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# The extent of practice of Total Quality Management (TQM) in the maintenance of university buildings in South Africa

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## **ABSTRACT**

### **Purpose**

The purpose of this paper is to investigate the extent to which TQM is practiced in the maintenance of school buildings in South Africa.

### **Design**

Available literature in Total Quality Management was thoroughly reviewed. A quantitative approach was adopted where a questionnaire with closed-ended questions was distributed to purposively sampled maintenance workers in a tertiary institution. Respondents proffered their perceptions on the practice of TQM during their building maintenance activities. Descriptive data analysis comprising of mean, and percentages was used to analyse the data.

### **Research limitations**

The study was built upon an available sample of practicing maintenance workers in a university. There is a probability that other school categories in the country were not represented. A larger sample extended to other tertiary schools can be used for future studies.

### **Findings**

A total of 54 respondents participated in the study. The findings obtained indicated that all the TQM practices were implemented. People involvement was the most implemented TQM practice. Process approach, customer focus and system management were also found to be frequently practiced. For the practice of leadership, the development of clear objectives by top management to guide maintenance activities was low, likewise the development of effective strategies to guide maintenance activities.

### **Practical implications**

This study shows that top maintenance management is expected to develop clear objectives and effective strategies to guide and control maintenance activities and systems should be well managed in order to contribute to the effectiveness of the maintenance department.

### **Value to conference theme**

This study adds to existing literature by bridging the gap and revealing the importance of practicing TQM in maintenance. The study also provides research information on the Total Quality Management process in the South African school building maintenance system and evaluates the extent to which it is being practiced.

**Keywords:** Maintenance, University buildings, South Africa, Total Quality Management.

## **1. INTRODUCTION**

The idea of Total Quality Management (TQM) is to make sure that attempts to gain the required level of quality are well planned and organised. The implementation of TQM is identified as one of the most effective ways to monitor and maintain facilities and also enhance continuous improvement in the management of facilities in order to meet customer needs (Ashworth, 1994). According to Ater (2013), TQM is perceived as a step to realizing the deliberate changes that will bring about the necessary changes in proper management and maintenance of buildings.

TQM principles and framework has received a lot of popularity with most organizations using it as a tool to achieve competitive advantage. The adaptation of TQM principles have been beneficial to not only service and manufacturing organizations, it has also had a significant impact in healthcare, government agencies and educational institutions. While quality has become a universal concern, universities are challenged with maintaining existing physical facilities within acceptable quality standards. Arguably, maintaining buildings within acceptable quality standards is one of the most important aspects in education, government and business.

According to Olawunmi (1992), the consequences of neglecting the aspect of quality management in the maintenance of facilities and buildings results in high cost of maintenance and low building performance, wasted energy and effort, and inadequate management of maintenance. However, the issues stated above could be rectified by applying the principles of Total Quality Management (TQM), which is the basis upon which this study is conceptualized. Since the TQM principles proffer solutions to such problems. Therefore the objective of the study was to investigate the extent to which the school's maintenance department practiced TQM in the maintenance of school buildings.

## **2. LITERATURE REVIEW**

### **2.1 Evolution of TQM and its contextual definition**

TQM came into existence during the 1970s, as at this time the progression of quality shifted from quality control to a better approach of quality in order to deal with the growing concern for quality. Quality management has evolved from quality inspection, to quality control, to quality assurance then to Total Quality Management. A number of authors identify three periods in the TQM evolution process and others propose four stages of evolution.

Steeple (1992) suggests three periods in TQM evolution: quality control, quality assurance, and total quality management. Meanwhile, Garvin (1998) argues that four stages exist in the evolution of TQM, which are inspection, statistical quality control, quality assurance, and strategic quality management.

