

# Effects of Relevant TQM Principles (Cost, Time Quality) in Effective Delivery of Hospitals Maintenance Cleaning Service

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**ABSTRACT:** Public hospital maintenance cleaning services contracts have failed to performed up to stakeholders' expectation. Maintenance cleaning services performance have been poor and ineffective in terms of cost, time and quality delivery of the existing public hospital projects. These issues have compounded owing to the persistence problem resulting from inadequate and inexperienced staff of maintenance departments, poor access to formal training, low motivation, and lack of adequate management tools, like TQM. This study aimed to look at the effects of relevant Total Quality Management (TQM) principles in delivery of effective maintenance cleaning services in Public Hospitals in Nigeria. The study utilised a survey design approach and stratified sampling technique in the administration and collection of data. With a response rate of 96.15%, the collected data were analysed using Mean Item Scores (MIS) and Relative Important Index (RII). The study shows that TQM culture enhances hospital management's growth in the hospitality sector; coordination of information was effective from top to down level in the hospital thus 57.7% of respondents agree very little cost will be needed to apply TQM principles and lastly, improvement on working and overall environment was highly suggested as action point for implementation of TQM in the effective delivery of maintenance cleaning service in public hospitals in Niger State. Recommendations deduced from the findings includes stakeholders should be carried along in the decision making, cleaning services manual should be developed; innovation; organizational quality culture should not be static. In conclusion, the study has been able to establish the relevance and application of TQM in the delivery of effective maintenance cleaning

services in public hospital buildings in terms of cost and time reduction.

## I. INTRODUCTION

Building maintenance as an important aspect of facilities management that requires adequate planning to achieve performance efficiency and reduce wastage of resources [22]. Hospitals and other healthcare buildings are regarded as the complex facilities with different rooms, functions and also due to their complex engineering service [3]. Cleaning services is an aspect of the maintenance services of facility management in healthcare facilities[20]. Cleaning is the most important and functional services in facility maintenance as compared to other maintenance operations in a hospital building, like lighting and other electrical, mechanical and plumbing services and the likes[18].

Owing to the fact that it is impossible to produce a maintenance free building, an appropriate analysis of the quality and performance of the building will assist in designing a process that will increase the service years of the building[17]. Hence, [6] highlighted that effective maintenance management is the best way to achieve good maintenance of buildings, which is capable of meeting the expected requirements of the end users. Total quality management (TQM is known as Quality Management (QM), Quality Improvement (QI), Continuous Quality Improvement (CQI), and also Total Quality Control (TQC) according to [15],[19]. It is a tool that could be applied to efficiently utilise buildings like medical facilities/hospitals to ensure all organisational activities are been carried out effectively according plan in other to achieve desired objectives [6].

In current times, the delivery time, cost of operations and quality of work of the existing public hospital maintenance cleaning service in Nigerian is poor and inefficient[8]. These inefficiencies are mostly attributable to insufficient and untrained maintenance staff, lack of access to formal maintenance training, low motivation from top management, insufficient tools to properly manage the operations, like TQM, and value management which are major factors for ineffective delivery of maintenance cleaning services in public hospitals, [15]. Hence, this study seeks to address effects of relevant TQM principles in effective delivery (cost, time quality) of maintenance cleaning services in Nigerian hospitals to explore possible solutions for improved performance. solve the imminent challenges of quality as it relates to costs of application, time management, procedure of cleaning, management, contract style adopted, challenges and probable solutions for effective delivery of the cleaning service.

## II. LITERATURE REVIEW

### Cleaning services in healthcare facilities

Cleaning service is an important element in hospitals and all health care facilities, it also provides aesthetic benefits that comfort and retain patients. Cleaning provides necessary disinfection with the hospital environment which is necessary to prevent infections,[14]. Cleaner hospitals generally results in healthier hospitals and hence, effective cleaning in hospitals is an issue of paramount importance. According to [16] simple act of well-scheduled and monitored hand washing in hospitals led to a drastic reduction in the median rate of hospital-based infection across the board. If just having everyone remember to wash their hands thoroughly and often can do that, just imagine what kind of an effect our professional cleaning service could have such as Prevent any cross-contamination; Keep staff members safe; improve the overall health of the environment and promote a good image of the facility.

