



IMPLEMENTATION OF QUALITY-MANAGEMENT PROCEDURES IN THE PRODUCTION AND UTILISATION OF CEMENT STABILIZED LATERITE INTERLOCKING BLOCKS IN NIGERIA

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Abstract: The challenges associated with building materials in Nigeria have been largely blamed for the high cost of housing delivery in the country. As a result, there has been a clarion call for the introduction of cheaper building materials into the Nigerian building construction market. Consequently, various research and development efforts have resulted in the introduction of alternative building materials and their associated technologies. Building materials are expected to meet stipulated standards which will ensure not only their aesthetics but also their appropriateness for their intended uses including structural stability, safety and health of building occupants. A major criticism of alternative building materials in the country has been their non-compliance to quality management procedures in their production and use. This study explores the extent to which quality control measures have been implemented in the production and use of alternative building materials and challenges encountered. The study has been motivated by series of building collapse in the country. Qualitative research method was adopted for the study and involved interviews with purposively selected persons involved in the production and use of alternative building materials in the Lagos area. Findings indicate a low level adoption of quality management procedures due to insufficient training, non-optimum performance of equipment, lack of manuals, time constraints, low education and motivation of workers involved in the production and use of alternative building materials. The paper concludes that in order for the potentials of alternative building materials to be realized in the country, there is a dire need for quality control procedures.

Keywords: quality management, alternative building materials, standards, research and Development.

1. Introduction

Housing inadequacy is one of the

major outcomes of rapid urbanization in Nigeria. This

inadequacy is not only quantitative but also qualitative. The supply of affordable and durable building materials is one of the major obstacles to meeting the huge housing demand and improving housing conditions in a challenged country like Nigeria. The initial reaction of government was to establish some industries to produce conventional building materials. Because these industries were of imported high technology, they used less labour and depended heavily on foreign exchange for importation of expertise, raw materials and spare-parts. They fueled unemployment and in many cases were not able to meet local demands. Perhaps more disturbing was the fact that their products were very expensive and beyond the reach of many. It was in reaction to this that government embarked on the drive for development of local building materials. In this regard, the Nigerian Building and Road research Institute, (NBRRI) was established in 1978 to champion research and development efforts in local building materials among others (Okereke, 2003). Today, there are several public and private organizations involved in this area with considerable results. Many of the technological products, both building materials and their associated technologies, are made from locally sourced raw materials which have been re-engineered or improved through

research and development processes. They are referred to as alternative building materials and technologies. Unfortunately, the uptake of these technologies in the Nigerian Building Construction Industry has not been extensive and rapid in view of their advantages and the huge housing backlog in the country. One of the reasons for this is their doubtful quality. Fakere, et al. (2012) found that some factors responsible for building collapse in the country bordered on poor quality management in the building material procurement and building construction processes. This paper therefore examines the extent to which quality management processes are followed in the production and use of these products as well as the challenges encountered.

2. Theoretical Background

The modern concept of quality is considered to have evolved through four major stages which include inspection, quality control, quality assurance and total quality management (Ayandibu, 2010). Hoonakkera et al. (2010) identified the following definitions for quality performance: 'meeting expectations of the customer'; 'reduced rework or defects' ; 'repeat business' ; 'conformance to ISO 9000 criteria'; and 'completion on-time and within budget'. These definitions essentially focus on customer satisfaction and product

marketability. Thus, in addition to customer demands (Polat et al., 2011), the needs could be legal and regulatory. Quality never happens by chance. To achieve and sustain quality, certain pre-planned measures must be put in place to manage the process.

2.1. Quality Management

Quality management in construction implies maintaining the quality of construction works at the required standard so as to obtain customers' satisfaction for long term competitiveness and business survival. Ozaki (2003) identified a three-fold meaning of quality management in construction to include getting the job done on time; ensuring that the basic characteristics of the final project fall within the required specifications; and getting the job done within budget. It involves continued evaluation of the activities of planning, design, development of plans and specifications, advertising and awarding of contracts, construction, and maintenance, and the interactions of these activities. Benefits of quality management include higher customer satisfaction and productivity (Akinola, et al., 2012). In recent times, the drive for quality is actualized through the implementation of total quality management, (TQM) principles. It involves every member of the organization and according to ISO 8402, is a continuous search for

ways to prevent defects by doing the job right. In TQM, the focus is not at getting a product right but getting all the processes that contribute to the realization of the product right as well as the product right all the time (Polat et al., 2011). Problems associated with quality management implementation include lack of technical skills; ineffective communication; poor linkage between research and practice; transient nature of workforce; time constraints and corruption (Kumarasawamy, 2006).

