study only focused on the construction of low-cost houses provided through the government subsidy and this was not a representation of the overall quality issues of houses in the construction industry.

The collection of data in its nature was time consuming and therefore site visits to participants took its time and fell outside the researcher's set timeframes and had delayed the finalisation of the research report. It should be noted that of all the participants, the data collected by the

honours and master's students from the contractor, did not fully give a picture of the challenges with quality. The issue foreseen earlier was that certain questions will be challenging for the participants to answer for fear of affecting their employment contracts.

The limitation of literature especially from 2013 to date has missed an opportunity to document severe poor quality of low-cost housing and has not been in a position to capture the situation and the intensity of the problem of quality of the low-cost houses. The study area of a low-cost housing project has not been a full representation of the situation of the entire province and the country at large as far as quality of low-cost housing is concerned.

### **3.13 Reliability and validity**

Sekaran and Bougie (2016:220) states that 'on one hand, reliability is a test of how constantly a measuring instrument measure whatever concept it is measuring. Reliability is concerned with stability and consistency of measurements and on the other hand validity is a test on how well an instrument that is developed measures a particular concept it is intended to measure. Validity is concerned with whether we measure the right concept. It is noted with caution that some of the participants might be disgruntled and provide information that does not pass the test of validity and reliability'.

For secondary data collection, the reliability and validity tests has ensured that the data is relevant to the research question and has been recent and within the last 5 years as suggested by the School of Construction Economics and Management (SCEM). According to the SCEM's requirements, when one is doing academic research, only published, peer reviewed journals are accepted as they have undergone a thorough process of verification.

On the collection of empirical data, which is the primary data collection, the reliability and validity tests, has ensured that the information provided by professionals has been taken as reliable taking into consideration that professionals (Contractor, subcontractor, and site agent, municipal and departmental building inspector) are always bound by ethical and indemnity clauses of their Councils. The test of reliability and validity on the data collected from local labour and officials of the municipality and the department has been coded in similar groupings of questions and answers.

Table 3.4 shows how credible, confirmable, dependable, transferable and authenticated the research findings are, how people have been changed by the process and to what extent the investigation prompted action.

**Table 3. 4 Principles of trustworthiness in qualitative research. Johnson & Rasulova, 2016**

SUBJECT	QUESTIONS	RELEVANCE Answer: How it was dealt with?
<i>Credibility</i>	How can we be confident about the truth of the findings	The interviews were conducted with the existing construction team, thus getting the first-hand feedback from the respondent.
<i>Confirmability</i>	How can we be certain that the findings have been determined by the subjects and contexts of the inquiry, rather than the biases, motivations and perspectives of the investigator	The research also has asked similar questions to the management team and employees so that the perspective of both parties is investigated and compared for any inconsistencies.
<i>Dependability</i>	Would the findings be repeated if the inquiry were replicated with the same or similar subjects in the same or similar context	The respondents were not coerced to give certain responses, hence a replication of these questions would yield similar answers.
<i>Transferability</i>	Can we apply these findings to other context or with other groups of people	These findings apply to the building of low cost income houses, the findings cannot be assumed for other different type of projects.
<i>Authenticity</i>	Have people been changed by the process. To what extent did the investigation prompt action	The research interview was carried out with the management reflected on some of the communication shortfalls they are having hence they will be revising their communication strategies.

Table 3.4 shows the credible, confirmable, dependable, transferable and authenticity of the findings of the research.

### **3.14 Ethical considerations**

As pointed out by Sekaran and Bougie (2016:13) ‘ethics in business research refers to a code of conduct or expected societal norms of behaviour while conducting research. Ethical conduct

applies to the organization and the members that sponsor the research, the researchers who undertakes the research and the respondents who provide them with the necessary data. The observance of ethics begins with the person instituting the research, who should do so in good faith, pay attention to what the results indicate and surrendering the ego, pursue organizational rather than self-interests'.

Following these values of ethics, interviews were carried in such a manner that no personal or company details was attached to the responses of the respective respondents to facilitate respondents with anonymity and confidentiality. Therefore, this means that the responses from the workers, owners or the housing delivery personnel cannot be traced back to the respondents, and the specific respondents that replied are not known. Contractual matters have been given serious consideration and have been kept confidential and the researcher took necessary precautions that no sensitive information was asked from the respondents. The researcher made sure to get the necessary informed consent from the respondents. All participants were encouraged to participate at their free will, and no one was neither coerced to respond to the questions nor to be part of the interviews.

### **3.15 Protocol**

Upon obtaining ethics clearance the research went on to gather primary data from Ratanda Township, in Lesedi Local Municipality with a sample made up of three sets of respondents whom included the local workers, the owners of the RDP houses and the participants in the supply of the housing. During data collection the researcher made sure that the process was done impartially, where an honours and masters student collected the data.

Data collection was made through interviews, where the masters' student interviewed the workers and the owners of the houses because he could speak to them in vernacular to improve the quality of data collection. Then the honours had to interview the other last group of respondents which comprised of the participants in the supply. All the interviews were recorded using an audio recorder followed by decoding the verbal information into written text, in preparation of incorporating the information in data presentation. The data gathered was then presented, discussed and analysed qualitatively. Afterwards the researcher concluded on the data gathered by incorporating a fifth chapter to the thesis. The chapter also included recommendations for the industry and future study based on the findings from the interviews and existing secondary data.

### **3.16 Summary**

The chapter began by detailing that the study follows an interpretivism philosophy which according to Ibid (2014) it is a research philosophy that allows the researcher to understand and describe meaningful social action and experience. Following the description stated by Ibid (2014) interpretivism philosophy was ideal for the research because the researcher intends to understand the social experience of the Ratanda community project and thereafter put a meaning to these experiences. Thereafter the chapter laid out the approach for the research design that is utilised in the research, which is the inductive approach which fits well with the interpretivism philosophy and qualitative methodological choice in this study.

The researcher then followed by choosing an exploratory as the most appropriate method of research as the study aims to establish the nature of the relationship between the use of local labour and the achievement of quality standards on low-cost housing. Then the research strategy that was chosen is the case study which depicts a real-life scenario of a project. In this instance, the case was used in line with the interpretivist philosophy and descriptive studies.

Thereafter the chapter detailed the data collections techniques which consists of both the primary and the secondary methods. The primary being the empirical that was undertaken on site with various participants and the secondary being the literature review that has already been done and analysed in line with the formulated conceptual framework. The empirical data collection was done through face to face interviews with structured questions to several randomly selected participants who has through the participation information sheet and the signing of the consent form engaged. Then the chapter further stipulated how the data collected was analysed using content analysis which is ideal for this research because it allowed the researcher to analyse qualitative data quantitatively and qualitatively.

The chapter then touched on the population of this research which consists of a low-cost housing construction project situated in Ratanda Township, in the Jurisdiction of Lesedi Local Municipality. This was followed by highlighting the ethical considerations that were observed by the researcher in the project. And lastly the chapter was concluded by outlining the protocol that the researcher undertook during data collection. The next chapter is going to be dealing with the presentation and analysis of the data collected.

## 4 PRESENTATION AND ANALYSIS OF DATA

The chapter intends to present, discuss and conduct analysis of the data that was gathered from the interviews that were carried out in the Ratanda Township, Lesedi Local Municipality. Before analysing the data the chapter will first outline the respondents' profiles, then it began with an in-depth analysis in the research to include how contractors communicate the standards for the building of low-cost houses to local labour. This was followed by how local labour ensures that their work meet the norms and standards in the construction of low-cost houses and lastly, to what extent does the use of labour affect the quality of the construction of low-cost houses?

### 4.1 Response

Following the structured interviews carried out from the sample of three sets of respondents, the research managed to receive a 100% response rate. Where a total of seventeen respondents where successfully interviewed and they comprised of eight site workers, four home owners and five participants in the delivery of the houses who include the contractor, subcontractor, site manager, municipal building inspector and department building inspector (GDHS).

This positive response was attributed to the persuasiveness of the researcher who made the respondents become aware of the benefit of the research that it is meant to improve the delivery of the houses, hence giving the respondents an incentive to be part of the interview.

The response in Table 4.1 is of the local labour on how the contractor communicate the standards and guidelines for the construction of low cost houses.

