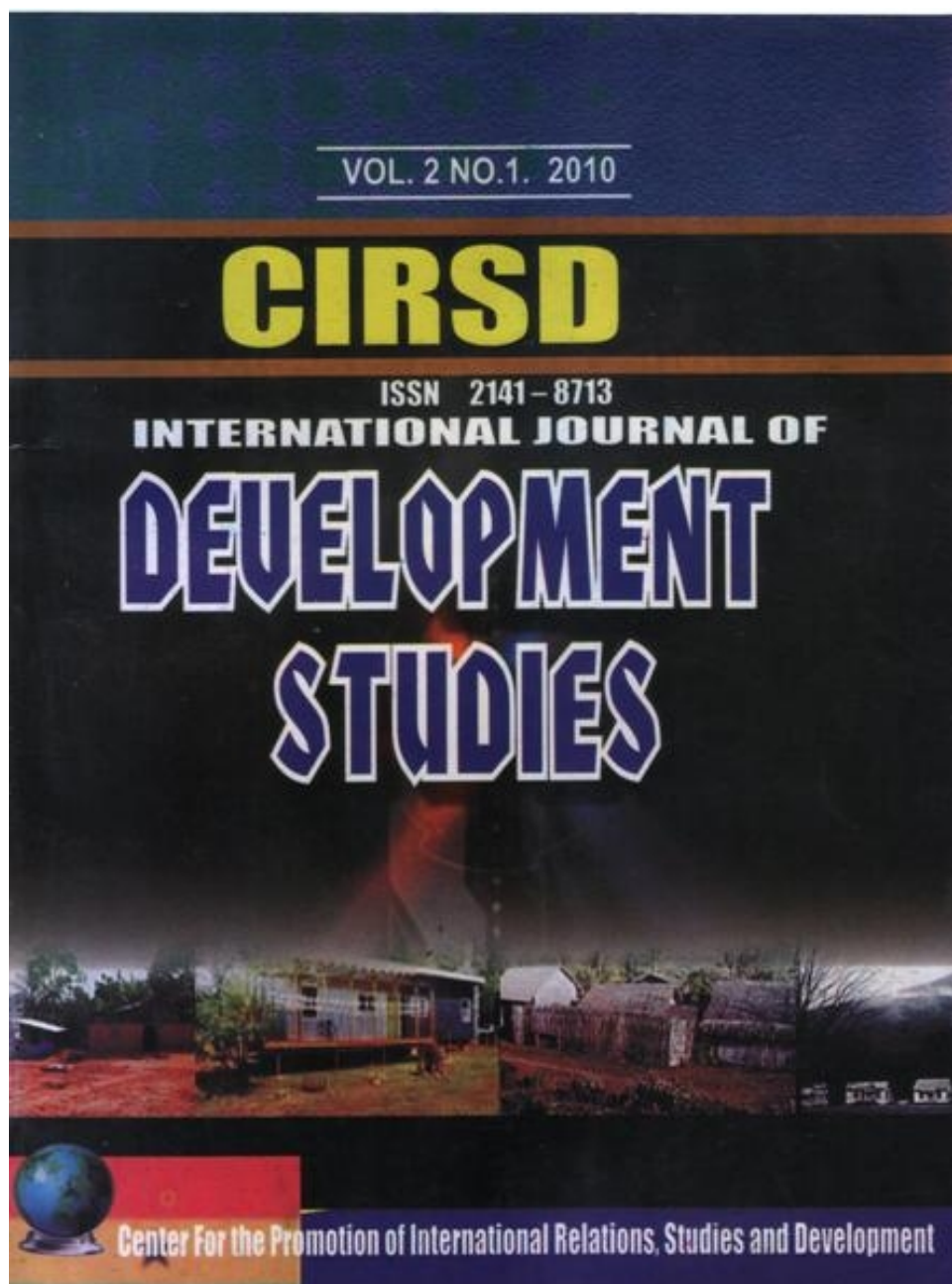


**MAINTENANCE PRACTICE AND MANAGEMENT OF INFRASTRUCTURES IN  
NIGERIA: IMPLICATIONS FOR PUBLIC PROCUREMENT AND SERVICE QUALITY**