3. Materials and Methods

This study adopted a qualitative methodology which involved in-depth interviews with purposefully selected stakeholders in the production and use of alternative building materials and their associated technologies in Lagos and Ogun States where stakeholders are concentrated. Focus was on interlocking blocks made from laterite stabilized with 4-8% of cement and produced using a block making machine developed at NBRRI. The machine produces solid blocks with dimensions of 225x225x112.5. Stakeholders included relevant research and development organizations; professionals, artisans and unskilled labour. Visits were made to production sites to observe the production processes adopted in order to determine the extent to which quality management

measures were implemented. Some workers were randomly selected and interviewed. Similar visits were made to selected construction sites where alternative building materials were being used. These were complimented by literature review and long term experience of the author in the production and use of alternative materials. Data was analyzed using content analysis techniques.

4. Findings and Discussions

Findings indicate a low level adoption of quality management procedures due to poor technical skills and work ethics, non-optimum performance of equipment, lack of manuals, time constraints, low education and motivation of workers. It was found that most of the organizations have some kind of quality improvement programme in place which were however, found to be inadequate. Site supervisors were seen at every site visited to supervise and inspect the construction works. Few quality management tools and techniques were revealed from the interviews on project quality plans, weekly site reports. Basic field tests were not done neither were laboratory tests carried out on both raw materials and products.

There was an obvious disconnect between management and employees as evidenced in a lack of shared long-term vision between the management and their

employees in the organizations studied. This could be explained by the fact that apart from the public research and development organizations, the other organizations had sole-ownership. Consequently many of the staff did not feel a sense of belonging. The study also found that allocation of financial and human resources for the implementation of quality management in many instances were insufficient.

Apparently, top management of most of the organizations investigated do communicate about the importance of meeting customer requirements, however, it was noted that their concerns were mainly to avoid problems with customers and make profit instead of desire for excellence as a corporate culture. The same issues dominated reviews which were reportedly mainly undertaken to remedy situations. The above suggest that many organizations consider customer satisfaction and return business as measures of quality. Customer satisfaction is an obvious outcome measure but should not be unduly pursued at the expense of other quality deliverables like technical performance, for example. Lack of management commitment could be attributed to lack of awareness of the benefits of quality management system, market pressures and desire to cut corners.

In the Nigerian Construction

Industry, there are two main product/process certifications. These are the ISO and Nigerian Industrial Standard, (NIS). None of the organizations visited had any of these certifications. Certified products are generally regarded as safe and of high quality. In practice, certification can be taken as a mark of the manufacturer's quality control and supervised production.

The study found out that several of the organizations including public organizations, did not have well equipped research laboratories for testing. Many of the relevant facilities were not available and the few found in place were either obsolete or non-functional. Further enquiry revealed that the situation was due to the high financial outlay required for establishing a comprehensive and well function laboratory. In the absence of testing in-house facilities, products were either taken outside for testing thus cost of testing sometimes limited the number of tests that were performed on a product making it difficult for a comprehensive data to be compiled. On various sites, it was observed that production staff relied more on rule of thumb.

Many of the staff did not appear to have reasonable explanations for the processes they were following. It was observed that laterite was not sieved and optimum moisture content was exceeded. This

resulted in weakly formed bricks with poorly formed edges and dimensional distortions. The bricks appeared to have good appearance, their technical performance will be suspect. The study found that often times, customers place orders for products at short notice. In order to please such customers, such orders are accepted and the production staff put under tremendous pressure to meet the demands. Under such circumstance, due process in production is usually not followed sometimes with the consent of supervisors and even management. The curing period may be shortened simply to meet deadlines. The study found out however, that this is not usually without consequence. The consequences include the additional time required to re-do work, losses due to damages of poorly cured products, poor quality and customer dissatisfaction.

5. Recommendations

Management should provide leadership by first of all creating favorable work environments which engender commitment to excellence and the general corporate good. In the same vein, it should fashion out an appropriate quality management system which clearly outlines the processes to be followed and the specific roles expected of each staff. Everyone should then be

encouraged through appropriate motivation and reward systems to key into the corporate vision. This will go a long way in improving management-worker relations and reducing the frequent staff turnover.