**Table 4. 1 Response on how the contractor communicate the standards and guidelines for the construction of low-cost houses**

<b>4.1.1 Explain the training process you underwent in this project</b>	
<u>Local labour female 1 age 25 to 34</u>	Safety training, setting up and pouring of slabs, the supervisor taught through practicals
<u>Local labour male 1 age 25 to 34</u>	On the job training and got a certificate to be a subcontractor
<u>Local labour male 2 age 25 to 34</u>	No training was provided
<u>Local labour female 1 age 35 to 50</u>	The labours did practicals through one labour who was taken to training
<u>Local labour female 2 age 35 to 50</u>	Practicals from previous labours
<u>Local labour male 1 age 35 to 50</u>	Practicals at an institution of learning
<u>Local labour male 2 age 35 to 50</u>	Trained a long time ago before this project

<b>4.1.2 Describe the practice utilised to brief local labours on quality issues</b>	
<u>Local labour female 1 age 25 to 34</u>	Induction, safety talk, toolbox talk and the site agent assists the subcontractor to brief labours about quality issues through short meetings
<u>Local labour male 1 age 25 to 34</u>	Self-supervision but supervisor checks as well and if something was not done properly, they break and start afresh
<u>Local labour male 2 age 25 to 34</u>	Daily monitoring with house keeping with a check list
<u>Local labour female 1 age 35 to 50</u>	Practicals and supervision
<u>Local labour female 2 age 35 to 50</u>	Practical and on the job training
<u>Local labour male 1 age 35 to 50</u>	Have a supervisor who is also the boss who ensures that he maintain safety and the quality of the houses
<u>Local labour male 2 age 35 to 50</u>	Meeting with the supervisor who explains the quality needed
<u>Contractor</u>	An induction is held for each labour, highlight safety measures and what is required. The tool talk happens every week and the safety is discussed as well. Every fortnight, there is a subcontractors meeting and main issues for discussion are quality, safety and progress on site.
<u>Subcontractor</u>	An induction on safety, toolbox meetings addressed on time on any issue on site as well as concerns on site
<u>Site agent</u>	An induction is usually done and this is where quality issues are addresses. This is done once a week. Every fortnight a subcontractors meeting is held to address any onsite issues and concerns females are trained to pour foundations and brickwork
<u>Municipal building inspector</u>	Contractor supervise the quality of the work e.g preparing mixing boards and batches (mixing ratios). A show house is also constructed to the standard and then construction that follows should be of the same standard with the show house
<b>4.1.2 Explain the training process you provided to local labour in this project</b>	
<u>Contractor</u>	Provision of pacesetters at the beginning of the work, they are skilled and train the new local labours/workers
<u>Subcontractor</u>	Train the labour on my own as the training instruction comes from the main contractor
<u>Site agent</u>	Normally women are trained to do platforms, brickwork, plumbing, ceiling and painting, whereas males and some females are trained to pour foundations and brickwork
<u>Municipal building inspector</u>	The contractor is encouraged to transfer skills to local labour eg safety representative from the community to be trained for a course in order to have skills to perform certain tasks

**Table 4. 2 Measures taken by the local labour and contractors ensure that the work meet the standards and guidelines in the construction of low-cost houses.**

The response in Table 4.2 is of the local labour in terms of how the local labour and the contractor ensure that the work meet the standards and guidelines for the construction of low cost houses.

<b>How does local labour ensure that their work meet the standards and guidelines for the construction of low cost housing in this project</b>	
<u>Local labour female 1 age 25 to 34</u>	Supervision of the work and that knowledge is passed through on the job training
<u>Local labour male 1 age 25 to 34</u>	They double check, they test the slabs and they pass inspection
<u>Local labour male 2 age 25 to 34</u>	The onsite job training, some learn by mistakes that are normally costly to the contractor
<u>Local labour female 1 age 35 to 50</u>	By supervision and training
<u>Local labour female 2 age 35 to 50</u>	on the job training and supervision
<u>Local labour male 1 age 35 to 50</u>	Training and supervision
<u>Local labour male 2 age 35 to 50</u>	Through supervision
<b>Describe the practice utilised to brief local labours on quality issues</b>	
<u>Local labour female 1 age 25 to 34</u>	Induction, safety talk, toolbox talk and the site agent assists the subcontractor to brief labours about quality issues through short meetings
<u>Local labour male 1 age 25 to 34</u>	Self-supervision but supervisor checks as well and if something was not done properly, they break and start afresh
<u>Local labour male 2 age 25 to 34</u>	Daily monitoring of house keeping with a check list
<u>Local labour female 1 age 35 to 50</u>	Practicals and supervision
<u>Local labour female 2 age 35 to 50</u>	Practical and on the job training
<u>Local labour male 1 age 35 to 50</u>	Have a supervisor who is also the boss who ensures that he maintain safety and the quality of the houses
<u>Local labour male 2 age 35 to 50</u>	Meeting with the supervisor who explains the quality needed
<b>What is your understanding regarding standards and guidelines for the construction of low cost housing in this project</b>	
<u>Local labour female 1 age 25 to 34</u>	Not sure
<u>Local labour female 2 age 25 to 34</u>	build to the best of your ability as per instructions
<u>Local labour male 1 age 25 to 34</u>	The standard and guidelines are good
<u>Local labour male 2 age 25 to 34</u>	Note sure
<u>Local labour female 1 age 35 to 50</u>	There are set guidelines but contractors are cutting costs by utilising less cement
<u>Local labour female 2 age 35 to 50</u>	Very little

<u>Local labour male 1 age 35 to 50</u>	Note sure
<u>Local labour male 2 age 35 to 50</u>	Note sure

**Table 4. 3 The extent that the use of labour affects the quality of the construction of low-cost houses.**

The response in Table 4.3 shows the response of the contractor, site agent, municipal building inspector, departmental building inspector, and owners of houses on the extent that the use of labour affects the quality of the construction of low cost houses.

<b>What is your view on the cause of poor quality in the construction of low cost houses?</b>	
<u>Contractor</u>	There is no quality issues on this project and those who are involved with construction are brief before work commences and also supervised on how to deliver quality work
<u>Site Agent</u>	Lack of supervision is a major cause of poor quality, Lack of material affect quality and non-SABS material can lead to poor quality
<u>Municipal building inspector</u>	Labour that is not passionate but working for the sake of earning a salary. Weather conditions can hinder quality
<u>Departmental building inspector</u>	Poor quality is an ongoing issue, some workers/contractors leave for better pay and new staff should be trained again
<u>Female Owner 1</u>	They think that the funds are shared accordingly and as a result, materials and methods are compromised to increase the number of houses build
<u>Female Owner 2</u>	Shortage of brick force
<u>Male Owner 1</u>	The failure of the contractors to check if construction is done properly and the failure of inspectors to point the issues out
<u>Male Owner 2</u>	The workers don't use enough cement

#### **4.2 The communication of the standards and guidelines for the construction of low-cost houses to local labour by contractors.**

The contractor was asked how he communicates the quality standards to the workers, also which systems were in place to facilitate the education of the workers onsite about the quality standards. In the contractor's reply it was mentioned that the staff is quiet extensively informed about the quality standards that are required for the project to be successful. The contractor

stated that quality issues are communicated to the staff during induction, where each labourer is taught about how to maintain quality in his work area.

Another platform where issues of quality are communicated are the fortnight meeting, which take place during the project implementation. The fortnight meetings are attended by the subcontractors, professional team, contractor with the construction team comprising of the construction manager, site agent, foreman and health and safety officer. The contractor further mentioned that in these meetings the professional team meets the contractor's team to discuss the progress of the work and the technical aspects of the progress. The site agent further added that these meetings are essential towards communicating quality as the professional team gives a detailed explanation to the contractor about how the work is meant to be carried out. Furthermore, as the work progresses the professional team inspects the work to make sure that it is done according to the drawings.

This trend in the Ratanda construction project seems to be in line with recommendation made by Ceric (2014) who mentioned that to improve quality standards in construction projects, companies should apply the inter-firm, intra-firm and interpersonal relationships between the project parties i.e., the project owner, contractor and their respective project managers. These fortnightly meetings are a means of building inter-firm and intra-firm relationships between the stakeholders that are tasked with the delivery of the project, such as the contractor, subcontractors and the skilled labourer.

Another means where quality is communicated to the local labour was mentioned by the site agent and the subcontractor are the tools box talks. The site agent and the subcontractor mentioned that the issues to deal with quality are brought up during the tools box talk and a detailed execution of works is given to the workers. In the literature review Fapohunda and Chileshe (2014) state that the tools box talk are a means of knowledge transfer where the skilled workers impart their knowledge on the best way to carry out the works. From the findings at the Ratanda community project, the tools box talk is used as a tool that facilitates the communication of quality standards and the contractor has managed to utilise this tool to communicate the quality requirements to the labourers.

The site agent and the subcontractor went on further stating that during the tools box talks the issues to deal with quality are brought up and clarified to the labourers, whereas the municipal

building inspector mentions that a show house is also constructed to the standard and then construction that follows should be of the same standard with the show house.

The responses from the construction management team shows that the Ratanda construction site does to a greater extent follow the quality guidelines stated in the project management handbook. The project management handbook states that an organisation must establish, implement, maintain and continually improve a quality management system. The response from the site agent and the contractor state that for quality purposes they have inductions which are done at the beginning, then there are site tools box where they breakdown the quality issues for the task of the day. Thirdly there are fortnightly meeting where quality is discussed with the professional team, this aspect is also in line with the project management handbook because the quality system contains interaction between the key stakeholders.

The construction company has also managed to determine the resources and authorities needed for the processes to address the risks, this was shown by the appointment of the site agent, foreman and the pace setters. But unfortunately, the site management seems to fall short in that they do not evaluate their process to see if there are any changes that may be required to optimise the quality system.

