ORGANISATIONAL QUALITY POLICY PRACTICE OF THE NIGERIAN BUILDING DESIGN FIRMS

Kado D., Garba M.M. & Dodo M.
Department of Building, Ahmadu Bello University, Zaria - Nigeria

Abstract
Quality policy is the overall intentions and direction of an organisation related to quality and it provides the framework for establishing and reviewing organisational objectives while activities managers perform in an effort to implement their quality policy constitute quality management. In the Nigerian context, the issue of quality and standard have been the subject of concern in the country's construction industry. This paper was aimed at studying the practice of the Nigerian Building Design Firms relating to Organizational Quality Policy. Six quality practices were identified under Organizational Quality Policy. Questionnaire survey was used to generate data regarding the quality practices from identified groups of design firms across Nigeria. Average Prevalence, was adopted for data analysis. An overall average prevalence of 73.79% indicated that the Nigerian building design firms were lacking in the aspect of organisational quality policy particularly regarding availability of or update of quality manuals and policies and in the preparation of quality plan for individual projects. Thus it is recommended that the Nigerian building design firms should practically pay attention to the issues relating to organisational quality policy in all its ramifications so that quality can really be achieved in the Nigerian construction industry.

Key Words: Design Firms, Percentage Prevalence, Quality Management, Quality Policy, Quality Practices

Introduction

According to Yasamis *et al.*, (2002), Quality Management System (QMS) is the collection of all processes, tools, techniques and subsystems that run simultaneously with production system and the control of the production system's effectiveness, efficiency and productivity. QMS basically consists of a framework for guiding quality related actions and all employees and means of assessing how well these actions are carried out. It is also responsible for ensuring that production conforms to customer requirements, minimizing cost of quality and production of a product to standards (Stebbing, 1990; Campenella, 1999; Yesamis *et al.*, 2000 Pyzdek, 2003; Arditi and Lee, 2004).

QMS enables an organization to achieve its goals and objectives that are set out in its quality policy and strategy. Achieving such goals according to Zhang *et al.* (2014) must begin with the identification of customer requirements and ending with their satisfaction at every transaction interface. The general requirements of QMS as contained in the International Standard Organisation: ISO 9001 (2008) are that the organisation shall establish, document, implement and maintain a QMS and continually improve its effectiveness in accordance with requirements of the ISO.

Quality is a fundamental issue in construction all over the world. The construction industry is highly quality demanding as such Dodo *et al.* (2013) insist that all construction project

stakeholders should perceive quality as a wide scale failure prevention programme that will lead to cost savings. Issues to be considered when setting up a QMS in any design and construction according to Zhang *et al.* (2014) must revolve around: design; building; resource deployment; measurement; periodic review (audit) and continual improvement. For the construction industry to meet up with these, consistency and satisfaction must be embraced in terms of materials, methods and equipment in its QMS.

Design is described as the selection of facts, requirements or perceptions about the properties or behaviour of individual elements which can be combined into a larger whole, (Tunstall, 2000). The quality at the design stage is a vital component of any QMS. Bamisile (2002) described design quality as the quality determined by the client's consultants on behalf of the client. It is the quality standards required by the contract and described in the appropriate production information issued by the designers to the production team. Quality of design involves the degree to which the features of the facility conform to the client's need. Thus, there can be no doubt that design organisations bear the greater burden in ensuring quality as they define owners' requirements in form of drawings and specifications to the contractor (Bubshait *et. al.*, 1999). Kolawole (1998) opined that there are three categories of factors militating against the achievement of quality in construction: cheapest cost; attitude; and design and construction. Abdel-Razek (1998) conducted a survey of 159 construction professionals and academics in Egypt on the relative importance of factors needed to improve construction. The survey revealed that improving design and pre-construction planning was ranked first thereby pointing out the relevance of design organisations in construction. Bubshait *et al.* (1999) stated that documents of the design organisations are the media that transfer the requirements of the client to the contractor. As such, professionals need to provide a high quality of service to ensure that their client's project achieves the best possible standards of cost, time and quality.