### **2.2 TQM in maintenance of university buildings**

According to Council on Higher Education (2011), South Africa has twenty three public universities, eleven of which are traditional universities, six universities of technology and six comprehensive universities. Zakaria and Wan-Yusoff (2011); Sukirno and Siengthai (2011); Tirronen and Nokkala (2009) explain that universities develop the intellectual capacity and employability of a citizens of a country. Therefore accelerates a country's economy and promotes development of a country. For universities to meet all these objectives effectively, buildings are important. Olanrewaju, Khamidi and Araz (2010) state that buildings are regarded as the most important facility of a university. In order for university buildings to provide a conducive environment that supports research, learning, teaching and innovation, maintenance is required. Olanrewaju *et.al* (2010) further explain that a university building should enable the transfer of knowledge. Therefore, for a university achieve its major objective of promoting

academic activities, it important for its building facilities to be adequately maintained (Zakari & Wan-Yousoff, 2011).

The relationship between quality and maintenance, though not totally missing, has not been addressed adequately in literature (Ben-Daya & Duffua, 1995). It is crucial to note that most of the literature in existence and which is reviewed seems to have less focus on TQM practice in the maintenance of tertiary school buildings. Not much attention is paid to the extent to which TQM is practiced in the maintenance of school buildings. The issue of quality practice in maintenance practice has been very rare. Ben-Daya and Duffuaa (1995) realise a fracture in knowledge of understanding the issue of quality in the aspect of maintenance.

Abdul Azeez, Abass and Mansur (2014) stress that the building maintenance team has a significant impact on the outcome of maintenance operations in any educational institution because management is a living force and it is the force that gets things done to acceptable standards.

Yasin, Alavi, Kunt and Zimmerer (2004) clearly stipulate that the rate at which service organizations are reluctant to practice TQM is alarming, especially considering the high importance of the service sector to global economies and that service organizations are straggling in the aspect of the effective application of total quality management (TQM) practices towards the achievement of its strategic goals. Au and Choi (1999) further explain that service organizations are still sauntering behind their counterparts in the aspect of their commitment to TQM practices.

### **2.3 Dimensions of TQM practice**

Previous empirical studies on TQM confirm that TQM practices have been described by various researchers in different ways although they are inter-related. From the principle of TQM, and its theories, it is apparent that the TQM practice is shaped towards the philosophy of waste reduction and continuous improvement, aimed to achieve a common goal, and customer satisfaction. TQM practices are a set of beliefs which are fundamental and comprehensive aimed at improving an organisations performance over a long period of time by placing focus on its customers in the process of addressing its stakeholder needs (Hoyle, 2001). According to Obaid (2005) eight TQM practices that have been perceived as fundamental to the management of quality are illustrated by the ISO 9000(2000). They are as follows:

#### ***Customer focus***

Customer focus is concerned with the achievement of customer satisfaction through the conformance to its requirements (Obaid, 2005). According to ISO 9001(2000) standard, customer focus is reflected through the requirements addressing concerns with customer communication,

management commitment, appointment of a management representative and the resolution of customer needs and expectations.

### ***Leadership***

For effective leadership, leaders must develop clear objectives to guide maintenance activities. It is the responsibility of top management to lead employees to be more efficient at their jobs (Rahaman, 2014). The appropriate management structure should be established and employee participation through empowerment should be encouraged (Oakland, 1997). Al-Khalifa (2000) states that leadership by top management that supports the objectives and vision of the organization is crucial in the TQM process. Management should consistently pay attention to their employees and monitor their progress (Obaid, 2005).

### ***People involvement***

The participation of everyone in the maintenance activities, from the top executives to the low level management assists in increasing productivity which means getting benefits (Obaid, 2005). According to Galgano (1994), the involvement of the workforce is important as it is one of the conditions to an organizations ultimate success.

### ***Process approach***

According to Hoyle (2001) desired results are more effectively when related activities and resources are managed as a process. It entails the management of processes which have clearly defined objectives based on the needs and interests of all parties involved.

### ***System Management***

Ludwig-Becker (1999) proposes that identifying, understanding and managing a system of interrelated activities, processes or a given objective contribute to the effectiveness and efficiency of the organisation.

