

An investigation on the impact of subcontracting system on the eventual quality of construction facilities in Swaziland-An-Exploratory study

Mashwama, N. X¹, and Musonda, I. ²

^{1,2}Department of Construction Management & Quantity Surveying / Faculty of Engineering & the Built Environment / University of Johannesburg, South Africa

Email: schwalicious@gmail.com

Email: imusonda@uj.ac.za

Abstract:

The construction industry is a key sector in the development and economic growth of Swaziland, however, the industry has not escaped the challenges facing other countries worldwide in terms of delivering construction projects of good quality as stipulated in the contracts. This paper assess the extent to which subcontracting in Swaziland has contributed to the apparent poor quality workmanship in the construction industry. The data used in this paper were derived from both primary and secondary sources. The secondary data was collected via a detailed review of related literature. The primary data was collected through a well-structured questionnaire which was distributed to construction stakeholders namely: Contractors, Sub-contractors, client (Government), Consultant representatives (Quantity Surveyors, Architects, Civil engineers, Project Managers and Electrical and mechanical Engineer). Only organisations registered with the ministry of public works and transport in Swaziland and other professional bodies were surveyed. 100 questionnaires were distributed and 80 were completed and returned and used for the survey, it represented 80% response rate. Data received from the questionnaires was analysed using descriptive statistics procedures. Key findings from the study revealed that the major factors affected by subcontracting are poor quality, material wastage, high level of reworks and level of disputes and conflict. Major factors contributing to poor quality problems in constructed facilities were the superior/subordinate relationship, delayed payment from main contractor, poor relationship between main contractor and lack of subcontractor training. Findings on how quality can be improved in subcontracted projects were skilled workforce, training and education, good communication between parties and management commitments were major key. Investigating the extent to which subcontracting in Swaziland has contributed to the apparent poor quality workmanship in the construction industry will provide knowledge on the problem and hence the study.

Keywords:

Subcontracting, poor quality facilities, Swaziland

1 Introduction

The construction industry is a key sector in the development and economic growth of Swaziland. However, the construction industry in Swaziland has not escaped the challenges facing other countries worldwide in terms of delivering projects of good quality as stipulated in the contracts. Projects or construction works are mostly subcontracted, hence subcontracting on construction projects is common and well established practice. Subcontracting plays a major role in the construction industry (Hinze & Tracey, 1994:274). Nonetheless, subcontracting on a project can introduce certain associated problems that can affect project management and construction quality (Choudhry, Hinze, Arshad & Gabriel, 2012:1353). About 90 per cent of construction work is carried out by a variety of subcontractors while the main contractor tends to focus on management and coordination (Karim, Morasseky & Davis, 2008:28)

However, subcontracting impacts on quality, because contractors use pyramid subcontracting system which is using multiple tiers or multilayer of subcontractors on a project, and making the management of

contract to be difficult. Consequently difficulties in managing subcontractors lead to poor quality in constructed facilities (Karim, Morossek and Davis, 2008: 28). Currently the construction industry in Swaziland is facing a situation where the quality of work constructed by subcontractors is poor.

Factors contributing to poor quality work such as subcontractors are often paid late by general contractors, because of pay when paid (Yik, Lai, Chan &Yiu, 2006:17). Uneven power position (subcontractors are bullied and treated with little respect by main contractor or master & syndrome), Lack of direct/ poor communication with client and contractors (Enhassi et al. 2012:93, Ng & Price 2010:168, Lin &Gibson, 2011:41 & Love et al 2004:45). Lack of common understanding between contractor and subcontractor which contribute to poor relationship (Love et al 2004: 51).

Most subcontractors do not have the resources to adopt modern principle of quality management systems such as value management, total quality management, buildability, supply chain management concept and hence their smaller size does not provide them flexibility to be able to adopt ground breaking methods (Karim, Moresseky and Davis 2008:28). However, quality remains critical issue for the construction industry and the achievement of acceptable level of quality in the construction industry has always been a problem. Many authors argue that quality management can be a solution for the problems that the industry is facing (Kuprenas &Kenney, 1998:34)

Hence, this paper is aimed at establishing the extent to which subcontracting has contributed to poor quality works in Swaziland, identify factors of subcontracting which contribute to poor quality of subcontracted projects, and examine the ways of implementing quality management in subcontracting systems so as to improve quality performance in subcontracted projects.