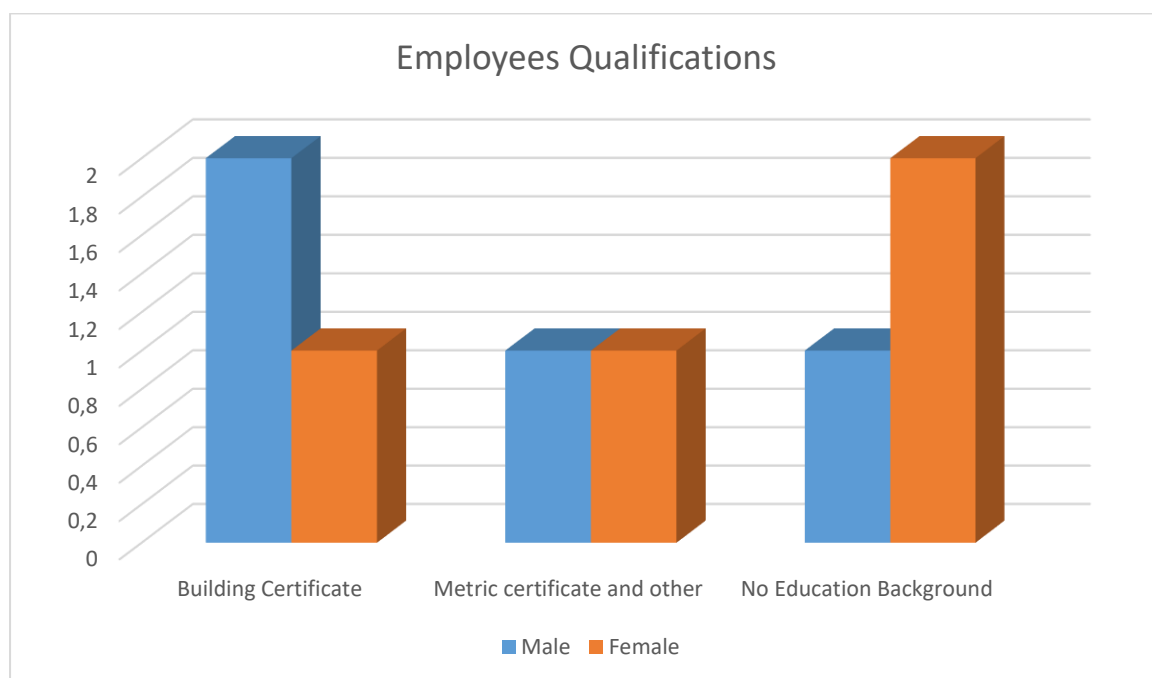
Following the interviews of the site management team the workers were interviewed. The workers concurred with the statements from the site management team that tools box talks are being undertaken onsite and that quality issues are detailed at this point. The reply from the workers points out that when the contractor is communicating the quality standards, they are not informed where the standards are coming from, and this may as well suggest that the labours level of understanding of quality standards is limited.

According to (PMBOK, 2013) communication processes includes the plan for managing communications, the management process of communication and the control and review of communication systems. The research done by Butt et al (2016) states that communication is critical to the success of a construction project, as a result one must include quality communication as part of quality control plans. As part of the communication one included the contact list of every stakeholder in the project, scheduled routine meetings and record keeping. From the interviews conducted with the contractor it is quite evident that of the three techniques that were suggested by Butt et al (2016), two of them are being practiced in the Ratanda housing project. The contractor was in contact with the stakeholders in the project and these

stakeholders held meetings fortnightly to discuss quality issues. The contractor needs to improve quality communications in the project by keeping records of all activities that occur on site and any correspondence concerning quality issues.

### 4.3 Measures taken by the local labour and contractors ensure that the work meet the standards and guidelines in the construction of low-cost houses.

Around the world, in the public sector there are developmental projects such as irrigation and housing delivery which are meant to develop the society by providing the infrastructure and empowering the unskilled workforce (Thwala and Mofokeng, 2012). Similarly to the other African countries, the South African industry has taken up this initiative by requesting the contractors giving priority to the employment of local labour in their projects and this is done through the community liaison officer, (Nkotitshi, 2013). Adebowale (2014) states that both the skilled and the unskilled labourers are being employed in construction projects in South Africa. From the interviewed workers all of them were staying in the Ratanda township and they stated that their employment was done through the community liaison officer. Fig 4.1 shows that Five out of eight of the interviewed personnel did not have building certificate this goes to show that most of the workers that were interviewed did not possess prior education in the built environment knowledge. These values in fig 4.1 further highlight that for one to be employed in a construction project does not necessarily need a building qualification as stated by Adebowale (2014) that even the unskilled do get employment in South Africa.



#### *Figure 4. 1 Employees Qualifications*

In other countries when the unskilled labour is employed, the most practised form of skills transfer to the unskilled labour which is done through on job training, where they observed how the skilled labourers worked, and they would be given a chance to work under supervision of the skilled labourers (Hassan, 2009). But on another hand, Hassan (2009) postulates that this form of training is not efficient as the unskilled labourer doesn't get to understand the concept of the process, hence the need for a vocational training where they are taught the concepts about the specific trade and all the technologies involved.

From interviewing the workers one may realise that the mode of training in the project is on the job training and when someone already is experienced in that job, they are not re-trained when they begin to work on this site but rather they use their experience from previous projects. The response from the female workers who were working on the pouring of the slabs mentioned that they learnt the job by following the steps of skilled workers and instructions from the foreman. This practice is not an international best standard as Hassan (2009) and Macfarlane (2012) recommends that the workers ought to be taken for a training so that they can grasp the concepts of their trades for a better outcome. Although it is worth noting that the in-house training has its advantages in that the labourers are being trained at work with actual work problems and they get to see the application of the various technologies.

After interviewing the labourer on the mode of training the researcher posed the same question to the contractor who had a similar response and mentioned that the training was done on the job. He further stated that the labourers would be guided by pace setters who are the skilled workers. The site agent went further to state that in the project by stating that the women do the platforms, brickwork, plumbing, ceiling and painting, whereas males and some females are trained to pour foundations and brickwork. The workers confirmed that they are indeed trained before they are deployed to their various posts.

When the workers were asked what proof of training were they given after they finished their in service training, three of them mentioned that they received certificates on the trades they were partaking on. Whereas the other workers said that they are not given any form of documentation that they have finally attained a certain level of expertise. The responses from the professional team is the opposite of what the workers stated, as the contractors mentioned that the workers are given a certificate of competence and completion when the worker has

finished the work. When one considers the results from the respondents the health and safety representatives, electrician and bricklayers where the ones that awarded certificates of competence.

Unlike the challenges in other countries, Ratanda construction project does not have problems in the employment of supervisors. There are supervisors who are permanently employed onsite and they do regular inspections of the work done. But then the supervision of the work seems to be done post construction and work must be redone, this is an ineffective way of building as there should be less reworks.

The respondents were asked how local labour ensures that their work meet the standards and guidelines for the construction of low-cost housing in the project and they answered that this was done through supervision. This goes to show that the labourers do not have means of checking if their work that they have done is in accordance with the regulations but rely on supervision to approve the work.

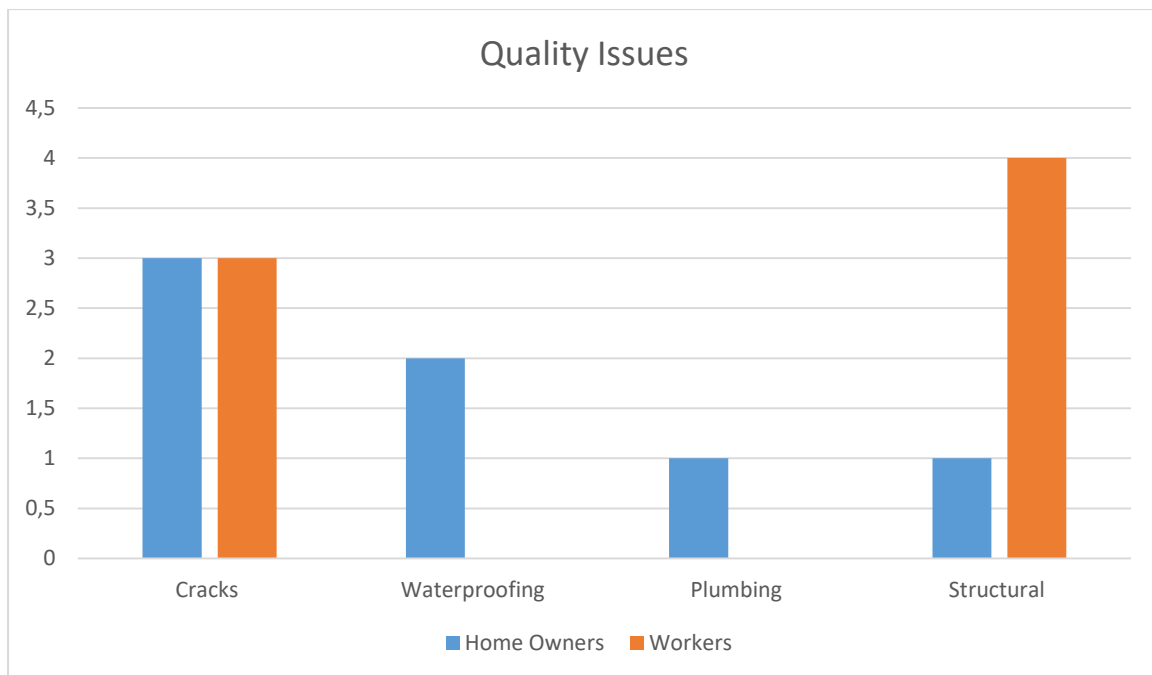
Some of the workers stated that the supervisor comes to inspect the work and any improperly work that does not meet the quality criteria is demolished and reconstructed. These workers may say this, but one may wonder why then the houses are plagued with quality issues if the supervisors ensure that the quality is well communicated and all substandard construction work is demolished and rebuild.