### Challenges of Maintenance Cleaning Services

McClellan [15] stated that inexperienced maintenance staff, poor access to formal training, low motivation lack of adequate management tools and value management is some of the challenges associated with maintenance cleaning services. [21] mentioned that supplier management, availability and accuracy of date, selecting the right cleaning vendors/teams, asset management are faced with challenges to solve. [8] also added inadequate and poor service delivery as issues associated with maintenance. [18] mentioned health and safety

issues, negative consequence on the environment, low productivity as challenges of maintenance cleaning service. Furthermore, training of staff, documented lines of accountability and a framework for measurement were lacking in maintenance cleaning services.

### Relevant TQM principles (cost, time, quality) and effective hospital maintenance cleaning services

Life span of buildings can vary significantly from expected service life, which is largely attributed to maintenance efficiency[9]. Maintenance and operational cost constitute large amount of building life cycle cost alongside design and construction costs, a significant part of this also goes to cleaning services[13]. [23] Applying TQM in cleaning service can lead to improvement in quality, process, as well as the product. Hence, there is an indication of a strong positive relationship with quality performance in areas of cleaning services[11]. Also with the implementation of TQM practices overall organizational performance tends to improve,[1]. Delivering cleaning services using TQM effectively address patient safety, worker safety, environmental safety and hence overall safety is fully taken care of.[14]. In implementing TQM, front line staff have an important role to play as they have physically interact with the customers or public when providing daily cleaning services. Their image of the hospital is most like perceived from the point of view of its cleaning staff, [12]. Several approaches have been tried by hospitals to improve quality to ensure customers are served efficiently[14]. Study reveals that organisations with TQM in place tends to be more customer focused than organization with no TQM programme, [4].

The implementation of TQM in an organisation needs a careful consideration of certain key factors; the most important of which are:

- Top management commitment: there is a need for the leadership of an organisation to always motivate and inspire staff to work diligently towards the achievement of organisational goals [2].
- Quality culture: every employee from top bottom should have a sense of responsibility toward quality and not only the quality controllers [7].
- Organisational policy and strategy: policy and strategy in a TQM organisation take the stakeholder's needs as a base for its plans and strategies[10]. Customer confidence also made

a priority in policy and strategy to extend that meeting the customers' needs and expectations is considered an integrated part of the policy and strategy [5].

- Training and development: this entails changes do not take place in an organisation without adequate training and development for staff.[4].
- Communication: effective communication can determine success for any organisation, clear lines of communications across all levels in the organisation is very essential, [1].
- Process management: in TQM organisation, formal system is not necessarily the focus but rather the establishment of process management teams to solve organisational problems problems.[10].
- Customer focus: here customer satisfaction is main focus in TQM organisation, meaning customer needs and comments always taken seriously[9].
- Continuous improvement: it is a general concept on TQM to continuously improve performance in the organisation which points to the fact that there should always be a plan to enhance performance [16].

### III. METHODOLOGY

A structured questionnaire was then designed and administered to examine the procedures of maintenance cleaning, examine TQM factors relevant to maintenance cleaning services, and examine the effects on cost, time delivery and quality on effective delivery of maintenance cleaning services. A stratified sampling technique was used to ease administration of the instrument. management staff, contractor and supervisors (that is, 32 management staff, 42 supervisors and 1 contractor) were selected from 25 public hospitals. After accumulating the data from the respondents via the structured questionnaire, the data gathered were carefully analysed in relation to the stated objectives using descriptive statistical method (Relative Importance Index, Ranking Method and Mean Item Score) with the aids of Statistical Package for Social Science (SPSS) and Microsoft excel package. While deductive method of analysis was used to analyze the qualitative aspect of the research work. The analyzed data were presented in tables.