2 Swaziland construction industry

The construction industry (CI) in many countries is a key component of economic growth. For the developing countries the construction industry plays even a greater role in development and poverty alleviation by providing access to basic services and transport facilities (Odediran, Adeyinka, Opatunji & Morakinyo, 2012:255). The construction companies operating in Swaziland range from small local contractors to major companies with the capability to carry out highly specialised projects. The large contractors employ about 20,000 people. The range of work undertaken in the construction industry covers small buildings, multi-level projects, roads, dams and infrastructure. Therefore the CI is a key source of work and income in the Kingdom. The overall contribution to the Gross Domestic Product (GDP) by the construction industry was 5.8% in 2002, but it has dropped down to 2.8% in 2013 (Swaziland Business year book 2002, Central bank of Swaziland).

Government is the major client in the construction industry. The ministry of Public Works and Transport is the Government's implementing agency on behalf of all ministries with regard to all construction capital projects (Mvubu &Thwala, 2009:356). The Swaziland Government through the ministry of Public Works and Transport also has a responsibility to educate contractors and subcontractors about government's expectations of the quality of work; the process of tendering and the information required (Mvubu &Thwala, 2009:356). The Government of the kingdom of Swaziland, through its 25- year National Development Strategy has identified the construction sector as a priority area to provide the impetus on improve the social and economic development of the country. However the Agriculture industry is the one that leads by contributing more to the economy of the country.

3 Extent to which subcontracting contributed to the perceived poor quality of constructed facilities

Subcontracting plays a vital role in the construction industry. Many construction projects are 80-90% subcontracted (Hinze & Tracey, 1994:274, Ardit & Chotibhongs, 2005:866). Subcontracting is a long standing practice in construction industry, which has been proven to be economical way of project delivery (Yik, Lai,Chan &Yiu, 2006:ii). A subcontractor in the construction industry is a construction firm that contracts with the main contractor to perform some aspect of main contractors work (Arditi, Chotibhongs, 2005:866). Also is a business strategy that is used by main contractor to deal with

uncertainties in the construction market transfer risks, such as financial risks, completion risk and responsibility for employees (CIDB, 2013:3). Subcontractor may be nominated, named and domestic according to their entry into construction contract (Vilasini, 2012:18). To complete any project, the general contractor must go through specialized subcontracting or labour subcontracting. To provide construction product or services to customers, contractors must rely on subcontractors (Kang, 2011:8).

The subcontractors, including domestic and nominated subcontractors, may further sublet the works to be undertaken under the subcontract to their subcontractors, which will allow them to more flexibly cope with the variable workloads and reduce costs. Further subcontracting to lower tier subcontractors may happen if doing so will allow the subcontractors to earn a greater profit, but the multi-layer subcontracting practice has also been alleged to be a cause of various types of problems with construction industry (Yik, Lai, Chan & Yiu, 2006:5). Such problems include poor quality of work. The extent to which subcontracting contribute to the quality work in constructed facilities can be seen in the defective buildings, cost of rework, cost of maintenance, construction delays, construction mistakes and poor quality of materials used for construction (Love & Edwards, 2004, Karim, Marosszeyky & Davis, 2006:28).

Factors contributing to poor quality in the subcontracting system

Subcontractors are often paid late by general contractors, because of 'pay when paid' or 'pay if paid'; Lack of direct /poor communication with client and contractor; Uneven power Position(Subcontractor are bullied and treated with little respect by main contractor or master & syndrome) (Yik, Lai, Chan & Yiu, 2006:17, Enshassi et al., 2012:93, Ng & Price, 2010:168, Lin & Gibson, 2011:41, Love et al, 2004:45). Lack of common understanding between contractor and subcontractors (poor relationship between subcontractor and main contractor; Subcontractors consist mostly migrate workers(People from rural areas seeking job in urban areas with less formal education), Lack of formal education(formal trade /skills training leading to defective facilities) (Love et al, 2004:51, Enshassi et al., 2012:93. Lin& Gibson, 2011:41).

Improving quality in the subcontracting system

The client, consultant, contractor and subcontractor of a construction project all have a role to play in delivering a quality project. Failure of any of the parties will seriously affect the quality of the final project (Kanji & Wong ,1998:34) Quality in construction project encompass not only the quality of product and equipment used in the construction, but the total management approach to completing the facility as per the scope of works to the owner satisfaction within budget and in accordance with the specified schedule to meet the owners defined purpose (Rumani, 2011:151).

However, the concept such as value management; benchmarking; buildability /constructability; partnering; reengineering and total quality management are approaches that can be applied as initiatives to solve problems in the construction industry and meet the client needs. The concepts are useful for the company in achieving best results (McGeorge, Palmer, 2002:4, Kanji & Wong, 1998:3; Love, et al, 2004:53).