In the reply, the contractor expressed that the projects encourage the employment of people without qualifications and during the project there is enough time to properly train the workers to be skilled. This concurs with the reply given by the workers that they are employed without a formal built environment programme. The contractor added that the current project has tried to stick to the national standards and has applied adequate materials to avoid the cracks that are happening in the previous houses. For supervision of the works, the contractor has employed a site agent and a foreman to oversee construction activities.

The owners believe that the whole construction needs to be in line with the stipulated building guidelines and standards, using acceptable and proper material accordingly, followed by the workers being monitored if they are building correctly, and lastly the building inspectors should conduct their inspections accordingly. The home owners went on to suggest that there should be allowed to inspect their houses before they are made to sign (happy letters).

#### 4.4 The extent that the use of labour affects the quality of the construction of low-cost houses.

The research began by interviewing the owners to ascertain if they had issues of quality with their houses. The reply from all the four homeowners displayed a high level of dissatisfaction about their houses. One half of the respondents mentioned that their houses have waterproofing issues, whereas three out of four of the respondents mentioned that their houses have cracks as shown in figure 4.2. One of the respondents mentioned the issue of poor ergonomics of the buildings pointing that the steps are badly built and its laborious to manoeuvre around them and that they once caused the owner of the house to fall and as a result one of the legs was broken. Another owner mentioned the poor plumbing system that cause water leaks from the pipes. The researcher also interviewed the workers who are coming from the community who mentioned that the houses in the previous phase have problems of cracks and four of the workers stated that the plaster on the walls is falling off as shown in figure 4.2 below.



*Figure 4. 2 Quality issues in existing houses in Ratanda community*

A further investigation revealed out of the four owners interviewed one stated that he got the house with defects whereas the other said the defects became visible after three months, then the last two realised the defects after a year of occupying the house. From these findings it is evident that these quality problems emerged within a year from occupation which would be within the latent defects liability period according to (Friel, 2011). Hence the research

concludes that these problems are construction related, this then prompted the research to ask the opinion of the workers and owners as to what causes the houses to have defects.

One owner mentioned that the cracking of walls maybe caused by inadequate cement in the mortar, whereas the other one mentioned that there isn't enough brick force hence the walls open up and the third respondent mentioned that the materials are compromised in the low cost housing projects. The owners response on the causes of poor quality are similar to those of the workers that it is because of the poor material utilised, basing their argument on the wearing concrete aprons that there is less cement. The last respondent mentioned that there isn't enough supervision from the contractor and that the inspectors fail to point out the quality issues for the contractor to fix them before handing the houses over to the homeowners. Furthermore the owners aired out that these houses pose a threat to their families siting the huge cracks on the walls, whereas other owners stated that houses are very cold and they are deteriorating faster.

It is worth noting that the workers who are below 35 years old stated that the cause of poor quality, is the insufficient time of training, whereas the workers above 35 years old blame the quality of materials that are, siting the poor concrete mixes. From the above responses from the two groups considering that the workers above 35 have had experience elsewhere one may consider the notion that the poor quality of the houses is partly caused by the poor construction methods and contractors having inadequate concrete mixes. This does not discount the response of the younger group that the contractors are not training their workers sufficiently hence the poor quality as a result of employers that are not adequately trained.

From the two groups interviewed there are three causes of poor quality that have been highlighted which is insufficient training, inadequate materials and failure of supervision and inspections. The contractor and the site agent agree with the labourers stating that the causes for poor quality in the houses is the lack of training, inadequate materials, and lack of supervision.

The causes of problems of quality being experienced in the Ratanda are to a greater extent like the ones discovered in the literature review which are lack of skills followed by workmanship, costs of material and equipment. Although to a lesser extent there is a difference with the Ratanda construction because they do not have communication problems as there are set communication meetings that take place between stakeholders. In conclusion labour influences the success of a project and in the Ratanda construction project the absence of trained personnel

together with inadequate material and lack of supervision are the major causes of quality issues in the constructed houses.

#### **4.5 Summary**

The data presentation and analysis began by highlighting the overview of Ratanda Township as a case study this was then followed by the detailing the information on the respondents that were interviewed for the project. Thereafter the chapter went onto present ad analyse data on how contractors communicate the standards for the building of low-cost houses to local labour. The findings revealed that the contractors communicate quality in the projects using tools box talks, by use of foreman and site agent supervising the works and by using pace setters who are the skilled workers. Thirdly the chapter gave an analysis on how local labour ensure that their work meet the norms and standards in the construction of low-cost houses. The results found showed that the workers are firstly not aware of the construction norms and standards they merely follow the works as shown by the pace setters and the supervision from the foreman.

Lastly the chapter had set out to investigate the extent to which the use of labour affect the quality of the construction of low-cost houses. Data analysed revealed that the labour influences the success of a project and in the Ratanda construction project the absence of trained personnel together with inadequate material and lack of supervision are the major causes of quality issues in the constructed houses. The next chapter will give a conclusion and recommendations to the above findings.

## **5 CONCLUSION AND RECOMMENDATION**

In conclusion, this study that was undertaken at a housing project: low-cost housing situated in the area of Lesedi Local Municipality, Gauteng Province. The research managed to reach its intended aim of establishing the nature of the relationship between the use of local labour and the achievement of quality standards on low cost housing. This was done by answering these three questions.

- How do contractors communicate the standards and guidelines for the construction of low-cost houses to the local labour?
- What mechanisms have been put in place to ensure that local labour and contractors' work meet the standards and guidelines in the construction of houses?
- To what extent does the use of labour affect the quality of the construction of low-cost houses?

In answering these questions the research involved contractor and professionals dealing with specific activities in the mentioned low-cost housing project and the local labourers working in construction projects in Lesedi Local Municipality and the Department of Human Settlements, Gauteng Province.

Firstly, the research gathered existing literature such as the Norms and Standards and subsidies, the National Home Builders Registration Council standards, labour & work conditions in the South African construction industry. Project management body of knowledge guide, project quality management, the ISO 9001: quality management, a guide to the Home Building Manual, encompassing the National Housing Code, the statistical release on the national and provincial labour market, a number of Journals, thesis, news clippings and articles on the issues of quality in construction and the employment of local labour.

Following the review of the literature the research moved into data gathering thereafter the data gathered was presented and analysed in chapter four of the research where all these three questions were answered. The chapter gave a summary on the findings which to a greater extent support the proposition made in the beginning of this research that local labour contributes to construction of poor standard of low-cost housing. This chapter intends to give a conclusion to all the research questions and research findings.

## 5.1 Conclusion

- (i) *The communication of the standards and guidelines for the construction of low-cost houses to local labour by contractors.*

The responses from the construction management team shows that the Ratanda construction site does to a greater extent follow the quality guidelines stated in the project management handbook. The project management handbook states that an organisation must establish, implement, maintain and continually improve a quality management system. The response from the site agent and the contractor state that for quality purposes they have inductions which are done at the beginning, then there are site tools box where they breakdown the quality issues for the task of the day. Thirdly there are fortnightly meeting where quality is discussed with the professional team, this aspect is also in line with the project management handbook because the quality system contains interaction between the key stakeholders.

The construction company has also managed to determine the resources and authorities needed for the processes to address the risks, this is shown by the appointment of the site agent, foreman and the pace setters. But unfortunately, the site management seems to fall short in that they do not evaluate their process to see if there are any changes that may be required to optimise the quality system.

Following the interviews of the site management team the workers were interviewed. The workers concurred with the statements from the site management team that tools box talks are being undertaken onsite and that quality issues are detailed at this point. The reply from the workers points out that when the contractor is communicating the quality standards he doesn't tell them where these standards are coming from, this may as well suggest that the labours level of understanding of quality standards is limited.

In the literature review we established that communication is critical to the success of a construction project, as a result one must include quality communication as part of his quality control plans. From the interviews conducted with the contractor it is quite evident that of the three techniques that where suggested by Butt et al (2016) in the literature review, two of them are being practiced in the Ratanda housing project. The contractor was in contact with the stakeholders in the project and these stakeholders held meetings fortnightly to discuss quality issues but unfortunately most of the communications happening are not documented. The

contractor needs to document all the communication happening the project for an effective communication system that will result in the success of the project.

*(ii) Measures taken by the local labour and contractors ensure that the work meet the standards and guidelines in the construction of low-cost houses.*

From interviewing the workers one may realise that the mode of training in the project is on the job training and when someone already is experienced in that job, they are not re-trained when they begin to work on this site but rather they use their experience from previous projects. This practice is not an international best standard as Hassan (2009) and Macfarlane (2012) recommends that the workers ought to be taken for a training so that they can grasp the concepts of their trades for a better outcome. Although it is worth noting that the in-house training has its advantages in that the labourers are being trained at work with actual work problems and they get to see the application of the various technologies.

After interviewing the labourers on the mode of training the researcher posed the same question to the contractor who had a similar response and mentioned that the training was done on the job. He further stated that the labourers would be guided by pace setters who are the skilled workers. The site agent went further and stated that women do the platforms, brickwork, plumbing, ceiling and painting, whereas males and some females are trained to pour foundations and brickwork. The workers confirmed that they are indeed trained before they are deployed to their various posts.

