

# QUALITY PERFORMANCE OF INFRASTRUCTURE DEVELOPMENTS IN SWAZILAND

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## Abstract

The construction of infrastructure developments are becoming more complex due to discovery of new materials, change in clients' expectations as well as increasing demand for improve project performance especially in the area of sustainability. In view of this, demand for projects of acceptable quality is gaining popularity among stakeholders. Quality performance of construction projects in Swaziland was examined in this study in the quest of ensuring resilience of projects in that regard. Questionnaires were administered on professionals that are concerned with the management and administration of infrastructural projects that are registered with their various approved professional bodies in the selected area. It was revealed that the major factors affecting quality performance of infrastructures include poor supervision, lack of motivation, non-compliance to specifications, lack of quality policy as well as lack of management commitment and improper decision making. These factors result in poor performance and eventually lead to delay, cost overrun as well as conflicts among construction team members. This study contributed to the body of knowledge by evaluating quality factors affecting quality performance of construction projects within the study area. It also examined results of non-performance and it is necessary for government board and agencies as well as other construction stakeholders to continuously monitor the activities of contractors in their adherence to approved standards. More so, the contractors should ensure that adequate

number of trained and experienced personnel are engaged for optimum delivery of projects to required quality.

**Keywords:** Construction Project, Performance Improvement, Project Performance, Project Quality.

## Introduction

Performance problems arise in large construction projects due to many reasons including improper techniques and tool, incompetent designers or contractors, site related issues, social and technological issues as well as poor estimations and change management (Long, Ogunlana, Quang & Lam, 2004). The Project Management Institute (PMI, 1987) explained that quality performance is the calculation of achievement used to measure and manage project quality. However, Tengan, et al (2014) observed that the perception of poor quality performance of small scale contractors has turned out to be of great concern to stakeholders. Poor quality performance (PQP) has potentially reduced the level of employment rate, influenced the completion time of projects due to re-work and ultimately pushing client's budget beyond reach. Factors affecting quality performance are inevitable but when identified, necessary steps should be taken to curb the menace. Contractor quality performance is critical to the success of any construction project since improved contractor quality performance leads to increase client satisfaction, improvement in the

reputation of contractor and hence competitiveness in the market (Xiao & Proverbs, 2003).

To address quality related issues, Chua, Kog & Loh (1999) developed a hierarchical model for construction project success for different project objectives. The study revealed that quality objectives are influenced by four main project aspects, that is, project characteristics, contractual arrangements, project participants and interactive processes. Arditi & Gunaydin (1998) noted that management commitment to continuous quality improvement, management leadership in promoting high process quality; efficient teamwork to promote quality issues at the corporate level; quality training of all personnel; and effective cooperation between parties taking part in the project are generic factors that affect process quality. Pheng (2004) through case studies, revealed that total quality management (TQM) – a successful management philosophy in the manufacturing and service industry – could be replicated in the construction industry with similar benefits. The benefits may be in terms of reduction in quality costs, and better employee job satisfaction. Bubshait & Al-Atiq (1999) observed that a contractor's quality assurance system, which ensures consistent quality, is essential in preventing problems and the reoccurrence of problems. The study also observed lack of documentation of quality systems for majority of sampled contractors. Abdel-Razek (1998) studied the quality improvement methodology, it was concluded that improvement of employee satisfaction is the most important area for quality improvement in Egyptian construction industry. Ledbetter (1994) developed a quality performance management system (QPMS) that tracks labour costs in three main categories, that is, normal work, quality management work (prevention and appraisal), and rework (deviation correction). Assuming that the cost of quality is the sum total of quality management and rework, the study revealed that QPMS is useful in promoting awareness and improving the understanding of the quality process in addition to facilitating communication, reducing the overall cost of quality, and directing the

management to the areas where quality improvements could be made. Love & Smith (2003) proposed a generic frame work for benchmarking rework at the interfaces of a project's life cycle in relation to quality performance of construction projects. There has been substantial international studies on quality issues in the construction industry however, under Swaziland conditions, not many systematic studies have been undertaken for construction projects.