In the Nigerian context, the issue of quality and standard have been the subject of concern in the country's construction industry in recent times following incessant collapse of building structures around the nation (Abiodun and Afangadem, 2007). A report of the Lagos State Physical and Development Authority (2010) indicated that from 1974 to 2006, out of 61 reported cases of building collapse, 13% were directly attributed to faulty designs. This was identified to be responsible for 53% of the resulting deaths. Bamisile (2004) asserted that one could say that the design teams (in Nigeria) have not yet adopted any quality culture in their contribution to production of buildings in Nigeria.

Table 1: Design Quality Secuons

S/N	Quality Section	ISO 9000	MB Standards	BS5750	Others
1	Organisational quality policy	4.1.1	1.0	4.1/4.2	
2	Designer qualifications	-	4.1	-	(Stebbing,1987)
3	Employee training and education	4.18	4.3	4.18	(Stebbing,1987)
4	Design contract review	-	-	4.3	
5	Design planning	4.4.2	5.3	4.4	
6	Design inputs	4.4.4	5.1	-	(Sebastian *et al*, 2003)
7	Design process	4.9	5.3	4.9	
8	Documents preparation, circulation and approval	-	-	4.16	(Stebbing,1987)
9	Interface control	4.4.3	4.2	-	
10	Design review	4.4.6	5.1	4.12	(Stebbing,1987)
11	Design changes	4.4.9	5.1	4.13	
12	External design review	-	-	-	(Stebbing,1987)
13	Subcontractor control	4.6.2	5.4	-	
14	Document control	4.5	2.1	4.5	
15	Design maintainability	-	-	-	(Bamisile, 2004)
16	Design buildability	-	-	-	(Bamisile, 2004)
17	Computer usage	-	-	-	(Bamisile, 2004)
18	Working relationship (solely with client only)	4.3	7.1	-	
19	Working relationship (jointly with client and contractor)	4.3	7.1	-	
20	Performance quality audit	4.17	7.3	4.17	

Source: Kado (2011)

There are several standards that establish minimum requirements in undertaking various organisational activities (design inclusive). According to Mesquida and Mas (2014), these standards aim to provide guidance relative to; justifying and evaluating a project for the development of a new management system standard with a view to assessing market relevance; the methodology of developing and maintaining management system standards with a view to ensuring compatibility and enhancing alignment; and the terminology, structure and common elements of management system standards with a view to ensuring compatibility as well as enhancing alignment and ease of use.

However, Stebbing (1987), Dubshait *et al.*, (1999), Sebastian *et al.*, (2003), Bamisile (2004) and Kado (2011) observed that irrespective of the standards aim, not a single standard can adequately fulfil all design requirements in construction and other fields. For instance, the ISO 9000 standard covers 13 sections, the Malcolm Baldridge standard covers14 sections and BS 5750 covers only 10 sections relating to quality in design as presented in Table 1.

ORGANISATIONAL QUALITY POLICY

Any QMS must embrace organisational quality policy (Harry and McCaffer, 2005). Quality policy is described in ISO 9000 (2005) as the overall intentions and direction of an organisation related to quality as formally expressed by top management. Organisational quality policy and objective go hand-in-hand. The Oxford Advanced Learner's Dictionary (2006) defined policy and objective as a plan of action agreed or chosen by a political party or a business.

Quality policy and objectives are established to provide a focus to direct organisation (ISO 9000, 2005). Quality policy provides the framework for establishing and reviewing quality objectives, while objectives need to be consistent with the quality policy and the commitment to continual improvement. Kume (1992) suggested certain procedures in creating appropriate policy for an organisation. These are; decide on the issues; set the objectives; device strategies and draw up action plans; and deployment of policy.

Bushait *et al.* (1999) identified six quality practices under Organisational Quality Policy. The practices and the issues they addressed are as follows.

i. Organisational quality philosophy: The specific practice involves ensuring that an organisation has a defined quality philosophy and is understood by all.
ii. Organisational quality programme: this ensures that the organisation has an established quality programme.
iii. Organisational objectives and individual responsibility for quality ensures clear definition of organisational objectives and individual responsibilities for achieving quality.
iv. Quality manual, quality policies and procedure: ensures that quality manual is available and is updated to reflect current quality policies and procedures.
v. Individual projects quality plan: ensures that quality plan is prepared for individual projects.
vi. Design methodology: establishes that an organisation has a specified design methodology in handling design projects.