In Singapore, the training of the workers was a challenge. The top factors affecting the training of new labourers include difficulty with recruitment of supervisors who are meant to be training the local labour, high rate of labour turnover, where some if the labourers being trained are most of the time leaving the sites or being absent from the work site (Ibid 2013). Whereas in Iran challenges in passing the knowledge of quality during project execution is due to the lack of materials adequate materials, weather and physical site conditions, lack of proper tools and equipment, design, drawing and change orders, inspection delays, absenteeism, safety, improper plan of work, repeating work, changing crew size. Then as for Thailand they include lack of materials, incomplete drawings, incompetent supervisors.’ (Ibid 2013).

Unlike the challenges in the other countries the Ratanda construction project does not have problems in the employment of supervisors. There are supervisors who are permanently employed onsite and they do regular inspections of the work done. But then the supervision of

the work seems to be done post construction and work must be redone, this is an ineffective way of building as there should be less reworks.

The respondents were asked how local labour ensures that their work meet the standards and guidelines for the construction of low-cost housing in this project and they answered that this was done through supervision. This goes to show that the labourers do not have means of checking if their work that they have done is in accordance with the regulations but rely on supervision to approve the work.

The contractor expressed that the projects encourage the employment of people without qualifications and during the project there is enough time to properly train the workers to be skilled. This concurs with the reply given by the workers that they are employed without a formal built environment programme. The contractor added that in this current project he has tried to stick to the national standards and applied adequate materials to avoid the cracks that are happening in the previous houses. Then for his supervision he has employed a site agent and a foreman to oversee all the works.

The owners believe that the whole construction needs to be in line with the stipulated building guidelines and standards, using acceptable and proper material accordingly, followed by the workers being monitored if they are building correctly, and lastly the building inspectors should conduct their inspections accordingly. The home owners went on to suggest that earmarked owners of houses should be allowed to inspect their houses before they are made to sign (happy letters).

In conclusion the contractor is upholding the quality measures by employing a management team to oversee the works, and has facilitated that there are skilled workers who are known as pace setters who showed the unskilled labourers how to do the work. Although the supervision team is not up to standard at all times because the inspector comes and demolishes some of the houses hence the contractor needs to improve the supervision of the team as well. The contractor also mentioned that the materials and construction technologies used in the project was in accordance with the building guidelines.

*(iii) The extent that the use of labour affects the quality of the construction of low-cost houses.*

In the analysis into the extent which the use of labour affects quality in the construction of low cost houses the research had to first ascertain if there were issues of quality in the houses being

built in Ratanda community. Fortunately, there was a first phase which was completed and there were people staying in the first phase. Upon interviewing four homeowners all of them displayed a high-level dissatisfaction about their houses. One half of the respondents mentioned that their houses have waterproofing issues, whereas three out four of the respondents mentioned that their houses have cracks. Another owner mentioned the poor plumbing system that the water leaks from the pipes.

An interview with the workers who stay in the community mentioned that the houses in the previous phase have problems of cracks and four of the workers stated that the plaster on the walls is falling off. A further investigation revealed that the quality problems emerged within a year from occupation which would be within the latent defects liability period according to (Friel, 2011). Hence the research concludes that these problems are construction related, this then prompted the research to ask the opinion of the workers and owners as to what causes the houses to have defects.

The home owners mentioned that the poor quality in the construction of the houses is because of inadequate cement in the mortar and brick force hence the walls open in a nutshell the home owner blame the inadequate use of materials. The response from the workers concur with the homeowners, as the workers stated that the wearing concrete aprons are a result of inadequate cement. The last respondent mentioned that there isn't enough supervision from the contractor and that the inspectors fail to point out the quality issues for the contractor to fix them before handing the houses over to the homeowners.

From the two groups interviewed there are three causes of poor quality that have been highlighted which is insufficient training, inadequate materials and failure of supervision and inspections. The contractor and the site agent agree with the labourers stating that the causes for poor quality in the houses is the lack of training, inadequate materials, and lack of supervision.

The causes of problems of quality being experienced in the Ratanda are to a greater extent like the ones discovered in the literature review which are lack of skills followed by workmanship, costs of material and equipment. Although to a lesser extent there is a difference with the Ratanda construction because they do not have communication problems as there are set communication meetings that take place between stakeholders. In conclusion labour influences the success of a project and in the Ratanda construction project the absence of trained personnel

together with inadequate material and lack of supervision are the major causes of quality issues in the constructed houses.

## **5.2 Recommendations**

From the findings and conclusions of the study the following recommend are made:

- The contractor needs to improve quality communications in the project by keeping records of all activities that occur in the site and any correspondence concerning quality issues.
- The contractors needs to also communicate to the workers the origin of these quality standards such that the workers are better informed.
- There needs to be a system that allows an intensive training of the labourer before they work on the project to equip them with the necessary skills to work productively and effectively.

## **5.3 Suggestions for future research**

The research managed to investigate how the quality is affected from the construction side looking mainly at the local labourers. The findings did point out that indeed labour has an impact on the achievement of quality but there are other factors that were discovered to be affecting quality which are lack of supervision and inadequate material. Hence a future research would need to be conducted to investigate more into these factors and find out how they may be rectified.

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# APPENDICES

## APPENDIX 1: GAUTENG PROVINCE: DEPARTMENT OF HUMAN SETTLEMENTS: NORMS AND STANDARDS 2016/17(GDHS, 2016)



### GAUTENG DEPARTMENT OF HUMAN SETTLEMENTS

#### STANDARD SPECIFICATIONS FOR LOW COST HOUSING 2016/2017

Please note these specifications may change subject to revision of the subsidy budget

1. **GENERAL:** (All the following should be included in the Notes/Specs on all drawings title Blocks)

- 1.15 All building materials to be SABS approved ( stamped where applicable)
- 1.16 All workmanship to be carried out in accordance with National Building Regulations (NBR), Building Standards Act (Act 103 of 1977, as amended)and the NHBRC Home Building Manual.
- 1.17 In case of uncertainty National Building Regulations and the NHBRC Home Building Manual should take precedence.
- 1.18 All raft or unconventional foundations to be accompanied by the Engineers Certificate and material test results.
- 1.19 Foundation inspection to be done on open trench with steel reinforcement in place and when concrete is cast and cured.
- 1.20 Wall plate inspection to be done on un-plastered walls with all the brick joints visible.
- 1.21 Final inspection (100%) to be done on a complete house ( Final completion)

2. **DESIGN SPECIFICATIONS**

- 2.15 **Area of unit:** Minimum 40 square meters
- 2.16 **Bathroom:** The bathroom is to contain a wash hand basin [whb] and water closet [WC] and bath [b]  
Refer to Gauteng Department of Human Settlements (GDHS) approved std drawings.
- 2.17 **Bedroom:** The unit design is to consist of two bedrooms.
- 2.18 **Privacy:** The unit design shall allow for privacy for the occupants, all the rooms to have lockable doors with three (3) lever lock set for exterior doors and two (2) lever lock set for interior doors.
- 2.19 **Lounge/ open plan Kitchen:** This to be allowed for as open plan type design. The kitchen space shall allow for a sink unit.

- 2.20 **Access/ Entrances:** The unit to have two (2) external doors with wheelchair access for disabled beneficiaries.
- 2.21 **Orientation of building:** Building should be orientated in accordance with SANA 204 & 10400XA

## **CONSTRUCTION SPECIFICATIONS**

### **3.1 FOUNDATIONS**

3.1.1 Foundation shall be as per the engineer's design and specifications (a note to this effect to be drawings).

3.1.2 Foundations shall be inspected and certified by a registered engineer.

3.1.3 On the foundation drawings it must be clearly stated which soil class the design is for (the geotechnical report used to design the foundation is required).

3.1.4. Trenches must be dug out so that the foundation rests on solid ground, with the trench width and depth conforming to the Engineers drawings.

### **3.2 STORM WATER MANAGEMENT**

3.2.1. A minimum of 900mm x75mm 15 Mpa concrete apron to be provided on the eaves sides of the house, sloping away from the foundations. The concrete aprons to have a 10mm thick expansion joint at 3m intervals or as per engineer's design.

3.2.2. The site must be shaped to cart water away from house.

### **3.3. WALLS**

3.3.1. External walls to be single leaf 140mm thick cement Maxi bricks (290x140x90) or Similar approved (min7mpa) on 375 micron DPC.

3.3.2. Internal walls to be 140mm maxi brick on flat (or 290x90x90mm high special brick) and duly bonded (built into) to external walls every 4<sup>th</sup> course, with DPC and brick force.

G3.3.3. Provide 2.8mm thick brick force every 4<sup>th</sup> course, as well as every course above Windows and doors or as specified by the engineer.

3.3.4. Horizontal DPC in external walls shall be same level as top of concrete floor slab and 150mm above ground level.

3.3.5. Horizontal DPC must be laid with mortar above and below the membrane, which extends over the full width of the wall including plaster thickness.

3.3.6. Cement mortar mix for walls to be 1:5 proportion by volume 2 bags cement (1wheelbarrow): 5 builder's wheelbarrows sand.

3.3.7. Building sand should comply with SABS 1090 and be well and evenly graded from 5mm and should not contain an excess of dust or other fine material.