Therefore, implementing the concepts they must be an improve communication among parties involved in the project; Also there should be one common language throughout the building. A formal training, educational programme is to be planned and provided on a timely and regular to every individual in the organisation (Dale, 2003:28, McGeorge & Palmer, 2002:176); Improve the payment method; Testing or measurement of work and product; Better craftsmanship; Improve management – worker relations. A successful knowledge management initiative will install learning and knowledge-sharing culture and environment, provide vision and effective leadership to overcome learning barriers. Team work needs to be practiced and is one of the key features of involvement, hence without it difficult will be found in gaining the commitment and participation of people throughout the organisation (Dale, 2003:29).

4 Research Methodology

The data used in this paper were derived from both primary and secondary sources. The primary data was obtained through the survey method, while the secondary data was derived from the review of literature and archival records. The primary data was obtained through the use of a structured questionnaire survey. This was distributed to a total of 100 construction professionals that included; client (government), Subcontractors, contractors, consultants' representative's quantity surveyors, civil engineers, architects

and mechanical and electrical engineers who are currently involved in construction of public projects in Swaziland. Out of the 100 questionnaires sent out, 80 were received back representing 80% response rate. This was considered adequate for the analysis based on the affirmation of Mcneill & Chapman, (2005: 51) since the result of a survey could be considered as biased and of little value if the return rate was lower than 30 to 40%. The data presentation and analysis made use of frequency distributions and percentages of all the respondents. The research was conducted between the months of June to August, 2013.

Analysis

In this study, the analysis employed a simple statistical methodology, which is descriptive statistics (mean, mode, median, number, percentage, range, standard deviations). The following table shows how analysis was done for each section.

Table 4.1: The methods of data analysis

Section A: General / Background information	Descriptive statistics (numbers, percentages)
Section B: Extent of subcontracting contributing to poor facilities	Descriptive statistics (percentages)
Section C: Factors contributing to poor quality work	Descriptive statistics (Percentage)
Section D: Improving quality performance in construction projects	Descriptive statistics (Percentage)

A five point Likert scale was used because it allows a range of responses to be generated including neutral answers and does not force a decision as in the case of “yes” or “no” type of questions. The question sought to establish the factors that contribute to poor quality work, with regard to the identified problems and factors from the reviewed literature. The adopted scale allowed individuals to express their opinion on how much they strongly agreed or strongly disagreed with a particular statement.

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly agree

The calculation of scores was also done to establish the level of significance of factors to the level of quality in the construction industry in Swaziland. A score was given to each factor as assessed by the respondents. The score made it possible to compare how much the respondent agree with the factors or statement.

5 Findings and Discussion

Findings from the 80 respondent revealed that 84% were males and 16% were female. Further findings revealed that 26% of the respondents were architects, 24% were quantity surveyors, 19% were civil/structural engineers, 14% were construction managers, 9% were project managers, 8% were M&E and 1% was a site engineer. Most of the respondent had a working experience of more than 10 years, 71% of the respondents were involved in building construction, 24% were involved in civil works and 4% were involved in other. The statistical mode for value of projects undertaken in the past 5 years majority of the respondent have executed more than five million at an average of 68%.

Extent of subcontracting contributing to poor facilities

The respondents were asked to indicate the extent to which they agree with the statement that subcontracting has contributed to the problems in the Swaziland Construction Industry. Generally the respondents agreed with some of the factors, especial the factor of poor quality work as the major problem by the subcontractors with 20%; material wastages at 14%; High level of reworks at 11%; High conflicts and disputes, construction delays and defective buildings at 8%; cost overruns and high level of accidents at 6% and lastly construction mistakes at 5% as shown in Table 1. Findings from the survey support the work of Vilasini et al (2012:20); Barber et al (2000:487); Auchterlounie (2009:242); Maturana et al (2007:67) and Love & Edwards (2004).

Table 5.1: Subcontractor contributing to poor facilities

Frequency	Response (%)			
	Poor quality	Material wastage	High level of reworks	High conflicts and disputes
Strongly disagree	6	4	8	4
Disagree	29	26	25	23
Neither agree or disagree	13	28	26	36
Agree	33	29	30	30
Strongly agree	20	14	11	8