Sinclair & Zairi (1995) suggested that the level of performance measurement system model is the development of organizational strategy. The development of strategy for an organization is one of the most fundamental activities that provide a vision of where the organization wants to be in the short and long term future. It is inevitable therefore, that any performance management system will need to have strategy as the main input, so that any results coming out of the system could be used to evaluate the extent to which the organization has met its strategic goals. In view of this, using quality factors obtained from existing literature, this study examined the quality performance of construction projects as well as the result of poor quality performance of construction projects.

## **Quality Performance of Projects in Swaziland Construction Industry**

### **Swaziland Construction Industry**

The Ministry of Public Works & Transport through her minister, launched the first ever Construction Industry Council in Swaziland on June 13, 2013. The Council has been established in terms of the Construction Industry Council Act No: 14 of 2013 (Kingdom of Swaziland Construction Industry Council, 2013). Furthermore the council was drawn from a wide spectrum of representative organizations and stakeholders including Swaziland Association of Indigenous Construction Consultants (SAICC), the Swaziland Association of Architects, Engineers and Surveyors (SAAES), the Swaziland

Contractors Association (SCA), the Construction Materials Manufacturers and Suppliers (CMMS) and relevant Government Ministries. The council is expected to regulate the construction industry by giving priority to Swazi firms and Swazi companies through establishment of ethical standards, practices and procedure, policy implementation, and to set and promote safety standards. Other duties entail promoting the construction industry and enhancing professionalism through training of persons engaged in the industry. The Council will also exercise disciplinary control over the conduct of any person engaged in the construction sector and aimed at attaining development in the country in pursuit of vision 2022 (Kingdom of Swaziland Construction Industry Council, 2013).

Judging by the number of companies listed in the registry of the Ministry of Public Works and Transportation (MOPWT) by Construction Industry Council (CIC) as regulated and launched on 13 June 2013, the rate of competition is so high such that grading must rely on performance versus a quality product and conforming to the CIC regulations. Great failure of registered firms is inevitable, and those that survive, for years remained at a state of emerging, therefore, the study aimed to establish factors affecting quality performance and which of them have the most impact within construction companies in Swaziland.

### **Quality Performance of Construction Projects**

Performance is measured on regular basis by determining how successful projects teams, organizations or individuals have been in attaining their objectives and strategies (Kagioglou, Cooper, & Aouad, 2001). Project success is ideally measured against the achievement of goals that were predetermined at the inception phase (Dainty, Cheng & Moore, 2003). In the construction industry there has been development of several tools to measure and manage performance such

as the total quality management, bench marking, etc. (Kagioglou et al, 2001) and key performance indicators which enable the measurement of project and organizational performance throughout the construction industry (Chan & Chan, 2004). Benchmarking works in comparing performance between projects within the same industry (Cheung, Suen & Cheung, 2004) and in this case, the construction industry.

Factors that influence quality performance of construction projects include inflation, procurement system, lack of communication, selection of materials and prices escalation, lack of proper motivation and incentives and poor on site supervision (Rizwan, 2008, Tengan, et al, 2014). According to Jha & Iyer (2004), critical factors affecting quality performance in construction projects are focused on two sets of variables relating to success and failure attributes. The study found that the factors having positive (success attributes) contributions to achieve the desired quality level are project managers competence, top management support and their competence, interaction between project participants, owners competence and monitoring and feedback. On the other hand, the factors that adversely affected (failure attribute) the quality performance of projects are; conflict among project participants, hostile socio-economic environment, and harsh climatic condition, project manager's ignorance and lack of knowledge, faulty project conceptualization and aggressive competition during tendering and availability of resources including machinery and labour, is particularly important because it affects construction quality in underdeveloped countries. Heravitorbati, Coffey, Trigunarsyah & Saghatforoush (2011) highlighted that poor stakeholder management appears to be one of the most fundamental causes of quality failure.