3.3.8. Where applicable provide SABS approved waterproofing to shower walls and floor.

3.3.9. Provide a 150mm wide plaster band around the doors and windows openings.

3.3.10. Opening for waste pipes in walls to be neatly core drilled and not hammered or chisel opened.

#### 3.4. **DOORS AND WINDOW FRAMES**

- 3.4.1. Clisco type steel window frames (1.2mm) or similar approved. Window frames other than Clisco to comply with sabs 727.
- 3.4.2. External doors: Fabricated solid Hardwood 2 or 4 panel Meranti or Saligna door with Timber frame, or solid hardwood, tongue and groove, braced and ledged.
- 3.4.3. Internal doors: hollow core doors to be made out of rail, stile, hinge block, semi-solid composite board/grid core paper Lock block, composite board cross banding and hardwood face veneer.
- 3.4.4. Provide three(3) lever lock set for external doors two(2) lever lock set for interior doors timber hollow core.
- 3.4.5. ND4 type window frame to living room, ND2 type to bedrooms, NC1 type to kitchen and NE1 to bathroom.

#### 3.5. **PLUMBING**

- 3.5.1. Provide 1700mmx700 perspex type bath (b) with hot and cold pillar taps (**no plastic taps allowed**), securely built into brick up stand support, silicone sealed all around vertical walls. Bath to have a 30x52mm waste pipe, an overflow drain outlet and a 300mmx300mm openable service hatch.
- 3.5.2. Provide a ceramic wash hand basin (whb) in bathroom with a min diameter of 350mm, With 2 tap holes, hot and cold SABS approved pillar taps. Silicone sealed at vertical walls and securely fixed to wall.
- 3.5.3. Provide a water cistern to be made of porcelain, 11 litres water capacity, complete with Ball and beta valve flushing mechanism and flush pipe.
- 3.5.4. Provide water closet (wc) pan, glazed fire-clay or glazed porcelain, fixed to floor with 1:3 Cement mortar mixes. The seat to be heavy duty plastic type with flap and hinges of Similar quality properly fixed to the pan.
- 3.5.5. Provide 1 stainless steel sink(s) with tap to kitchen area. Sink to be at least 900mm in Length and securely fixed to wall with 2 brackets & silicon sealed against wall.
- 3.5.6. Provide a Class B galvanized pipe as per SABS 62 and 509 to be used as an in feed pipe (external). Internally SABS plastic 'Polycop' class 16 or similar approved.

#### 3.6. **GEYSER INSTALLATION**

- All plumbing installation by a registered Plumber and geyser to comply with SANS 151, 0254 and SANS 10400XA
- 3.6.1. Provide a min 100 litre high pressure solar geysers system to be installed as per Manufacturer's specification.
  - 3.6.2. Roof support to be in place for geyser as per engineers drawing and installation to be Signed off by engineer.

3.7. **DRAINAGE**

- 3.7.1. Provide one (1) gully with tap per house outside kitchen.
- 3.7.2. All water supply piping to run inside house, only 1 inlet to be visible on exterior of House no longer/higher than 300mm above top of concrete.
- 3.7.3. Provide a 50mm diameter vent pipe to the drainage system duly fixed to wall.
- 3.7.4. Provide rodding eye at head of drain and within 1,5m of connection point, and an Inspection eye at each junction.
- 3.7.5. Provide marked concrete covers embedded at ground level for rodding eyes.
- 3.7.6. Drain pipes to be at least 1m away from the walls/ foundations.
- 3.7.7. Drain pipes invert level to be min.450mm at head of drain.

3.8. **ROOF**

- 3.8.1. Provide concrete roof tiles or similar approved SABS (SANS 1783-20) underlay on 38x38 mm SA pine battens @ 320mm C/C on 152x38mm SA pine grade 6 Prefabricated timber (or similar approved) trusses @ 20 degrees max 760mm centres on 114mm x 38mm timber wall plates fixed with approved 40mm serrated galvanized clout Nails.
- 3.8.2. Tapered ridge tiles to have 1:3 cement mortar mix at overlaps and to be laid in full (cutting not allowed)
- 3.8.3. Trusses to be tied down with 2 strands of 4mm galvanised roof wire anchors built-6 Courses deep into walls tied over a nail in purlins.
- 3.8.4. Matching tapered verge tiles or barge boards (200mmx15mm) to the gable ends and fascia boards (150mmx15mm) to the eaves ends of roof and nailed with 40 mm serrated galvanized clout nails. Barge & fascia boards to be painted to match plaster bands.
- 3.8.5. Storm clips on the bottom 2 rows on both eaves.

3.9. **CEILING**

(Ceiling as per SANS 10400XA)

- 3.9.1. A minimum of 2.5m ceiling height.
- 3.9.2. Provide 6.4mm thick gypsum board ceiling with 135mm thick aerolite insulation fitted on 38x38mm, SA pine brandering at 450mm C/C, painted with white 75mm standard cornice Painted white fitted with Rhino bed.
- 3.9.3. Provide a 610x610 mm standard trap door.
- 3.9.4. All ceiling members to be painted white.

3.10. **ELECTRICAL**

(All electrical installation by the registered Electrician/ Wireman. Installation to be as

PER sabs 0145(green book)

- 3.10.1. All material must be of a SABS approved standard.
- 3.10.2. One (1) electrical plug per room, 400mm high from finish floor level.
- 3.10.3. One (1) light switch per room, 1400mm high from finish floor level.
- 3.10.4. One (1) stove isolator, 1.200mm high from finish floor level.
- 3.10.5. A ready distribution board (DB), 1.600MM high from finish floor level.
- 3.10.6. Install a SABS and Municipality approved pre-paid electrical meter.
- 3.10.7. Conduiting to all areas surface mounted or conduiting and wiring to wall chiselled 30mm into brickwork wall make use of a mesh before plastering the wall.

The position of a stove must be considered before installing a stove isolator.

Electrical points in bedrooms need to be considered with furnishing in mind.

The switch for the bathroom must be installed outside the bathroom and Regular

Plug sockets may not be fitted in the bathroom.

3.11. **GLAZING**

(Glass to comply with SABS 0137)

- 3.11.1. Glass area of less than 0,75 m<sup>2</sup> to be 3mm thick.
- 3.11.2. All glass more than 0,75m<sup>2</sup> to be 4mm thick.
- 3.11.3. Glass to bathroom to be 4mm obscured glass.
- 3.11.4. All putty to be treated with a hardener and finished off with universal undercoat and 2 coats enamel based gloss paint to final colour and finish.

3.12. **FINISHES**

- 3.12.1. Floors to be power-floated or have a smooth steel-trowelled finish.
- 3.12.2. All steel window and door frames, including concealed areas of these, to be painted With 1 coat of universal undercoat (oil based) and 2 final coats of enamel paint in Addition to factory painted red-oxide.
- 3.12.3. External solid doors to be finished off with two (2) coats of external wood oil, or apply One(1) coat Sanding Sealer and two (2) coats SABS approved external polyurethane Varnish. (No SA Pine doors constructed with pressed wood to be used for external doors).
- 3.12.4. Timber trusses-all exposed parts to be treated (painted) with wood creosote.
- 3.12.5. External walls to be plastered and painted with undercoat & 2 final coats SABS approved PVA paint with 2 different paint colours as per elevations.
- 3.12.6. Internal walls to be plastered and painted with undercoat & 2 final coats SABS approved PVA paint with 2 different paint colours as per elevations.
- 3.12.7. The 150mm wide plaster band around the door and window openings to be painted in Contrasting colour to that of the wall.
- 3.12.8. Barge & Fascia boards to be painted to match plaster bands.

## **APPENDIX 2: DATA COLLECTED ON THE 21 NOVEMBER 2017: RESEARCH QUESTIONS FOR THE INTERVIEW OF THE PARTICIPANTS**

Research Topic: **The impact of local labour on achieving quality standards in low cost housing**

Research main question: **What is the nature of the relationship between the use of local labour and achievement of quality standards on low cost housing?**

### **Set: 1: Participants who work on site and do the actual construction**

- Local labour: 2 Females of the age of 25 to 34
- Local labour: 2 Males of the age of 25 to 34
- Local labour: 2 Females of the age of 35 to 50
- Local labour: 2 Males of the age of 35 to 50

#### **1. Explain the training process you underwent in this project**

Local labour female 1 age 25 to 34: Safety training

Local labour female 2 age 25 to 34: Safety training, setting up and pouring of slabs, the supervisor taught through practicals

Local labour male 1 age 25 to 34: On the job training and got a certificate to be a subcontractor

Local labour male 2 age 25 to 34: No training was provided

Local labour female 1 age 35 to 50: The labours did practicals through one labour who was taken to training

Local labour female 2 age 35 to 50: Practical from previous labours

Local labour male 1 age 35 to 50: Practical at an institution of learning

Local labour male 2 age 35 to 50: Trained a long time ago before this project

#### **2. What documentation did you get as proof of the training**

Local labour female 1 age 25 to 34: Safety and first aid certificate

Local labour female 2 age 25 to 34: Nothing

Local labour male 1 age 25 to 34: A certificate

Local labour male 2 age 25 to 34: Nothing

Local labour female 1 age 35 to 50: Nothing

Local labour female 2 age 35 to 50: Nothing

Local labour male 1 age 35 to 50: Received a certificate of basic electrician

Local labour male 2 age 35 to 50: Nothing

**3. What qualification/s do you possess**

Local labour female 1 age 25 to 34: Matric, safety certificate, first aid and Computer certificate