Pyzdek (2003) stated that once strategies and policies have been formulated and goals have been set, the organisation must develop a process to administer the policy effectively. Moreover, Kume (1992) proffered that to put a business policy into effect, an organisation must: decide on the policy; subdivide the policy into implementation steps with deadlines for their completion (medium and long-range plans and annual plans); and specify the role of each division in implementing the plans (divisional implementation plans). To ensure implementation of policies, Kume (1992) opined that; the people who will perform the work must fully understand its purpose and accept its necessity; the details of the plan must be communicated in full to those who are to put them into effect; those who are to perform the work must be given the necessary education and training; and that the necessary resources must be provided at the right time and at the right location.

Implementation of these policies must be recorded, progress must be identified, review must be carried out at a predetermined interval or progress level and information obtained must be used in preparing for subsequent activities. To this, a quality manual embraces all the outlined issues. BS 4778 (1971) defined quality manual as a document setting out the general quality policies and practices of an organisation. In construction, quality manual describes the strategies (specific procedures) designed to achieve the specific requirements of an organisation's construction contracts. It describes the general management structure, procedures and responsibilities towards quality achievement.

According to Stebbing (1987), quality manual is usually the first indication which a prospective client gets of a company's approach to quality. The manual sets out the company's intention towards achieving quality. Similarly, Duncan *et. al.* (1990) pointed out that a quality manual serves two purposes. At first, it provides evidence to people of the company's quality assurance capability and awareness. Secondly, it provides a statement of management control and requirements for those within the company. Moreover, Stebbing (1990) added that besides the requirements of quality standards, there are other very good reasons for the production of quality manual which include: it is a very good management tool to keep employees aware of their responsibilities within quality programme and as such, it can become a suitable training document; and if written well, it can be a useful sales aid of an organisation. ISO 9004 (2000) requires that any organisation adopting QMS must establish and maintain a quality manual which according to Stebbing (1987) should minimally include; policy statement; authority and responsibly of stakeholders; an organisations procedure outline; and list of procedures.

Kume (1992) pointed out that it is necessary to check the progress of the implementation of quality policies. This depends on the nature of the issues involved. A typical check can be conducted periodically during the business year and/or at the end of the business year. Process as well as the results must be checked. Checking the process will ensure that plans are actually being implemented. When implementation is not proceeding according to plan and hope for results are not being achieved, reasons must be investigated and adequate measures must be taken. The success of an organisation largely depends on how sound its quality policy and objectives are established and pursued. To this, ISO 9000 (2005) assert that the achievement of quality objectives can have a positive impact on product quality, operational effectiveness and financial performance and thus on the satisfaction and confidence of interested parties.

In view of such lack of fulfilment of all design requirements by a single standard, this paper aim at studying the practices of the Nigerian building design firms relating to organizational quality policy based on the quality practices adopted from the work of Bubshait *et al.*, (1999). The objectives of the study were tailored towards addressing the following research questions.

1) Do Nigerian building design firms employ QMS bordering on 'organisational quality policy' and to what extent?
2) Are there any differences among the groups of firms in handling issues relating to organisational quality policy?

To address the second research question, the following hypotheses were developed:

Hypothesis 1

Null Hypothesis: $\mathbf{H_o}$: There is no significant difference in the practice of organisational quality policy among the groups of Nigerian design firms.

Alternative Hypothesis: $\mathbf{H_1}$: There is a significant difference in the practice of organisational quality policy among the groups of Nigerian design firms.

Research Methods

Quality Sections and Practices

The primary data for this study was obtained through field survey using a structured questionnaire. From literature, 20 quality sections were identified. A total of 100 quality practices were recognised under these quality sections. This study focused on Organisational quality policy.

In the questionnaire, respondents were asked to rate their quality practices as; Always (100%); Mostly (75%); Sometimes (50%); Rarely (25%); and Never (0%). Responses obtained were used for conducting analysis. Values obtained were used to draw inferences.

Sampling frame and Questionnaire Administration

The sampling frame for the research constitute the identification of groups of designs firms, establishing the sample size, sampling procedures applicable to the research work and the scope of the research questionnaire administration.