Training is important for the transfer of skills required for the production and utilization of alternative building materials and their associated technologies. Training of workers to produce better quality workmanship can help to produce long term capacity building for the unemployed in a developing country. Old long channels through which the knowledge could be disseminated and shared, including: exhibitions, demonstration or pilot projects, continuing professional courses and changing educational syllabuses among others. Universities and professional bodies have a lot to contribute to incorporating relevant information in their curricular at the basic training level and continuing education programmes.

There is a need for research and development institutions to liaise with them. Nongovernmental organizations (NGOs) and community groups' cooperatives and associations, which work on non-profit basis, can possibly play a significant role in the dissemination of knowledge, and thus the adoption of appropriate technologies. It is suggested that management should fashion ways

of retaining trained staff in order to reduce the level of staff turnover and the need to repeat trainings. Also use of casual labour for technical applications should be discouraged.

There is a need to reformulate building standards, regulations and codes. Standards should be in simple and comprehensive form, taking into consideration the low technological background of those who are expected to use them. They should not only state what is expected but also how to achieve them. Efforts should also be made to ensure that formulated standards are brought to the knowledge of all stakeholders. Relevant public agencies should enforce the implementation of the building standards, regulations and codes. At secretly determined intervals unscheduled inspection visits to production and construction sites should be made where samples are taken for detailed testing and analysis.

6. Conclusion

A lot of research appears to have been done on the development of alternative building materials and their associated technologies, relevant information has not been pushed out to the public where they are urgently needed. Wide application of such proven alternative innovations will go a long way in transforming the housing scenario of the country. This can be realized by ensuring that these materials are produced

and used in ways that make them acceptable not only to customers but also professionals and relevant regulatory bodies. This means they have to follow strict quality management processes. In today's competitive world, quality of processes and products will increasingly become a decisive competitive factor. Production

and use of alternative building materials are processes involving several activities. Quality management should be followed through all the activities in order to realize quality outcome. To this end, quality management measures require the determined input of everyone along the process.

References

- Akinola, J.A., Akinradewo, O.F. and Olatunji, S.O. (2012) Impact of Total Quality Management (TQM) on Nigerian construction firms, in Laryea, S., Agyepong, S.A., Leiringer, R. and Hughes, W. (Eds) Proceedings of the 4th West Africa Built Environment Research (WABER) Conference, 24-26 July, Abuja, Nigeria
- Ayandibu, O. G. (2010) Quality Management And Socio-Economic Objectives In The Construction Of The Gautrain, A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in partial fulfillment of the requirements for the degree of Master of Science in Engineering, Johannesburg
- Carrilo, P. (1994) Technology Transfer: A survey of international construction companies. *Construction, Management and Economics*, vol.12/1, 45-51
- Fakere, Alexander A., Fadairo, G., Fakere, R. - Assessment of Building Collapse in Nigeria: A Case of Naval Building, Abuja, Nigeria, *International Journal of Engineering and Technology*, Volume 2/4, (2012), pp584-591.
- Hoonakker, P., Carayona, P. and Loushine, T. - Barriers and benefits of quality management in the construction industry: An empirical study, *Total Quality Management*, Vol. 21/ 9, (2010), pp953-969.
- ISO 8402 - Quality Management and Quality Assurance-Vocabulary, (1994)
- Iruobe O. J.; Ojambati, T. S.; Akinpade, J. A. and Iruobe, T. - An Investigation into the Impact of Total Quality Management Application in the Construction Industry (A Case of Training), *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*, vol.3/1, (2012) pp46-50.
- Kumarasawamy, M. M. - Accelerating Construction Industry Development, *Journal of Construction in Developing Countries*, vol.11/1, (2006), pp.73-96.
- Okereke, P.A. - Construction Materials: Testing and Quality

- Control in Tropical Climate, Crown Publishers Ltd, Owerri, 2003.
- Palalani, K. - Challenges Facing the Construction Industry: A Botswana Perspective, Proceedings of the 2nd International Conference on "Construction in Developing Countries: Challenges Facing the Construction Industry in Developing Countries", 15-17 November, Gabarone, Botswana, 2000.
- Polat, G., Damci, A. and Tatar, Y. - Barriers And Benefits Of Total Quality Management In The Construction Industry: Evidence From Turkish Contractors, 7th Research/Expert Conference with International Participations "QUALITY 2011", Neum, B&H, June 01 – 04, 2011.
- Ozaki, R. - Customer-focused Approaches to Innovation in House Building, Journal of Const. Mgt. and Economics, 21, (2003), pp.557 – 564.