Factors contributing to poor quality work

The respondents were asked to indicate the extent to which they agree with the factors contributing to poor quality work done by subcontractors in Swaziland. Most of the respondents reveals that Superior/subordinate relationship between main contractor & subcontractor is the major factor that contributed to poor quality work at 41%; lowest bidding/tender price selection at 28%; delayed payment by main contractors at 26%; poor subcontractor/ main contractor relationship at 24%; poor supervision by subcontractor, lack subcontractor training, subcontracting the works to another subcontractor without the approval of main contractor at 20%. Furthermore, poor quality was not considered a contributing factor to poor quality work at 13%; High level of mobility of subcontractor at 11%; poor supervision by main contractor 10% at and poor materials management 8% were also found out not contributing to poor quality work. (Figure 4.2) Findings from the survey support the study done by Enshassi et al (2012:93), Lin& Gibson (2011:41), Yik, Lai, Chan & Yiu, (2006:17), Marosszeky (2005)

Table 5.2: factors causing poor quality work

Factors	Response (%)
Superior/subordinate relationship between main contractor & subcontractor	41
Lowest bidding/ tender price selection	28
Delayed payment by main contractors	26
Poor subcontractor / main contractor relationship	24
Lack of subcontractor training	20
Lack of quality awareness	13
High level of mobility of subcontractor	11
Poor supervision by main contractor	10
Poor materials management	8

Improving quality in the subcontracting system

Respondent were asked to indicate the extent of using the concept of improving quality in the construction industry. Most of the respondent often use constructability/buildability to improve quality (28%); followed by value engineering with a frequency of 22% and total quality management with a frequency value of 17% (Table 4.3). the findings agrees with the study done by Love, et al. (2004: 46), Wong & Fung(1999:201).

Table 5.3: concept of quality improvement

Response (%)	Not at all	rarely	sometimes	Often	Always
Buildability	8	18	25	28	13
VE/VM	12	20	13	22	13
TQM	10	18	26	17	9

Respondents were asked on the extent to which they agree with the factors that will improve quality performance. Most respondents, about 74% ,believed that improved communication among parties involved in the project is the major point can improve quality; education and training of both management and employees at 71%; improve the payment method and testing of work or product were also considered in improving quality performance at 59%; followed by better craftsmanship at 54%. However, improving management – workers relations was not considered to improve quality performance at 49% (Table 4.4). However, these findings were in agreement with the study done by Dale, (2003:28), McGeorge & Palmer, (2002:176), Maqsood, Finegan & Walker, (2003:614). Moreover, the study disagree with Maqsood, Finegan & Walker (2003:614), who pointed out that involvement is the key to improve quality, while the survey findings the respondent ranked is last they considered it as least factor to improve quality.

Table 5.4: Improve quality performance

	Response (%)
Improve communication among parties involved in the project	74
Education and training of both management and employees	71
Improve the payment method	59
Testing or measurement of work and product	59
Better craftsmanship	54
Improve management – worker relations	49

6 Conclusion and Recommendation

From the literature review we have seen the extent to which subcontractor contribute to poor quality problems such as construction mistakes, poor quality disputes and conflict, construction delays, reworks and material wastages contribute to construction quality problems and in order to avoid such problem, qualified and trained subcontractors should be appointed to perform their duties professionally to avoid the above mentioned problems and it must not be based on lowest tender because they tend to ignore quality in the process of construction trying to save money. Findings from the study supported work done by previous researchers also revealed that delayed payment by main contractors, superior/ subordinate relationship between main contractor and subcontractor must be improve in order to avoid poor quality work. Professionalism must be in place, good managerial skills need to be in place and training and education must be in place to, etc. However, findings revealed that the concepts of quality are known such as buildability, value management and total quality management but are not well practice because client, contractors and subcontractors feel it is expensive to implement them. Findings revealed that important aspect of improving quality in the subcontracting system were skilled workforce, training and education, good communication between parties, etc, in the Swaziland construction industry.

However, the empirical study was based on a relatively small sample of construction professionals, contractors, client and subcontractor in the Swaziland construction industry. The findings revealed the extent to which subcontracting in Swaziland contributed to the apparent poor quality workmanship in construction and how to improve quality in subcontracting system. The reliability of the methodology adopted; when the procedure is followed in a bigger and more diverse sample, findings would justify the current study. Moreover, the result revealed in this study gives valuable insight for the improvement of much better ways to run the subcontracting system in the Swaziland construction industry.

Recommendation

The concept of quality management and of improving quality in the construction industry should be emphasised in higher education. It must be treated as a subject in its own right, the brightest young people will be encouraged from studying it and best graduate will be attracted into quality profession. Therefore, quality management should be taught as a separate subject in relation to undergraduate and postgraduate degrees. Hence, the construction industry in Swaziland faces the shortage of able people qualified to take up quality management position. Therefore, with respect to the lack of quality management in the course curriculum of many undergraduate and post degree course, the situation won't change since the is lack of exposure, graduate won't recognize the potential of employment prospective in quality management

7 References

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