### ***Continuous improvement***

It is the driving tool of TQM because it ensures consistent quality delivery to customers by involving everyone in the organization. This propels an organization to be both creative and logical in searching for ways to become productive and more effective at meeting stakeholder expectations. Organisations are required to develop a programme for upgrading processes in order to achieve competitive advantage (Obaid, 2005).

### ***Factual approach to decision making***

Management needs to continually take decisions. Hoyle (2001) suggests that for an organisation to determine how well it is performing, data on performance measures are important. TQM requires that an organisation continually gather and analyse data in order to improve the accuracy of its decision making, reach a consensus and allow prediction based on past occurrences (Westcott, 2013).

### ***Supplier relationship***

A mutually favourable relationship between the organisation and its suppliers amplifies the potential of the organisation to create value (Hoyle, 2001). Regular supplier audits should be carried out and it should be ensured that suppliers maintain quality standards.

## **3. METHODOLOGY**

The quantitative research approach was adopted for this study. Quantitative research is the systematic and objective process of using numerical data from a selected subject of population to carry out a study (Maree & Peterson, 2007). A detailed conveniently selected single case study of a university was carried out from four universities situated in the Western Cape Province, South Africa. A purposive sampling method was used to select workers of the maintenance department who participated in this survey. These workers comprised of the maintenance department's top management, supervisors, foremen, clerk of works, technicians, administrators and labourers.

Five point Likert scale closed-ended questions were formulated to get the perceptions of respondents on the extent to which TQM was practiced in the maintenance of their buildings. The questionnaire was hand-delivered to each respondent. SPSS version 24.1 was used to capture and compute the data. The descriptive analysis consisting of means, percentage and standard deviation was used to analyse the data. Reliability is mostly used as regards to the question of whether the measures that are formulated for concepts in the study are consistent. To ensure reliability of this study, the Cronbach's co-efficient alpha was used to test the consistency of the obtained.

## 4. FINDINGS

### 4.1 Research participation

Questionnaires were administered to workers across five campuses of the university including Bellville, Cape Town, Mowbray, Wellington and Mowbray. Table 4.1 shows that 11.2% (6) of the respondents occupy the top management position, 16.9% (9) of the respondents occupy the position of supervisor, 16.9% (9) of the respondents occupy the position of foreman, 9.4% (5) of the respondents work in the position of clerk of works, 24.3% (13) of the respondents occupy the position of technician, 14.9% (8) respondents occupy the position of labourer and 7.5% (4) respondents occupy the position of administrator. 16.2% (9) respondents have less than 10 years' experience, 65.1% (35) have between 11 and 20 years' experience, 17.0% (9) have between 21 and 30 years' experience, 1.9% (1) has between 31 and 40 years' experience. Table 4.1 indicate that 9.3% (5) are female and 90.7% (49) are male.