Financial difficulty faced by contractors was considered the primary and the most frequent factor affecting quality performance in the construction industry. Financial difficulties faced by the contractors are a natural result of the competitive

nature of the industry and this competitive market either raises income for contractors or leads to huge losses (Tao & Kumaraswamy, 2012). Most residential contractors are independent, small, have limited resources and experience and often resort to underbidding rivals to win contracts, clear evidence of the competitive nature of the market. Together, these factors are a recipe for cash flow problems which eventually lead to financial difficulties. Contractors do however indirectly blame their financial difficulties and overall project failure on the activities of the owners of construction projects concerned with making many changes to the original documents (Drewins, 1985).

Palaneeswaran, Kumaraswamy, Ng & Lam (2007), stated that too many change orders from owners have tremendous effect on the financial performance of construction projects and their progress, this often lead to financial and legal problems. Change orders can make or break a job, changing an order can cause serious damage if the change is incorrect or poorly studied. On the other hand, it can protect the project from unseen future problems and reduce extra costs. The average cost of change orders on construction as a percentage of the original project budget in Swaziland is from 5 - 10% (Ahmed & Kangari, 1995). Furthermore, contractors mostly blame consultants for the extensive change in variation orders as a result of mistake in specifications and drawings (Yung & Yip, 2010). Poor project planning and scheduling by contractors is an important factor as lack of communication in and planning for construction projects and a failure to prepare tasks in a well-organized manner deeply affect firms' performance and cause project delays.

Teamwork is another factor and it refers to an increase in employees control over their work and allowing them to work as a group (Ooi, Bakar, Arumugam, Vellapan & Loke, 2007). The eventual aim of the team approach in construction projects is to get everyone including contractors, designers, vendors, subcontractors and owners involved with the total quality performance process. Team work is necessary

to encourage competitive activities internally among employees and eventually with respect to suppliers and customers. According to Arditi & Gunayadin (1997), team work among construction parties such as structural, electrical, environmental, civil engineers, architects and owners are essential to reach the quality goals for design and construction.

According to Mane & Patil (2015), management leadership refers to management providing policies promoting customer satisfaction as well as builds an improvement culture. Management is also involved in decision making, making sure communication links established between employees and management and leading a clear mission developed regarding business objectives. With all mentioned above management also acts as key driver in continuous improvement, (Delgado, Miller, Inati & Phelps, 2005). Project management action is the key for project success (Hubbard, 1990). Jaseliskis & Ashley (1991) suggested that by using proper management tools, the project managers would be able to plan and execute their construction projects to maximize the project's chances of success in every aspects including quality performance. The important variables in project management include adequate communication, control mechanisms, feedback capabilities troubleshooting, coordination effectiveness, decision making effectiveness, monitoring, project organization structure, plan and schedule followed as well as related previous management experience (Belout, 1998). These variables are essential for proper planning and monitoring of construction projects in the quest to ensure and improve quality and other measures of construction project performance.

## Research Methodology

Using survey approach, the study was conducted in Hhohho region of Swaziland due to high number of construction professionals and contractors as well as increasing number of construction developments in the area. Targeted respondents

were building and civil contractors and consultants (architects, quantity surveyors as well as project and construction managers) that are registered with the Construction Industry Council (CIC) and Ministry of Public Works and Transport (MPWT) for the financial year 2015/2016. Registration with the bodies was on-going at the time of this study but the population included the already registered members. The study was limited to the formal sector because there is no database on the registered companies within the CIC for the informal sector. Since this research is quantitative in nature, the study adopted standardized questionnaires which was designed based on findings from the literature as well as the objectives set for this research.