### IV. DATA PRESENTATION AND ANALYSIS

#### General characteristics of respondents

Table 1 shows the result of the analysis of the respondents' general characteristics. Based on the category to which the respondents belong, more than half of them (57.33%) belong to hospital supervisors' category, 41.33% belonged to the management board, and only 1.33% of them belong to contractors. On their profession, Architects constitute 14.67%, Builders only 4.0%, engineers 22.67%, and Quantity surveyors 10.67%. Many of them (84.0%) belongs to other professions

In regards to their years of experience, 33.33% have up to 1-5 years' experience, 17.33% have 5-10 years' experience, 29.33% have 11-15 years' experience, 10.67% have 16-20 years experience, and 9.33% have experience of above 20 years. The average years of experience of the respondents are 8.96%. On academic qualifications, a sizeable proportion 28.0% and 29.33% of them have HND and B. Sc/B. Tech as their highest qualification respectively. About 14.677% of the respondents hold Postgraduate Diploma, 12.0% holds a Master's degree. This depicts that 100% of the respondents received a higher formal education, thereby qualified to provide relevant information for this research.

Their professional affiliation shows that, 53.33% as not a chartered member of their affiliate professions, the remaining 46.67% are corporate members of the bodies. This fact indicates that most of them had recognition with their respective professional bodies.

The result from this section shows that the respondents have the requisite academic qualification, industry experience and professional qualification to give reliable information on this research.

**Table 1: Demographic characteristics of Respondents**

Category	Classification	Freq.	Percent
Category in organization	Management board	31	41.33%
	Hospital supervisor	43	57.33%
	Contractor	1	1.33%
	<b>TOTAL</b>	<b>75</b>	<b>100.00%</b>
Respondents profession	Architects	11	14.67%
	Builders	3	4.00%
	Engineers	17	22.67%
	Quantity Surveyors	8	10.67%
	OTHERS	36	48.00%
	<b>TOTAL</b>	<b>75</b>	<b>100.00%</b>
Years of experience	1 – 5 years	25	33.33%
	5-10 years	13	17.33%
	11-15 years	22	29.33%
	16-20 years	8	10.67%
	above 20years	7	9.33%
	<b>TOTAL</b>	<b>75</b>	<b>100.00%</b>
Academic Qualification	ND	12	16.00%
	HND	21	28.00%
	PGD	11	14.67%
	B. Sc/B.tech	22	29.33%
	M. Sc/M. Tech	9	12.00%
	PhD	0	0.00%
	<b>TOTAL</b>	<b>75</b>	<b>100.00%</b>
professional affiliation	None	40	53.33%
	MNIA	5	6.67%
	MNIOB	2	2.67%
	MNSE	9	12.00%
	MNIQS	6	8.00%
	OTHERS	13	17.33%
	<b>TOTAL</b>	<b>75</b>	<b>100.00%</b>

**TQM Principles that are Relevant in Maintenance Cleaning Operations of Hospital Facilities**

Table 2 shows the result of the key TQM principles relevant in maintenance cleaning operations of hospital built facilities. From the table, the major TQM principles are; the hospital management understands the needs of both its patients and staff well (RII=0.90), Changing the old mind set on culture leads to a successful transition of TQM in hospitals (RII=0.87), Top management intends to fund the resources needed for quality (RII=0.85), the hospital management’s flow is effective in all activities (RII=0.84), and a campaign

has been launched among cleaning staff in hospitals (RII=0.83).

From the table, the least relevant TQM principles are; Coordination of information is effective from top to down level in the hospital (RII=0.59), The hospital management employees are encouraged to create ideas, give suggestions on improvement in effective cleaning services delivery (RII=0.58), Measures to impact positively on the cleaning services or delivery process by the hospital is in place (RII=0.57), Uses of performance indicators to monitor adequate performance (RII=0.56), and the mantra of quality is embedded in the mission statement of the hospital (RII=0.54)