Local labour female 2 age 25 to 34: Matric, Supervisor Certificate

Local labour male 1 age 25 to 34: Door fitting and carpentry certificates

Local labour male 2 age 25 to 34: Business management, wholesale and retail certificate

Local labour female 1 age 35 to 50: Grade 11

Local labour female 2 age 35 to 50: None

Local labour male 1 age 35 to 50: Electrical certificate

Local labour male 2 age 35 to 50: None

**4. What documentation did you produce when you were hired for this job**

Local labour female 1 age 25 to 34: Matric and computer certificates

Local labour female 2 age 25 to 34: Matric certificate

Local labour male 1 age 25 to 34: Company registration and profile

Local labour male 2 age 25 to 34: The business management certificate

Local labour female 1 age 35 to 50: ID

Local labour female 2 age 35 to 50: ID

Local labour male 1 age 35 to 50: The electrical certificate

Local labour male 2 age 35 to 50: ID

**5. Describe the practice utilised to brief local labours on quality issues?**

Local labour female 1 age 25 to 34: Induction, safety talk, toolbox talk and the site agent assists the subcontractor to brief labours about quality issues through short meetings

Local labour female 2 age 25 to 34: Induction and supervisor checks the quality

Local labour male 1 age 25 to 34: Self supervision but supervisor checks as well and if something was not done properly, they break and start afresh

Local labour male 2 age 25 to 34: Daily monitoring wrt house keeping with a check list

Local labour female 1 age 35 to 50: Practicals and supervision

Local labour female 2 age 35 to 50: Practical and on the job training

Local labour male 1 age 35 to 50: Have a supervisor who is also the boss who ensures that he maintain safety and the quality of the houses

Local labour male 2 age 35 to 50: Meeting with the supervisor who explains the quality needed

**6. What is your view on the cause of poor quality in the construction of low cost houses**

Local labour female 1 age 25 to 34: Those labours that are not serious about the work but wants to earn money

Local labour female 2 age 25 to 34: Not enough training as the contractor is required to show delivery

Local labour male 1 age 25 to 34: The period of training is not enough

Local labour male 2 age 25 to 34: If the house is not plastered, this is seen in the old houses as they were backwashed

Local labour female 1 age 35 to 50: When the slab cracks when sweeping, it is poor quality because the house is free

Local labour female 2 age 35 to 50: Cracked houses

Local labour male 1 age 35 to 50: Backwashed houses

Local labour male 2 age 35 to 50: Backwashed houses in the old project adjacent to this project

**7. What is your understanding regarding standards and guidelines for the construction of low cost housing in this project**

Local labour female 1 age 25 to 34: Not sure

Local labour female 2 age 25 to 34: build to the best of your ability as per instructions

Local labour male 1 age 25 to 34: The standard and guidelines are good

Local labour male 2 age 25 to 34: Note sure

Local labour female 1 age 35 to 50: There are set guidelines but contractors are cutting costs by utilising less cement

Local labour female 2 age 35 to 50: Very little

Local labour male 1 age 35 to 50: Not sure

Local labour male 2 age 35 to 50: Not sure

**8. How does local labour ensure that their work meet the standards and guidelines for the construction of low cost housing in this project**

Local labour female 1 age 25 to 34: Supervision of the work and that knowledge is passed through on the job training

Local labour female 2 age 25 to 34: They double check, they test the slabs and they pass inspection

Local labour male 1 age 25 to 34: The onsite job training, some learn by mistakes that are normally costly to the contractor

Local labour male 2 age 25 to 34: In house training and supervision

Local labour female 1 age 35 to 50: By supervision and training

Local labour female 2 age 35 to 50: on the job training and supervision

Local labour male 1 age 35 to 50: Training and supervision

Local labour male 2 age 35 to 50: Through supervision

**Set: 2: Owners of low cost houses allocated in the last 3 years**

- 2 Females of the age of 40 to 60
- 2 Males of the age of 40 to 60

**9. Are you happy with the quality of your house**

Female owner 1: No

Female owner 2: No

Male owner 1: No

Male owner 2: Yes

**10. Are there any quality problems on your house**

Female owner 1: Yes

Female owner 2: Yes

Male owner 1: Yes

Male owner 2: Yes

**11. What are those quality problems**

Female owner 1: Drainage problems causes' damage to the walls of the house, the steps are bad and the owner fell, when it rains, and water enters the house

Female owner 2: House cracks

Male owner 1: Water comes through the wall when it rains. The house is not plastered inside

Male owner 2: Cracks

**12. How soon after allocation did your house deteriorate**

Female owner 1: From the first year of occupation

Female owner 2: After 3 months of occupation

Male owner 1: The first year of occupation

Male owner 2: Immediately after occupation

**13. Did you use your own money to fix your house**

Female owner 1: Yes, I raised the level of the slab but then the water is still entering

Female owner 2: No

Male owner 1: Yes, I fixed the toilet as it was falling, plumbing is poor and the pipes are not chased into the wall

Male owner 2: Yes

**14. Was there anyone ever injured as a result of the quality of the house**

Female owner 1: The owner fell and broke the right leg

Female owner 2: No

Male owner 1: No

Male owner 2: No

**15. What do you think is the cause of the poor quality**

Female owner 1: No

They think that the funds are shared accordingly and as a result, materials and methods are compromised to increase the number of houses build

Female owner 2: Shortage of brick force

Male owner 1: The failure of the contractors to check if construction is done properly and the failure of inspectors to point the issues out

Male owner 2: The workers don't use enough cement

**16. How has the poor quality of your house affected you**

Female owner 1: Always worry about the safety of my family

Female owner 2: The house is slowly deteriorating

Male owner 1: In winter the house gets very cold as the air freely enter through the walls

Male owner 2: I had to use my money to fix what the contractor was paid to do

**17. How do you think quality of future houses should be improved**

Female owner 1: No

Allow people to check the faults before signing the happy letter

Female owner 2: The use of acceptable and proper material accordingly. The workers should be monitored if they are building correctly

Male owner 1: Proper plastering, plumbing and insulation

Male owner 2: Quality bricks and enough cement, better doors, window frames and ceiling

### **Set: 3: Participants in the supply**

- Contractor
- Sub-contractor
- Site agent
- Municipal Building Inspector
- Department of Human Settlements: Gauteng Province Building inspector

#### **18. Describe the relationship between the local labour and the contractor**

Contractor: No issues, good relationship, try to keep a good relationship eg payment of wages on time

Subcontractor: Very, good relationship, at meetings issues and misunderstandings are sorted out and as a result avoid strikes

Site agent: The relationship is good but those who don't come to work and the ones who will often engage in strikes

Municipal building inspector: Labour ratio is encouraged (not more than 30% import labour and not less than 70% local labour

Departmental building inspector: N/A

#### **19. Explain the training process you provided to local labour in this project**

Contractor: Provision of pacesetters at the beginning of the work, they are skilled and train the new local labours/workers

Subcontractor: Train the labour on my own as the training instruction comes from the main contractor

Site agent: Normally women are trained to do platforms, brickwork, plumbing, ceiling and painting, whereas males and some females are trained to pour foundations and brickwork

Municipal building inspector: The contractor is encouraged to transfer skills to local labour eg safety representative from the community to be trained for a course in order to have skills to perform certain tasks

Departmental building inspector: N/A

#### **20. What documentation did you issue as proof of the training**

Contractor: Certificate of competence and confirmation of completion

Subcontractor: There is no issuing of certificates as this function is done by the main contractor

Site agent: A certification of completion on the specific training and the time period of the training is specified

Municipal building inspector: The contractors issue accredited certificates

Departmental building inspector: N/A

#### **21. What qualification/s did local labour possess**

Contractor: Most have matric, no skills, it is their first job

Subcontractor: Local labour has no qualifications but undergo training and acquire skills

Site agent: Some have no courses, usually this is not a requirement. However construction sites requires services of safety representatives as well as an environmental representative

Municipal building inspector: Certain jobs such as electrification requires certification.

Departmental building inspector: N/A

**22. What documentation did local labour produce when they were hired for this job**

Contractor: ID and proof of residence

Subcontractor: ID and proof of residence

Site agent: Qualifications are not specified or needed from labour but any sort of qualification will be a bonus. ID and proof of residence is required

Municipal building inspector: Labour ID and proof of residence whereas subcontracted labour must come from registered businesses, tax clearance certificate and proof of banking account

Departmental building inspector: N/A

**23. Describe the practice utilised to brief local labours on quality issues**

Contractor: An induction is held for each labour, highlight safety measures and what is required. The tool talk happens every week and the safety is discussed as well. Every fortnight, there is a subcontractors meeting and main issues for discussion are quality, safety and progress on site.