The questionnaires were designed in English as it is the common international language that respondents could read and understand. Personal data that could reveal their identities were avoided, therefore ensuring privacy. Closed-ended questions were used for this study because they are not only simpler to administer and analyse but are also more efficient in the sense that it is more easier for respondents to complete closed-ended items than open-ended ones in a given period of time. The questions were designed using Likert scale structured to five scaling, that is, 1=Strongly Disagree (SD); 2=Disagree (D); 3=Neutral (N); 4=Agree (A); and 5=Strongly Agree (SA). Mean item score (MIS) was adopted to calculate the total weighted responses and it was further used to rank the order of importance of highlighted variables in conjunction with Standard Deviation.

## Findings and Discussion

Out of the 50 questionnaires distributed using purposive sampling technique, 46 were received while 2 were not completely filled and certified unfit for further analysis. The usable 44 questionnaires includes 8 from architects, 6 from engineers, 8 from quantity surveyors, 5 from project and construction managers, and 17 from contractors. The purpose

for collecting general information is to better understand the level and capacity of participants in this survey. Furthermore, findings revealed that 36% of the respondents had working experience of not more than five years, 23% of the respondents had 6-10 years working experience, 14% had 11-15 years' experience, 9% had 16-20 years' experience while the remaining 18% of respondents had more than twenty years working experience.

Table 1 shows the respondent's ranking of quality factors affecting quality performance of construction projects in Swaziland. It reveals that poor on-site supervision is the most important factors in that it was ranked first with a mean item score of 4.30 and a standard deviation of 8.542; the issue of none compliance to project specifications was ranked second with a mean item score (MIS) of 4.14 and standard deviation (SD) of 7.756; lack of management commitment with decision making was ranked third with a MIS = 4.09 and SD = 7.222. The respondents further ranked lack of motivation of construction workers forth with a mean score of 4.05 and standard deviation of 6.794; unavailability of quality policy or system in firms was also ranked same as it share the same MIS = 4.05 with a different SD = 7.222. Under standard skills training facilities was ranked fifth with a MIS = 3.89 and SD = 8.280; irregular site visits was ranked sixth with a MIS = 3.73 and SD = 4.665; trust and communication was ranked seventh with a mean item score of 3.64 and SD = 6.615 and minimum workers induction before executing work was ranked the least with a MIS = 3.39 and SD = 8.085. It could be observed that the SD values for the factors are relatively high and this is as a result of difference in opinions of consultants (architects, engineers, quantity surveyors, project managers and construction managers) and contractors that were sampled for this study. Due to interests and level of perceptions of the two groups of respondents, the difference is expected. However, the adoption of average mean value of their responses helped to consider their views for the purpose of making general inference on quality performance of construction project.

The findings on quality factors affecting quality performance of construction projects were similar to the findings by Mallawaarachchi & Senaratn (2015) where poor site supervision and lack of on-site project manager were revealed to be the most factors affecting quality performance of projects in the construction industry. These results were in-line with findings by Arditi and Gunaydin (1998) where the lack of contractor supervision and poor training systems were also identified as major factors affecting quality performance of construction projects. Furthermore, findings by Meng (2012) and Jha & Iyer (2004) revealed that communication problems and lack of competent manager in assisting with organizing site control meetings were also rated among major factors affecting quality performance of construction projects. Lack of motivation and unavailability of quality policy or system with construction firms were identified as least factors in the current study and studies by Hiyassat (2000), Pheng and Wee (2001) as well as Jamaludin, Mohammad & Ahma (2014) align with these findings. Pheng and Wee (2001) stated that material/equipment specifications are important factors affecting quality performance of construction projects.

*Table 1. Quality Factors Affecting Project Quality Performance*

| Factors   | MIS  | Standard Deviation | Rank |
|---|------|--------------------|------|
| Poor on-site supervision                            | 4.30 | 8.542              | 1    |
| Not complying to project specifications             | 4.14 | 7.756              | 2    |
| Lack of management commitment with decision making  | 4.09 | 7.222              | 3    |
| Lack of motivation                                  | 4.05 | 6.794              | 4    |
| Unavailability of quality policy or system in firms | 4.05 | 7.222              | 4    |
| Under standard skills training facilities           | 3.89 | 8.280              | 5    |
| Irregular site visits                               | 3.73 | 4.665              | 6    |
| Trust and communication                             | 3.64 | 6.615              | 7    |
| Minimum workers induction before executing work     | 3.39 | 8.085              | 8    |