**Table 2 TQM Principles That Are Relevant In Maintenance Cleaning Operations**

S/nr	Key TQM principles	RII	RANK	OVERALL RANKING
<b>Top Management Commitment</b>				
1	Top management intends to fund the resources needed for quality	0.84	1 <sup>st</sup>	3 <sup>rd</sup>
2	Continuous demonstration of its commitment to quality	0.76	2 <sup>nd</sup>	11 <sup>th</sup>
3	Uses of performance indicators to monitor adequate performance	0.56	3 <sup>rd</sup>	24 <sup>th</sup>
<b>Continuous improvement</b>				
4	Hospital management encourages improvement to maintenance	0.81	1 <sup>st</sup>	7 <sup>th</sup>
5	Employees have a mindset they are each responsible for quality improvement	0.76	2 <sup>nd</sup>	11 <sup>th</sup>
<b>Process Management</b>				
6	Work plans, procedures and instructions is followed by hospital management	0.73	1 <sup>st</sup>	14 <sup>th</sup>
7	Measurements for major processes are structured by management	0.66	2 <sup>nd</sup>	19 <sup>th</sup>
8	Control mechanism are put in place to improve the cleaning services or delivery process by the hospital	0.57	3 <sup>rd</sup>	23 <sup>rd</sup>
<b>Customer Focus</b>				
9	The hospital management understands the needs of both its patients and staff well	0.90	1 <sup>st</sup>	1 <sup>st</sup>
10	The hospital management determines what they need now and requirements for the future.	0.82	2 <sup>nd</sup>	6 <sup>th</sup>
11	The hospital management understands what is trending in the healthcare industry.	0.74	3 <sup>rd</sup>	13 <sup>th</sup>
<b>Training and Development</b>				
12	The hospital management evaluates the impact of trainings done on employees periodically.	0.78	1 <sup>st</sup>	9 <sup>th</sup>
13	Training is given on quality to maintenance	0.66	2 <sup>nd</sup>	18 <sup>th</sup>

	supervisors and managers			
14	Availability of resources to support the training needs and development of employees.	0.62	3 <sup>rd</sup>	20 <sup>th</sup>
	<b>Quality Culture</b>			
15	Changing the old mind set on culture leads to a successful transition of TQM in hospitals.	0.87	1 <sup>st</sup>	2 <sup>nd</sup>
16	A campaign has been launched among cleaning staff in hospitals.	0.83	2 <sup>nd</sup>	5 <sup>th</sup>
17	Using TQM culture enhances hospital management's growth in the hospitality sector.	0.80	3 <sup>rd</sup>	8 <sup>th</sup>
	<b>Policy and Strategy</b>			
18	The hospital maintenance staffs are versatile on the subject of quality policies and strategies to achieve them.	0.76	1 <sup>st</sup>	10 <sup>th</sup>
19	The mantra of quality is embedded in the mission statement of the hospital.	0.54	2 <sup>nd</sup>	25 <sup>th</sup>
20	Hospital maintenance policy and strategy on quality management are adjusted periodically.	0.48	3 <sup>rd</sup>	26 <sup>th</sup>
	<b>Employee Empowerment</b>			
21	Top management carry along with subordinates in taking decisions	0.72	1 <sup>st</sup>	16 <sup>th</sup>
22	Rights are given to employee o carry out prompt decisions when required.	0.70	2 <sup>nd</sup>	17 <sup>th</sup>
23	The hospital management employees are encouraged to create ideas, give suggestions on improvement in effective cleaning services delivery	0.58	3 <sup>rd</sup>	22 <sup>th</sup>
	<b>Communication</b>			
24	The hospital management's flow is effective in all activities	0.84	1 <sup>st</sup>	4 <sup>th</sup>
25	The hospital management information requirements from sources (internal and external) is readily available	0.73	2 <sup>nd</sup>	14 <sup>th</sup>
26	Coordination of information is effective from top to down level in the hospital	0.59	3 <sup>rd</sup>	21 <sup>th</sup>

### Effects of relevant TQM principles in Effective Delivery (Cost, Time Quality) Of Maintenance Cleaning Services

The result of the analysis of the data collected on the effect or relevant TQM principles in effective delivery of maintenance cleaning services is shows in Table 3. with regards to cost, the five (5) most ranked effect of TQM are; a campaign has been launched among cleaning staff in hospitals (RII=0.89), continuous demonstration of its commitment to quality (RII=0.87), coordination of information is effective from top to down level in the hospital(RII=0.80), hospital maintenance policy and strategy on quality management are adjusted

periodically(RII=0.79) and changing the old mind set on culture leads to a successful transition of TQM in hospitals (RII=0.78).

In the same vein, the five (5) most ranked effect of TQM on time delivery of maintenance cleaning services are: a campaign has been launched among cleaning staff in hospitals (RII=0.85), continuous demonstration of its commitment to quality (RII=0.87), coordination of information is effective from top to down level in the hospital (RII=0.80),the hospital maintenance staffs are versatile on the subject of quality policies and strategies to achieve them (RII=0.79) and the hospital management employees are encouraged to create

ideas, give suggestions on improvement in the effective cleaning services delivery (RII=0.78).