**Table 4.1** Profile of participants

| Profile of participants | Bellville |      | Cape town |      | Mowbray |      | Wellington |     | Granger bay |      | Total |      |
|-------------------------|-----------|------|-----------|------|---------|------|------------|-----|-------------|------|-------|------|
|                         | N         | %    | N         | %    | N       | %    | N          | %   | N           | %    | N     | %    |
| <b>Position</b>         |           |      |           |      |         |      |            |     |             |      |       |      |
| Top Management          | 2         | 3.7  | 0         | 0    | 0       | 0    | 1          | 1.9 | 3           | 5.6  | 6     | 11.2 |
| Supervisor              | 3         | 5.6  | 3         | 5.6  | 1       | 1.9  | 1          | 1.9 | 1           | 1.9  | 9     | 16.9 |
| Foreman                 | 1         | 1.9  | 5         | 9.3  | 0       | 0    | 1          | 1.9 | 2           | 3.7  | 9     | 16.8 |
| Clerk of Works          | 1         | 1.9  | 3         | 5.6  | 0       | 0    | 0          | 0   | 1           | 1.9  | 5     | 9.4  |
| Technician              | 5         | 9.3  | 5         | 9.3  | 1       | 1.9  | 1          | 1.9 | 1           | 1.9  | 13    | 24.3 |
| Labourer                | 3         | 5.6  | 0         | 0    | 4       | 7.4  | 1          | 1.9 | 0           | 0    | 8     | 14.9 |
| Administrator           | 2         | 3.7  | 1         | 1.9  | 1       | 1.9  | 0          | 0   | 0           | 0    | 4     | 7.5  |
| <b>Work Experience</b>  |           |      |           |      |         |      |            |     |             |      |       |      |
| 0-10                    | 4         | 7.5  | 2         | 3.8  | 0       | 0    | 2          | 3.8 | 1           | 1.9  | 9     | 16.2 |
| 11-20                   | 9         | 16.8 | 12        | 22.0 | 6       | 11.2 | 3          | 5.7 | 5           | 9.4  | 35    | 65.1 |
| 21-30                   | 3         | 5.7  | 3         | 5.7  | 1       | 1.9  | 0          | 0   | 2           | 3.7  | 9     | 17.0 |
| 31-40                   | 1         | 1.9  | 0         | 0    | 0       | 0    | 0          | 0   | 0           | 0    | 1     | 1.9  |
| <b>Gender</b>           |           |      |           |      |         |      |            |     |             |      |       |      |
| Female                  | 2         | 3.7  | 1         | 1.9  | 1       | 1.9  | 1          | 1.9 | 0           | 0    | 5     | 9.3  |
| Male                    | 15        | 27.8 | 16        | 29.6 | 6       | 11.1 | 4          | 7.4 | 8           | 14.8 | 49    | 90.7 |

### 4.2 Reliability

The reliability of scaled questions was tested with the use of Cronbach's alpha coefficient. Table 4.2 shows a summary of the reliability test for questions 1 and 2. The Cronbach's co-efficient for the scaled questions was 0.76, which satisfies the reliability test requirements.



**Table 4.2** Summary of reliability test

| Question No | Questions                         | Number of items | Cronbach's alpha coefficient |
|-------------|-----------------------------------|-----------------|------------------------------|
| 1           | Perception on the practice of TQM | 14              | 0.73                         |
| 2           | Extent of TQM practice            | 31              | 0.78                         |
|             | Total questions                   | 45              | 0.76                         |

### 4.3 Perception on the practice of TQM

From Table 4.3, respondents were required to respond along a 5-point Likert scale where; 1= strongly disagree, 2= disagree, 3= somewhat agree, 4= agree, 5= strongly agree. This section sought to explore the knowledge of the respondents about the practice of TQM. An overall mean score of 4.58 was obtained. It is evident that appropriate corrective measures should be carried out was ranked first with a mean score of 4.83 followed by department focuses on stakeholder satisfaction and appropriate preventive procedures should be carried out with mean scores of 4.79. Activities are done right the first time was ranked the least with a mean score of 4.18. An overall mean score of 4.58 was obtained. This indicates TQM is practiced in maintenance of tertiary learning buildings. This is consistent with the findings of Mukherjee (2006:42). It was highlighted that eight internationally recognized building blocks should be practiced together for the effective implementation of TQM.