Results of analysis relating to poor quality performance within the construction industry in Swaziland are indicated in table 2. The table depicts the ranking of the factors, where delay in payment of service rendered was ranked first with a mean score of 4.39 and standard deviation of 9.621, construction cost overruns was ranked second with a MIS = 4.14 and SD = 8.109. Conflicts within the construction team was ranked third with a mean score of 4.07 and SD = 6.969; hence halting and abandonment of projects in hand was ranked fourth with a MIS = 3.77 and SD = 8.035. Accidents during construction was ranked fifth with a mean score of 3.59 and SD = 6.585; involvement of a third party in dispute resolution being ranked sixth with a MIS = 3.07 and SD = 8.750. The least ranked was delay in acquiring occupation certificate with a MIS = 2.91 and SD = 5.879. From the results, it could also be observed that the SD values for the factors are on the high side which is due to the differences in the opinions of respondents, that is, consultants and contractors that were sampled for the research. The difference is as a result of the variance of interests and level of perceptions of the two groups of respondents. However, to obtain a balanced and unbiased results, MIS was adopted to better explain the results of poor quality performance of construction projects in the study area.

*Table 2. Results of Poor Quality Performance*

| Variables  | MIS  | Standard Deviation | Rank |
|--|------|--------------------|------|
| Delay in payment of service rendered               | 4.39 | 9.621              | 1    |
| Construction cost overruns                         | 4.14 | 8.109              | 2    |
| Conflicts within the construction team             | 4.07 | 6.969              | 3    |
| Halting and abandonment of projects in hand        | 3.77 | 8.035              | 4    |
| Accidents during construction                      | 3.59 | 6.585              | 5    |
| Involvement of a third party in dispute resolution | 3.07 | 8.280              | 6    |
| Delay in acquiring occupation certificate          | 2.91 | 5.879              | 7    |

The first two results of poor quality performance of construction projects in the study area, that is, delay in payment of services rendered by contractors and other stakeholders and construction cost overrun, are related to cost and financial aspect of projects. This is in line with the assertion of Palaneeswaran, et al (2007) that financial issues are usually the major effects of poor quality performance of construction projects. Another effect of poor quality of project performance is site accidents especially during construction. Tao & Kumaraswamy (2012) further stated that poor quality performance of construction projects if not properly managed, results in various forms of conflicts and disputes necessitating the adoption of various forms of dispute resolution methods. This may eventually lead to project abandonment and other construction problems.

## Conclusion and Recommendations

Factors affecting quality performance of infrastructure projects as well as the resultant effects on construction projects in Swaziland was examined with a view to providing information for improvements. Poor on-site supervision, non-compliance with project specifications, lack of management commitment with decision making, lack of motivation, unavailability of quality policy or system in firms, low standard skills training facilities as well as trust and communication were the important quality factors affecting quality performance of construction projects in Swaziland. Furthermore, the study discovered that poor quality performance of construction projects leads to delay in payment from owner to contractor, additional time and cost overruns, conflicts within the construction team and disagreements between contracted parties being referred to dispute resolution boards.

To improve quality performance of construction projects, the Swaziland Government should establish strategic quality improvement programmes by putting up proper and higher training facilities for stakeholders in the construction industry. More so, top management and all stakeholders concerned

with delivery of the projects should provide policies for promoting client or customer satisfaction policy and actively communicate quality policies and plans to employees (internal and external) to create awareness, interest desire and actions.

This study has been able to explore quality factors affecting quality performance of construction projects in Swaziland from the opinions of construction stakeholders. Further studies can be geared towards cost, time, productivity and schedule related factors. Historical as well as cost data can also be collected to further examine the effects of the factors. Research can also be conducted to evaluate various means of improving quality performance of construction projects including steps and techniques before, during and after construction of projects.

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