In terms of Quality, the 5 most ranked effects of TQM principles on the delivery of maintenance cleaning services are; the hospital management's flow is effective in all activities (RII=0.86), using TQM culture enhances hospital management's growth in the hospitality sector (RII=0.83), hospital management encourages improvement to maintenance (RII=0.82) a campaign has been launched among cleaning staff in hospitals. (RII=0.80), employees have a mindset they are each responsible for quality improvement (RII=0.80).

Overall, the major effects of relevant TQM principles in effective delivery (cost, time quality) of maintenance cleaning services are; using TQM culture enhances hospital management's growth in the hospitality sector, employees have a mindset they are each responsible for quality improvement, the hospital management's flow is effective in all activities, changing the old mind set on culture leads to a successful transition of TQM in hospitals and hospital management encourages improvement to maintenance.

In order to establish whether the effects of TQM principles is high or low in the delivery of maintenance cleaning services, a further analysis was made using the criteria set in the methodology section of this work. The result of the effects of relevant

TQM principles in effective delivery (cost, time quality) of maintenance further shows that, in terms of the effects on cost performance of maintenance work, 10 variables showed high effect on the cost of delivering maintenance cleaning services applying TQM principles. Five (5) variables showed moderate effect on cost and eleven (11) variables showed little effect on cost.

With respect to time, 12 variables showed high effect on the time of delivering maintenance cleaning services applying TQM principles. Seven (7) variables each showed moderate effect and little effect on time of delivery of maintenance cleaning services. In terms of quality, 9 variables showed high effect on the quality of maintenance cleaning services applying TQM principles. Five (5) variables each showed moderate effect quality and twelve (12) showed little effect on quality of delivery of maintenance cleaning services.

Overall, the effect of some relevant TQM principles in effective delivery of maintenance services in terms of the key project measurement baselines of (cost, time and quality) ranges from little to high effect. This is evident as 12 variables have their RII cut-off point of 0.30-0.49 and 10 having their RII from 0.70-0.89. Only 4 variables have moderate effect on the delivery of maintenance cleaning services.

Table 3: Effects of relevant TQM principles in effective delivery (cost, time quality) of maintenance cleaning services

Key TQM principles	Cost		Time		Quality		Total		DECISION
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	
<b>Top Management Commitment</b>									
Continuous demonstration of its commitment to quality by management	0.693	11	0.69	13	0.693	10	0.693	11 <sup>th</sup>	ME
Top management intends to fund the resources needed for quality	0.587	14	0.69	13	0.693	10	0.658	14 <sup>th</sup>	ME
Uses of performance indicators to monitor adequate performance	0.377	24	0.4	25	0.4	24	0.392	25 <sup>th</sup>	LE
<b>Continuous improvement</b>									
Employees have a mindset they are each responsible for quality improvement	0.87	2	0.85	1	0.797	4	0.838	2 <sup>nd</sup>	HE
Hospital management encourages improvement to maintenance	0.757	9	0.76	8	0.82	3	0.779	5 <sup>th</sup>	HE
<b>Process Management</b>									
Measures to control and improve the cleaning services or delivery process by the hospital is in place	0.373	25	0.44	24	0.383	26	0.398	24 <sup>th</sup>	LE
Measurements for major processes are structured by management	0.357	26	0.39	26	0.4	24	0.382	26 <sup>th</sup>	LE
Work plans, procedures and instructions is followed by hospital management	0.66	13	0.71	10	0.693	10	0.688	12 <sup>th</sup>	ME
<b>Customer Focus</b>									
The hospital management determines what they need now and requirements for the future.	0.7	10	0.71	10	0.693	10	0.701	10 <sup>th</sup>	HE
The hospital management understands the needs of both its patients and staff well	0.423	23	0.48	22	0.447	21	0.451	23 <sup>rd</sup>	LE
The hospital management understands what is trending in the healthcare industry.	0.49	17	0.48	23	0.46	18	0.477	18 <sup>th</sup>	LE
<b>Training and Development</b>									
Training is given on quality to maintenance supervisors and managers	0.47	19	0.5	17	0.46	18	0.477	18 <sup>th</sup>	LE
Availability of resources to support the training needs and development of employees.	0.443	21	0.5	20	0.437	23	0.459	22 <sup>nd</sup>	LE
The hospital management evaluates the impact of trainings done	0.503	15	0.52	15	0.46	18	0.496	15 <sup>th</sup>	LE