**Table 4.3** Practice of TQM

| Statement                                                     | 1 | 2   | 3    | 4    | 5    | Total | Mean | SD   | Rank |
|---------------------------------------------------------------|---|-----|------|------|------|-------|------|------|------|
|                                                               | % | %   | %    | %    | %    |       |      |      |      |
| Appropriate corrective procedures should be done              | 0 | 0   | 3.7  | 9.3  | 87.0 | 54    | 4.83 | 0.46 | 1    |
| Department focuses on achievement of stakeholder satisfaction | 0 | 0   | 0    | 20.4 | 79.6 | 54    | 4.79 | 0.40 | 2    |
| Appropriate prevention procedures should be done              | 0 | 0   | 1.9  | 16.7 | 72.2 | 54    | 4.79 | 0.45 | 3    |
| Everyone should be involved in the execution of activities    | 0 | 0   | 1.9  | 20.4 | 77.8 | 54    | 4.75 | 0.47 | 4    |
| Department understands stakeholder needs                      | 0 | 0   | 0    | 25.9 | 74.1 | 54    | 4.74 | 0.44 | 5    |
| More focus should be placed on prevention                     | 0 | 0   | 5.6  | 22.2 | 72.2 | 54    | 4.66 | 0.58 | 6    |
| Development of relationship with stakeholders is vital        | 0 | 0   | 0    | 35.2 | 64.8 | 54    | 4.64 | 0.48 | 7    |
| Mistakes should be analysed                                   | 0 | 0   | 7.4  | 20.4 | 72.2 | 54    | 4.64 | 0.61 | 8    |
| Efforts should be made to satisfy all stakeholders            | 0 | 0   | 9.3  | 22.2 | 68.5 | 54    | 4.59 | 0.65 | 9    |
| All parties should be satisfied                               | 0 | 0   | 13.0 | 27.8 | 59.3 | 54    | 4.46 | 0.71 | 10   |
| Cost of resources consumed is measured                        | 0 | 0   | 5.6  | 46.3 | 48.1 | 54    | 4.42 | 0.60 | 11   |
| Value is added to maintenance processes                       | 0 | 0   | 5.6  | 50.0 | 44.4 | 54    | 4.38 | 0.59 | 12   |
| Mistakes are eliminated to save time and cost                 | 0 | 1.9 | 18.5 | 24.1 | 55.6 | 54    | 4.33 | 0.84 | 13   |
| Activities are done right the first time                      | 0 | 1.9 | 13.0 | 35.2 | 46.3 | 54    | 4.18 | 0.99 | 14   |
| OVERALL                                                       |   |     |      |      |      | 54    | 4.58 | 0.59 |      |

#### 4.4 Extent of TQM practice

Table 4.4 required respondents to indicate the extent to which TQM was practiced in their maintenance activities using a 5- point Likert scale, where 1= never; 2= rarely; 3= sometimes; 4=often; 5= always. Scale means and standard deviation were used to analyse the data for this study.