Identification of Groups of Design Firms

The nature of this research work is exploratory and comparative. Thus, the following groups of design firms were recognised as responsible for design of buildings in Nigeria.

(a) Architectural Design Firms.
(b) Structural Design Firms.
(c) Mechanical and Electrical Design Firms.
(d) Multi-disciplinary Design Firms (engaged in more than one aspect of building design).

Sample Sizing, Sampling Procedure and Questionnaire Administration

To obtain the population size of the design firms across the country, a list of registered consultancy firms was obtained from the Headquarters of the Corporate Affairs Commission (CAC), Abuja. The Commission is the only Government Agency of Nigeria charged with the responsibility of registration of Companies, Business Names and Incorporated Trustees (CAC, 2010). Table 2 shows the distribution of the consultancy firms according to the Nigerian six geopolitical zones.

Table 2: Design Quality Sections

S/N	Geographical Zone	Number of Consultancy Firms	Percentage (%)
1	North-East	140	2
2	North-West	489	7
3	North-Central	1,747	25
4	South-East	350	5
5	South-West	2,796	40
6	South-South	1,468	21
Total		6,990	100

Source: (CAC, 2010).

Given a population size of 6,990 firms, a sample size of 237 was calculated at 95% confidence level. Approaches and recommendations outlined by Krejcie and Morgan, 1970; Cochran, 1977, Salkind, 1997; Bartlett *et. al.*, 2001; United Nation Development Programme (UNDP), 2004; and Olanruwaju (2010); were adopted in the sample sizing. To ensure adequate coverage and representation of design

firms, geopolitical zones of the country were used for questionnaire administration. Hence cluster sampling was adopted (Keller and Warrack, 2003). Stratified random sampling plan was also adopted according to Fellows and Liu (2003) as firms were grouped based on their respective activities.

Due to the nature of data required by the research, Executives of the design firms were targeted as the respondents. Self-administered survey principle was adopted due to the complexity of the questionnaire in accordance with the suggestion of Keller and Warrack (2003). Questionnaires were administered directly on the spot by the Researchers and/or Field Assistants.

Data Analysis Techniques

Quality Practice Prevalence

Data analysis was based on the criteria used by Bubshait *et al.*, (1999). Accordingly, average quality practice prevalence for each quality practice under the quality section was calculated using equation 1.

$$\text{Average Prevalence} = \frac{\Sigma(aixi)}{\Sigma(xi)} \quad \text{----------} \quad (1)$$

Where a_i takes the percentage values 100, 75, 50, 25 and 0 (against the backdrop); and x_i (x_1, x_2, x_3, x_4 and, x_5) represent the number of corresponding respondents answering always, mostly, sometimes, rarely and never. Quality practices were ranked according to a particular group of firms.

Based on the results obtained, observations and inferences on groups' performance in relation to the particular quality practices were made using four categories of performance as observed in the work of Bubshait *et al.*, (1999) which are:

- Commendable (90-100%);
- Satisfactory (81-89%);
- Require slight improvement (75-80%); and
- Require increased improvement (less than 75%).

Test for Agreement between Pair of Groups of Design Firms

To establish the level of the differences existing between pair of groups of design firms, Relative Agreement Factor (RAF) concept according to Okpala and Aniekwu (1985) in Kumaraswamy and Dissanayaka (2000) was adopted. The Rank Agreement Factor is used to evaluate agreement in ranking between different groups of project participants and in the case of this research work, groups of building design firms. The factor is calculated using equation 2.

$$\text{RAF} = \frac{(\Sigma_{i=1}^{N}|Ri1-Ri2|)}{N} \quad \text{----------} \quad (2)$$

Where i is the i^{th} item in group 1, N is number of items, R_{i1} is the rank of the i^{th} item in group 1 and R_{i2} is the rank of the same i^{th} item in group 2.

RAF value of zero indicates perfect agreement between two groups. A higher value of RAF gives lesser agreement. Negative value indicates divergent view between pair of groups or respondents.

Maximum RAF is calculated as in equation 3:

$$\text{RAF}_{max} = \frac{(\Sigma_{i=1}^{N}|Ri1-Rj2|)}{N} \quad \text{----------} \quad (3)$$

Where, j = N-i +1.