on employees periodically.									
<b>Quality Culture</b>									
Changing the old mind set on culture leads to a successful transition of TQM in hospitals.	0.78	5	0.76	8	0.837	2	0.792	4 <sup>th</sup>	HE
Using TQM culture enhances hospital management's growth in the hospitality sector	0.887	1	0.85	1	0.797	4	0.843	1 <sup>st</sup>	HE
A campaign has been launched among cleaning staff in hospitals.	0.683	12	0.71	10	0.653	14	0.682	13 <sup>th</sup>	ME
<b>Policy and Strategy</b>									
The mantra of quality is embedded in the mission statement of the hospital.	0.45	20	0.49	21	0.447	21	0.461	21 <sup>st</sup>	LE
The hospital maintenance staffs are versatile on the subject of quality policies and strategies to achieve them.	0.767	7	0.79	4	0.727	7	0.761	7 <sup>th</sup>	HE
Hospital maintenance policy and strategy on quality management are adjusted periodically.	0.787	4	0.77	7	0.727	7	0.76	9 <sup>th</sup>	HE
<b>Employee Empowerment</b>									
Rights are given to employee to carry out prompt decisions when required.	0.77	6	0.78	6	0.77	6	0.772	6 <sup>th</sup>	HE
The hospital management employees are encouraged to create ideas, give suggestions on improvement in effective cleaning services delivery	0.767	7	0.79	4	0.727	7	0.761	7 <sup>th</sup>	HE
Top management carry along subordinates in taking decisions	0.493	16	0.5	17	0.467	17	0.487	17 <sup>th</sup>	LE
<b>Communication</b>									
Coordination of information is effective from top to down level in the hospital	0.477	18	0.51	16	0.483	15	0.49	16 <sup>th</sup>	LE
The hospital management information requirements from sources (internal and external) is readily available	0.44	22	0.5	17	0.48	16	0.473	20 <sup>th</sup>	LE
The hospital management's flow is effective in all activities	0.8	3	0.8	3	0.857	1	0.819	3 <sup>rd</sup>	HE
<b>Very High Effect (VHE)= 4.00-5.00, High Effects (HE)=2.99-3.99, Moderate Effects (ME)=2.50- Little Effects (LE)=0.1-1.9</b>									
Source: Researcher's Analysis (2019)									

**Table 4.6 Decision rule**

SN	Cut-off Points for MIS	Decision	Freq.	Percent
1	3.00-4.00	Very High Effect (VHE)	0	0.00%
2	2.00-2.99	High Effect (HE)	10	38.46%
3	1.0-1.99	Moderate Effect (ME)	4	15.38%
4	0.1-0.99	Little Effect (LE)	12	46.15%

## V. CONCLUSION AND RECOMMENDATIONS

This study set out to assess the impact of the application of Total Quality Management (TQM)

principles in delivery of effective maintenance cleaning services in Public Hospitals in Nigeria. The study was able to ascertain the TQM principles that are relevant in maintenance cleaning operations of

hospital built facilities. Also, the study was able to determine the effects of relevant TQM principles in effective delivery (cost, time quality) of maintenance cleaning services.

Based on the findings shows that the care on customers, employees and their relationship, quality of culture of the hospital and the management commitment to quality cannot be overemphasized as it was highly rated with the least being carrying out routine adjustments on policies and strategies regarding quality.

Cost, time and quality had high effect on quality culture and improvement of its staff and processes. Though, not much effect was recorded on process management.

From the findings and conclusion, the study makes the following recommendation

- All the stakeholders should be carried along in the decision to implement the principles of TQM on the maintenance cleaning services projects.
- Rigorous training should be carried out on need and benefits of TQM at all levels.
- Organizational quality culture should be subject to regular update in line with the dynamics of the industry.
- Effective communication and top management commitment should be encouraged and emphasized.
- Emphasizes should be placed on customers' needs and effective feedback system should be encouraged to ascertain changing states and fashion.

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