**Table 4.4** Extent of practice of TQM

| TQM practices                                                        | 1    | 2    | 3    | 4    | 5    | Total | Mean | SD   | Rank |
|----------------------------------------------------------------------|------|------|------|------|------|-------|------|------|------|
|                                                                      | %    | %    | %    | %    | %    |       |      |      |      |
| Process approach                                                     |      |      |      |      |      |       |      |      |      |
| Related maintenance activities are managed effectively               | 0    | 1.9  | 11.1 | 11.1 | 75.9 | 54    | 4.61 | 0.76 | 1    |
| Resources are managed as a process                                   | 0    | 0    | 14.8 | 11.1 | 74.1 | 54    | 4.59 | 0.74 | 2    |
| Objectives are clearly defined                                       | 0    | 0    | 14.8 | 20.4 | 64.8 | 54    | 4.50 | 0.74 | 3    |
| Processes based on interest of all parties are effectively managed   | 0    | 13.0 | 22.2 | 44.4 | 20.4 | 54    | 3.72 | 0.94 | 4    |
| OVERALL                                                              |      |      |      |      |      |       | 4.25 | 0.79 | 1    |
| People Involvement                                                   |      |      |      |      |      |       |      |      |      |
| Satisfaction of workers are measured regularly                       | 1.9  | 1.9  | 18.5 | 24.1 | 53.7 | 54    | 4.25 | 0.95 | 1    |
| Maintenance department contributes to the safety of workers          | 1.9  | 5.6  | 9.3  | 33.3 | 50.0 | 54    | 4.24 | 0.97 | 2    |
| All workers are involved in the maintenance process                  | 0    | 3.7  | 11.1 | 44.4 | 40.7 | 54    | 4.22 | 0.79 | 3    |
| Everyone participates in the execution of activities                 | 3.7  | 3.7  | 16.7 | 42.6 | 33.3 | 54    | 3.98 | 0.99 | 4    |
| OVERALL                                                              |      |      |      |      |      |       | 4.17 | 0.92 | 2    |
| Customer focus                                                       |      |      |      |      |      |       |      |      |      |
| Stakeholder inputs are encouraged                                    | 0    | 0    | 11.4 | 24.1 | 64.8 | 54    | 4.53 | 0.69 | 1    |
| Stakeholder needs are effectively disseminated and understood        | 1.9  | 1.9  | 7.4  | 44.4 | 44.4 | 54    | 4.27 | 0.83 | 2    |
| Stakeholder expectations are considered                              | 0    | 1.9  | 33.3 | 29.6 | 35.2 | 54    | 3.98 | 0.87 | 3    |
| Regard stakeholders as the focus                                     | 5.6  | 0    | 44.4 | 24.1 | 25.9 | 54    | 3.64 | 1.04 | 4    |
| Satisfy stakeholders by conforming to specification                  | 20.4 | 11.1 | 9.3  | 22.2 | 37.0 | 54    | 3.44 | 1.57 | 5    |
| OVERALL                                                              |      |      |      |      |      |       | 3.97 | 1.00 | 3    |
| System Management                                                    |      |      |      |      |      |       |      |      |      |
| Clear instructions are available                                     | 1.9  | 1.9  | 29.6 | 18.5 | 48.1 | 54    | 4.09 | 1.01 | 1    |
| Systems and maintenance processes are well identified and understood | 1.9  | 0    | 18.5 | 70.4 | 9.3  | 54    | 3.85 | 0.65 | 2    |
| Activities are managed in order to contribute to effectiveness       | 1.9  | 5.6  | 20.4 | 53.7 | 18.5 | 54    | 3.81 | 0.87 | 3    |
| OVERALL                                                              |      |      |      |      |      |       | 3.91 | 0.84 | 4    |

| TQM practices                                                                                       | 1    | 2    | 3    | 4    | 5    | Total | Mean        | SD          | Rank     |
|-----------------------------------------------------------------------------------------------------|------|------|------|------|------|-------|-------------|-------------|----------|
| <b>Continuous improvement</b>                                                                       |      |      |      |      |      |       |             |             |          |
| Continuous improvement of all services and processes is practiced                                   | 3.7  | 3.7  | 27.8 | 27.8 | 37.0 | 54    | 3.90        | 1.06        | 1        |
| Programs for upgrading the continuous improvement process is implemented                            | 1.9  | 14.8 | 13.0 | 48.1 | 22.2 | 54    | 3.74        | 1.03        | 2        |
| Improvement teams are available in all departments                                                  | 3.7  | 5.6  | 29.6 | 46.3 | 14.8 | 54    | 3.62        | 0.93        | 3        |
| <b>OVERALL</b>                                                                                      |      |      |      |      |      |       | <b>3.75</b> | <b>1.00</b> | <b>5</b> |
| <b>Supplier relationship</b>                                                                        |      |      |      |      |      |       |             |             |          |
| A mutually favourable relationship exists between the department and suppliers                      | 0    | 3.7  | 25.9 | 51.9 | 18.5 | 54    | 3.85        | 0.76        | 1        |
| Maintenance department ensures all suppliers can maintain quality standards and meet specifications | 3.7  | 14.8 | 24.1 | 38.9 | 18.5 | 54    | 3.53        | 1.07        | 2        |
| Regular supplier audits are conducted                                                               | 3.7  | 22.2 | 24.1 | 33.3 | 16.7 | 54    | 3.37        | 1.12        | 3        |
| <b>OVERALL</b>                                                                                      |      |      |      |      |      |       | <b>3.58</b> | <b>0.98</b> | <b>6</b> |
| <b>Leadership</b>                                                                                   |      |      |      |      |      |       |             |             |          |
| Top management consistently pays attention to members                                               | 3.7  | 0    | 7.4  | 29.6 | 59.3 | 54    | 4.40        | 0.92        | 1        |
| Top management encourages members through empowerment                                               | 1.9  | 3.7  | 9.3  | 27.8 | 57.4 | 54    | 4.35        | 0.93        | 2        |
| Maintenance department puts in place appropriate management structures                              | 0    | 3.7  | 16.7 | 27.8 | 51.9 | 54    | 4.27        | 0.87        | 3        |
| Contingency plans are developed to control maintenance                                              | 3.7  | 14.8 | 22.2 | 27.8 | 31.5 | 54    | 3.68        | 1.17        | 4        |
| Top management develops clear objectives                                                            | 31.5 | 16.7 | 5.6  | 27.8 | 18.5 | 54    | 2.85        | 1.57        | 5        |
| Effective strategies are developed to control maintenance                                           | 27.8 | 20.4 | 14.8 | 18.5 | 18.5 | 54    | 2.79        | 1.49        | 6        |
| <b>OVERALL</b>                                                                                      |      |      |      |      |      |       | <b>3.58</b> | <b>1.20</b> | <b>7</b> |
| <b>Factual approach to decision making</b>                                                          |      |      |      |      |      |       |             |             |          |
| Statistical methods are used to analyse data                                                        | 1.9  | 7.4  | 40.7 | 29.6 | 20.4 | 54    | 3.59        | 0.96        | 1        |
| Data to improve decision making is continually analysed                                             | 1.9  | 11.1 | 44.4 | 22.2 | 20.4 | 54    | 3.48        | 1.00        | 2        |
| Ensure data on performance measures is gathered                                                     | 3.7  | 31.5 | 33.3 | 18.5 | 13.0 | 54    | 3.05        | 1.08        | 3        |
| <b>OVERALL</b>                                                                                      |      |      |      |      |      |       | <b>3.37</b> | <b>1.01</b> | <b>8</b> |