The percentage disagreement (PD) is expressed in equation 4:

$$\text{PD} = \frac{\Sigma_{i=1}^{N}(|Ri1-Ri2|)}{\Sigma_{i=1}^{N}(|Ri1-Rj2|)} \times 100 \quad \text{----------} \quad (4)$$

The percentage agreement (PA) is then calculated as in equation 5:

$$\text{PA} = (100 - \text{PD})\ \% \quad \text{----------} \quad (5)$$

Six pairs of groups of design firms were identified.

Test for General Agreement between Groups of Design Firms

To establish general agreement between all the groups of firms, Kruskal-Wallis Non Parametric test was adopted due to the fact that ranks of quality practices were considered. Kruskal-Wallis test is similar to One Way Analysis of Variance (ANOVA) and it is used to test the significance of difference among more than two independent sample means (Fellows and Liu, 2003).

The Kruskal-Wallis test statistics α-value is calculated using equation 6 as follows:

$$T\ (\alpha\text{-value}) = \frac{1}{s^2}\left(\sum_{i=1}^{k}\frac{Ri}{ni} - N\frac{(N+1)^2}{4}\right) \text{ ---------- (6)}$$

Where N is the total number (all ni), Ri is the sum of the ranks (from all samples pooled) for i^{th} sample and the standard deviation of sample S^2 is calculated using equation 7.

$$S^2 = \frac{1}{N-1}\left(\sum_{all} R_{ij}^2 - N\frac{(N+1)^2}{4}\right) \text{ ---------- (7)}$$

Where, ΣR_{ij} is the sum of ranks of all the groups.

95% confidence level was adopted for the study. P-value and the calculated α-values are used to arrive at conclusion. The P-value is the estimated probability of rejecting the null hypothesis (Ho) of a study question when that hypothesis is true. If P-value is less than α-value ($P < \alpha$) – null hypothesis is rejected and alternative hypothesis is accepted and vice versa.

Discussion of Results and Research Findings

Analysis of Administered Questionnaires

A total response rate of 44.7% of the administered questionnaires was obtained. This satisfied the assertion of Moser and Kalton (1971) that the result of a survey could be considered as unbiased and significant if the return rate is not lower than 30-40%. Out of the returned questionnaires, 90.6% were observed usable and adequate for analysis.

Results on Quality Practice Prevalence

The details for the assessment of the various quality practices under Organisational Quality Policy section are presented in Table 3.

Table 3: Organisational Quality Policy Prevalence

Firms/ Code	Architectural AQP	RQS	Remark	Structural AQP	RQS	Remark	M & E AQP	RQS	Remark	Multi-disciplinary AQP	RQS	Remark	Average/ Remark
QP1	76.04	2	R3	82.81	2	R2	75.00	2	R3	79.65	3	R3	78.38 R3
QP2	77.00	1	R3	85.00	1	R2	72.50	3	R4	81.00	2	R2	78.83 R3
QP3	72.00	4	R4	79.68	4	R3	80.00	1	R3	81.40	1	R2	78.27 R3
QP4	65.00	6	R4	67.19	6	R4	62.50	6	R4	58.72	6	R4	63.35 R4
QP5	74.00	3	R4	70.31	5	R4	70.00	4	R4	67.86	5	R4	70.54 R4
QP6	70.19	5	R4	82.81	2	R2	65.00	5	R4	75.60	4	R3	73.40 R4
AQS	72.37		R4	77.97		R3	70.83		R4	74.01		R4	**73.79 R4**

QP = Quality Practice, R = Rank, AQP = Average Quality Prevalence, RQS = Rank in Quality Section AQS = Average Quality Section Prevalence, Remarks: R1 = Commendable (90-100), R2 = Satisfactory (81-89), R3 = Require Slight Improvement (75-80), R4 = Generally Require Increased Improvement (<75).

From Table 3, it can be depicted that the best practices for both Architectural and Structural groups of firms is QP2. This suggested that firms under the groups

have established quality programmes which in the case of the Architectural firms require slight improvement, while that of the Structural group was satisfactory. Clear definition of organisational objectives and individual responsibilities was the prevalent practice of both M & E and Multi-disciplinary firms. Both had 80.00% and 81.40% scores, respectively.