Subcontractor: An induction on safety, toolbox meetings addressed on time on any issue on site as well as concerns on site

Site agent: An induction is usually done and this is where quality issues are addresses. This is done once a week. Every fortnight a subcontractors meeting is held to address any onsite issues and concerns

Municipal building inspector: Contractor supervise the quality of the work e.g preparing mixing boards and batches (mixing ratios). A show house is also constructed to the standard and then construction that follows should be of the same standard with the show house

Departmental building inspector: N/A

**24. What is your view on the cause of poor quality in the construction of low cost houses**

Contractor: Lack of training and adequate supervision

Contractor: There is no quality issues on this project and those who are involved with construction are brief before work commences and also supervised on how to deliver quality work

Site agent: Lack of supervision is a major cause of poor quality, Lack of material affect quality and non-SABS material can lead to poor quality

Municipal building inspector: Labour that is not passionate but working for the sake of earning a salary. Weather conditions can hinder quality

Departmental building inspector: Poor quality is an ongoing issue, some workers/contractors leave for better pay and new staff should be trained again

**25. What is your understanding regarding standards and guidelines for the construction of low cost housing in this project**

Contractor: A project should be in compliance with NHBRC enrolments and check if a projects meet requirements

Subcontractor: Before construction can commence, instructions are given from the main contractor for compliance with the standards

Site agent: A need to adhere to approved drawings, understand norms and standards of the Department of Human settlements, understand the specifications of NHBRC and understand Municipal building regulations

Municipal building inspector: The usage and compliance with the National Building Regulations and Building Standard Act, 103 of 1977

Departmental building inspector: Compliance with the building regulations, NHBRC as well as the Gauteng Human Settlements Norms and Standards

**26. How do you ensure that local labour' work meet the standards and guidelines for the construction of low cost housing in this project**

Contractor: Continuous supervision and support given to workers

Subcontractor: Monitoring of work constantly from the beginning each morning to the end of the day and until the end of the project

Site agent: Through supervision, guidance and through training

Municipal building inspector: Random inspections, compulsory inspections per milestones

Departmental building inspector: Through inspection. If standards are not met, then a house is disapproved. Construction of houses commence with a construction of a show house to set the expected standard

**27. How can this situation be improved so that it does not occur in future projects**

Contractor: Time allocation in terms of contract period is insufficient and government needs to invest in training of labours

Subcontractor: There should be workshops and training and also teaching people of the mission and vision of quality work

Site agent: Government should invest more on training. Contractors should be given more time to train labour during the project as well as more time to deliver on a project

Municipal building inspector: Provide adequate training. Contractors can give recognition by providing recommendation letters

Departmental building inspector: All working on site must be supervised by a competent person and the show house should set the tone in terms of compliance to standard and good quality

My sincere appreciation goes to a number of people who assisted me with the research:

# APPENDIX 3: RESEARCH ETHICS CLEARANCE CERTIFICATE



## School of Construction Economics & Management

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### SCHOOL OF CONSTRUCTION ECONOMICS AND MANAGEMENT RESEARCH ETHICS COMMITTEE

<u>CLEARANCE CERTIFICATE</u>	<u>PROTOCOL NUMBER</u> CEM/17/10/MTR1/MSC
<u>PROJECT TITLE:</u>	The impact of local labour on achieving quality standards in low cost housing
<u>INVESTIGATOR</u>	Maluleke T. R. 1781937
<u>SCHOOL/DEPARTMENT</u>	SCHOOL OF CONSTRUCTION ECONOMICS AND MANAGEMENT
<u>DATE CONSIDERED</u>	24/10/2017
<u>DECISION OF THE COMMITTEE</u>	Approved conditionally with respect to the declaration
<u>EXPIRY DATE</u>	24th Oct 2018
<u>DATE</u>	24th Oct 2017
<u>CHAIRPERSON</u>	Dr. Kola Ijason

cc: Supervisor: Prof. D. Root

#### DECLARATION OF INVESTIGATOR (S)

To be completed in duplicate and ONE COPY returned to the Secretary Mrs. M. Sithole at the CEM reception desk.

I fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the committee. Agrees to completion of a yearly progress report.

  
Signature

Date 30.10.2017

## APPENDIX 4: PARTICIPANT INFORMATION SHEET

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JOHANNESBURG



### Participant Information Sheet

#### **PARTICIPATION IN THE RESEARCH: THE IMPACT OF LOCAL LABOUR ON ACHIEVING QUALITY STANDARDS IN LOW COST HOUSING: LESEDI LOCAL MUNICIPALITY**

Greetings

I am a part time Master's degree student currently registered for Building: Project Management, at the School of Construction Economics and Management. My name is Thabitha Refilwe Maluleke, student No: **1761937** and supervised by Dr David Root. The research involves the investigation of the impact of local labour on achieving quality standards in low cost housing: Lesedi Local Municipality.

I am inviting you to be a part of the research study through an interview with structured questions addressing the nature of the relationship between the use of local labour and the achievement of quality standards on low cost housing. You have been sampled to participate in this research due to your involvement in the project. The interview will take a period of less than an hour of your time. Should you agree to participate, I would request to use an audio recorder for purposes of reminding myself of the interview and take hand written notes as well. Your participation is voluntary, you are not obligated to proceed if it is in your best interest to withdraw. No remuneration will be offered for your participation in this study.

Thank you for making time for participation, it is highly appreciated. Your participation will contribute to the body of knowledge towards improving the quality of low cost houses through the involvement of local labour. While your organization may be identified, as a participant you will not be personally identified and your name will not be used. You will remain anonymous. You will be referred to as an interviewee. Any information that you share will be treated as confidential and will only be accessed by me through a password protected computer. No foreseeable risk is associated with your participation.

The research is undertaken for academic purposes only and once finalized, the report will be available electronically through the online library and can be accessed publicly. You are welcome to contact me or my supervisor on any comments, questions or concerns or for a copy of the final report on the following contact details: [thabithamaluleke@gmail.com](mailto:thabithamaluleke@gmail.com) or 0824547946 or my supervisor, Dr David Root at [david.root@wits.ac.za](mailto:david.root@wits.ac.za) or 011 7177663.

Thabitha Refilwe Maluleke \_\_\_\_\_ Date \_\_\_\_\_

MSC: Building: Project Management

## APPENDIX 5: CONSENT FORM FOR PARTICIPANTS

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School of Construction Economics & Management

### Consent form for participants

#### **PARTICIPATION IN THE RESEARCH: THE IMPACT OF LOCAL LABOUR ON ACHIEVING QUALITY STANDARDS IN LOW COST HOUSING: LESEDI LOCAL MUNICIPALITY**

The purpose of the consent form confirms that the research has been explained to me and have also been informed of the following:

- The details of the study
- I have an option to remain anonymous
- I have a choice in participating in the research
- I will not answer questions that makes me uncomfortable
- The information to be supplied will not in any way harm or benefit me

I \_\_\_\_\_ (participant's name), agree to be interviewed

It has been confirmed to me that my name and personal details other than age and gender will not be used.

I agree  or disagree  ve the interview audio-recorded.

Signature of Participant \_\_\_\_\_

Date \_\_\_\_\_

Signature of Researcher: Thabitha Refilwe Maluleke: Student No: 1761937\_\_\_\_\_

Date\_\_\_\_\_

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JOHANNESBURG



## **APPENDIX 6: RESEARCH QUESTIONS FOR THE INTERVIEW OF PARTICIPANTS**

Research Topic: **The impact of local labour on achieving quality standards in low cost housing**

Research main question: **What is the nature of the relationship between the use of local labour and achievement of quality standards on low cost housing?**

### **Set: 1: Participants who work on site and do the actual construction**

- Local labour: 2 Females of the age of 25 to 34
- Local labour: 2 Males of the age of 25 to 34
- Local labour: 2 Females of the age of 35 to 50
- Local labour: 2 Males of the age of 35 to 50

1. Explain the training process you underwent in this project
2. What documentation did you get as proof of training
3. What qualification/s do you possess
4. What documentation did you produce when you were hired for this job
5. Describe the practice utilised to brief local labours on quality issues?
6. What is your view on the cause of poor quality in the construction of low cost houses
7. What is your understanding regarding standards and guidelines for the construction of low cost housing in this project
8. How does local labour ensure that their work meet the standards and guidelines for the construction of low cost housing in this project

### **Set: 2: Owners of low cost houses allocated in the last 3 years**

- 2 Females of the age of 40 to 60
  - 2 Males of the age of 40 to 60
9. Are you happy with the quality of your house
  10. Are there any quality problems on your house
  11. What are those quality problems
  12. How soon after allocation did your house deteriorate
  13. Did you use your own money to fix your house
  14. Was there anyone ever injured as a result of the quality of the house
  15. What do you think is the cause of the poor quality
  16. How has the poor quality of your house affected you
  17. How do you think quality of future houses should be improved

**Set: 3: Participants in the supply**

- Contractor
  - Sub-contractor
  - Site agent
  - Municipal Building Inspector
  - Departmental Building Inspector: GDHS
- 
18. Describe the relationship between the local labour and the contractor
  19. Explain the training process you provided to local labour in this project
  20. What documentation did you issue as proof of the training
  21. What qualification/s did local labour possess
  22. What documentation did local labour produce when they were hired for this job
  23. Describe the practice utilised to brief local labours on quality issues
  24. What is your view on the cause of poor quality in the construction of low cost houses
  25. What is your understanding regarding standards and guidelines for the construction of low cost housing in this project
  26. How do you ensure that local labour' work meet the standards and guidelines for the construction of low cost housing in this project
  27. How can this situation be improved so that it does not occur in future projects