#### 4.4.1 Process approach

As regards the sub-practices, related maintenance activities are managed effectively was ranked first with a mean of 4.61. Resources are managed as a process was ranked second with a mean score of 4.59. Table 4.4 shows respondents indicated that all the practices for process approach were frequently observed. Respondents ranked process approach as the second most implemented TQM practice with a mean score of 4.25.

#### ***4.4.2 People involvement***

The mean scores for the sub-practices ranged from 4.24 to 3.98. From the mean scores for the sub-practices for people involvement, it is evident that respondents perceived TQM as highly practiced. People involvement was ranked the second most implemented TQM practice with an overall mean score of 4.17.

#### ***4.4.3 Customer focus***

Respondents indicated that the maintenance department regards stakeholders as the focus of their maintenance activities (3.64) was the most practiced sub-practice followed by satisfaction of stakeholders (3.44). A mean score of 3.97 was obtained for customer focus.

#### ***4.4.4 System management***

Systems and maintenance processes are well identified and understood was ranked the most implemented sub-practice with a mean of 3.85 followed by activities are managed in order to contribute to effectiveness with a mean of 3.81. For system management, a mean score of 3.91 was obtained.

#### ***4.4.5 Continuous improvement***

It is obvious from the mean scores of the sub-practices that continuous improvement of activities and processes had a mean of 3.90 followed by programs for upgrading the continuous improvement process with a mean of 3.74. Continuous improvement had a mean score of 3.75.

#### ***4.4.6 Supplier relationship***

It is evident that mutually favourable relationship exists between the department and suppliers with a mean of 3.85 were the most implemented sub-practice. Maintenance department ensures all suppliers can maintain quality standards and meet specifications were ranked second with a mean score of 3.53. A mean score of 3.58 was obtained for supplier relationship.

#### ***4.4.7 Leadership***

top management consistently pays attention to members was ranked as the most implemented sub-practice with a mean score of 4.40 followed by top management encourages members through empowerment with a mean of 4.35A mean score of 3.58 was obtained for leadership.

#### **4.4.8 Factual approach to decision making**

Factual approach to decision making was ranked the least implemented TQM practice with an overall mean score of 3.37. With regards to sub-practices, statistical methods are used to analyse data was ranked first with a mean of 3.59 followed by data to improve decision making is continually analysed with a mean of 3.48.