Generally, the result indicated that the poorest practice of all the groups was QP4. This revealed that quality manuals were either completely not available among the firms or that where they are, they are hardly updated to reflect current quality policies and objectives. Note that Multi-disciplinary firms were the worst in this respect.

On the overall, the average quality section prevalence scores earned by the groups placed the Structural firms in a leading position with 77.97% average prevalent value which however require slight improvement from among the firms in the group. All the other groups generally require increased improvement. Furthermore, the overall average prevalence value for the whole quality sections of 73.79% suggests that increased improvement is generally needed among all the group of firms. It simply indicates that little attention was generally being paid by all groups of firms in the aspect of organizational quality policy despite some of the satisfactory remarks attained by some groups in certain quality practices.

Results on Tests on Agreement

Agreement between Pair of Groups of Design Firms

Result of the test on agreement between pairs of design firms using the Relative Agreement Factor approach is presented in Table 4.

Table 4: Quality Practices RAF Analysis Results

S/No	Pair of groups of Design Firms	RAF	RAF MAX	PD (%)	PA (%)
1	Architectural vs. Structural Firms	0.25	0.65	38.46	61.54
2	Architectural vs. M & E Firms	0.30	0.80	37.50	62.50
3	Architectural vs. Multi-disciplinary Firms	0.40	0.80	50.00	50.00
4	Structural vs. M & E Firms	0.45	0.75	60.00	40.00
5	Structural vs. Multi-disciplinary Firms	0.35	0.85	41.17	58.82
6	M & E vs. Multi-disciplinary Firms	0.20	0.90	22.22	77.78
Average		0.33	0.79	41.56	58.44

RAF = Relative Agreement Factor, RAFMAX = Maximum Relative Agreement Factor, PD = Percentage Disagreement, PA = percentage Agreement.

It can be depicted from Table 4 that highest agreement exists between the M & E and the Multi-disciplinary firms as indicated by 77.78% agreement. This buttressed the fact that both had their quality practices within the category requiring increased improvement. It also indicated how closely the two groups were in treating the quality practices under organisational quality policy. Least agreement was between Structural and M & E firms (40% agreement).

General Agreement between Groups of Design Firms

Result in Table 4 showed that there were disparities among the groups with respect to individual practices. Hence, statistical evidence is needed to establish whether or not the differences were actually significant. Kruskal-Wallis Non Parametric test was adopted for that purpose. Result of the test is presented in Table 5.

Table 5: Test Statistics[a,b]

	Architectural Firms	Structural Firms	M & E Firms	Multi-disciplinary Firms
Chi-Square	5.000	5.000	5.000	5.000
df	5	5	5	5
Asymp. Sig (α-values)	0.416	0.416	0.416	0.416

a. Kruskal-Wallis
b. Grouping Variable: Quality Practice.

The result in Table 5 indicates that P-value is less than α-value (0.05 < 0.416). Therefore, based on the decision rule, the null hypothesis is rejected and the alternative hypothesis is accepted. It therefore follows that there is statistical evidence to prove that there is a significant difference in the practice of organisational quality policy among the groups of Nigerian design firms.

Conclusion and Recommendations

The study revealed that among the four groups of Building design firms, the Structural group of design firms is the only group that attained the status of requiring slight improvement among the practices relating to organisational quality policy by attaining 77.97% prevalence. All the other groups studied generally require increased improvement in this respect. Despite this, overall average prevalence of 73.79% of all the firms studied indicated that the Nigerian Building design firms were lacking in the aspect of organisational quality policy. In particular, their greatest weaknesses in this quality section are reflected more in the unavailability of or lack of update of quality manuals policy and in the preparation of quality plan for individual projects. Therefore, there is the need for the Nigerian Building design firms to wholeheartedly embrace the development bordering on quality management. Development of quality policy is an indication to that respect. Therefore, for the Nigerian Building design firms to exhibit a level of seriousness, they must have an established quality policy in all its ramifications in their individual firms. This will ensure proper focus in achieving quality in the Nigerian construction industry.

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