### **5. CONCLUSION**

The results obtained from the survey indicated that university maintenance departments practiced TQM in their maintenance activities. Results showed that people involvement, process approach, customer focus and system management were the most implemented TQM practices. These findings are supported by literature. Department of Trade and industry (2011) reveals that the involvement of people, core management of systems and processes and satisfaction customers form the basis of TQM. However, complete and thorough TQM components were practiced and all practices conformed to the principles of TQM. This indicates that all workers are involved in the maintenance process and the maintenance department contributes to the safety of workers. It is also demonstrated that satisfaction of workers are measured regularly. In addition everyone participates in the execution of activities.

### **6. RECOMMENDATIONS**

All the components of TQM are important. A comprehensive TQM program comprising all the key TQM components should be practiced, rather than implementing limited portions. Further studies should be carried out in other higher learning institutions for better understanding of TQM practices.

### **7. REFERENCES**

- Abdulazeez, A., Abumelha, M. and Almaleh, A., 2015, Total Quality Management implementation and challenges. International Journal of Computer Systems (IJCS), 2(12):558-563.
- Al-Khalifa, K.N. and Aspinwall, E.M., 2000, The development of total quality management in Qatar. The TQM Magazine, 12(3):194-204.
- Ashworth, A.C., 1994, Cost studies of Building. London: Longman Scientific & Technical Company Ltd.

- Ater, J.A. (2013). Challenges facing the implementation of total quality management practices in public secondary schools in Kenya (A survey of schools in Migori County) (Doctoral dissertation).
- Ben-Daya M. and. Duffuaa S.O, (1995) Maintenance and quality: the missing link, *Journal of Quality in Maintenance Engineering*, 1(1):20-26.
- Cartwright J. (1999). Cultural transformation: nine factors for continuous business improvement. London: Prentice Hall.
- Ceronio SF. (1996). Achieving Total Quality Management in a South African manufacturing environment. Johannesburg: RAU. (D Com-thesis).
- Crosby, P.B. (1979). *Quality Is Free*, McGraw-Hill, New York, NY.
- Hoyle, D. (2001). *ISO 9000: Quality system handbook*, Butterworth-Heinemann. Oxford
- Lam, K. C (2000). Quality Management in Building Service Maintenance. *Management Review*, 29-38.
- Ludwig-Becker, M. (1999). Quality management principles as top team performance practices ISO 9000 criteria re-interpreted. *Team Performance Management: An International Journal*, 5(7):207-211
- Oakland, J. and M. Marosszeky (2006). *Total quality in the construction supply chain*. Jordan Hill, Oxford: Elsevier Ltd.
- Obaid .A. (2005). Identifying the barriers affecting quality in maintenance within Libyan manufacturing organisations (public sector) (Doctoral dissertation, University of Salford).
- Olanrewaju, A.L., Khamidi, M.F. and Arazi, I. (2010). Building maintenance management in a Malaysian University Campuses: A Case Study. *Structural Survey*, 29(5) 397-410
- Olawunmi, O (1992). *A Critical Appraisal of Man, Material and Equipment in the Private and Public Sectors*. Ibadan: Ibadan. University Press Ltd.
- Westcott, R.T. (2013). *The certified manager of quality/organizational excellence handbook*. ASQ Quality Press.
- Sukirno, D.S. and Siengthai , S. 2011. Does participative decision making affect lecturer performance in higher education? *International Journal of Education and Management*, 25 (5) 494-508.
- Tirronen, J. and Nokkala , T. 2009. Structural development of Finnish Universities: achieving competitiveness and academic excellence. *Higher Education Quaterly*, 63(3) 219-236.
- Zakaria S and Wan Yusoff, W.F. 2011. Teaching management and its contribution to student satisfaction in higher institutions of learning. *International Journal of Trade, Economics and Finance*, 2(5) 387-390