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## **Maintenance practice and Management of Infrastructures in Nigeria: Implications for Public Procurement and service quality.**

By

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**Introduction:** In the country, developments tend to depend on maintenance practices. Maintenance practice is representing instances where all practices are based on certain standards and where cost will be reduced and reliability or performance of the system will be assured. When a nation or a sub system within a system conducts itself in a manner similar to what obtains above, this indicates the manifestation of best practices. In Nigeria, this practice is applied in all that we do although the said application differs from one environment to another or as situations or circumstances dictate. Maintenance management is significant in determining the extent of achievement of production system objectives (manufacturing and service alike). It has thus received attention in recent times. In this work, maintenance practice factor (MPF) and maintenance practice contribution (MPC) quantitative measures were formulated to appraise the maintenance practice in Nigeria (Deming, 1982). These two words represent benchmarking standards—nothing is better or exceeds a Best Practice. The words are most often applied to the quality of management. According to Moubray, J. (2000), there is a broad range of opinions from executives

in successful companies regarding what constitutes the best business practices, management styles, and corporate philosophies. Unfortunately, in some people's minds, Best Practices conjure up some obscure, ever-changing, and unachievable goal.

A developing society, typical of Nigeria, needs to adapt to change and foster creativity. In the pursuit of continual improvement, implementing wise maintenance-schedules is essential for contemporary organizations (Bekkers, (2002). This places the implementation of Nigeria's Public Procurement Act of 2007 in a strategic position (Ekueme,2010). Several studies of a wide range of Nigerian industries indicate that indigenous low availability and low productivity are endemic. The resulting closure of some of these industries has triggered off a realization of the strategic challenges in maintenance management. In addition, the increasingly-competitive business environment in Nigeria has raised the strategic importance of maintenance functions, especially in organizations with significant investments in physical assets. Five strategic aspects of maintenance management have been identified, namely: **maintenance methodology; support processes; organization and work structuring; comparable culture; and general management policy.** Three factors that permeate these dimensions are **wise leadership, excellent communications and an understanding of the human factors involved** (Campbell, J.D. and Jardine, A.K.S. 2001).

The following discussion will outline real, specific, achievable, and proven standards for maintenance management and show the expected results from targeting and reaching the performance levels of best maintenance practices. It also will provide methods, strategies, and actions to help develop a plan for executing best maintenance practices that can make maintenance departments more efficient, reduce plant maintenance and operating costs, improve reliability, and increase morale (Agyris, 1998). This paper is divided into two important parts. The first part provides a background and principles on the basis of which maintenance practice should be built while the other part attempts a discussion of the observed facts about Nigeria's experience.

If everyone at a facility is satisfied with the existing maintenance program, why should they be interested in best maintenance practices? Studies show that most maintenance departments in the United States and Canada operate at between 10 and 40 percent efficiency and that nearly 70 percent of equipment failures are self-induced. (Shingo,1991). These statistics should not be acceptable—not to upper management and certainly not to maintenance managers. In Nigeria, percentage of efficiency can be said to be comparatively lower.

These facts should generate some amount of interest. Where does your maintenance department stand in relation to these figures? Do you measure and track maintenance efficiency? Do you accumulate and analyze data on equipment failures? If not, then you probably have no idea if you are the same as, better, or worse than these averages.

### **The Problem**

Maintenance is undertaken to preserve the proper functioning of a physical system, so that it will continue to do what it was designed to do. Its function and performance characteristics not only take account of output, unit costs and effectiveness of using energy, but also such factors as end-product quality, process control, achieved comfort and protection of the employed personnel, compliance with environmental protection regulations, structural integrity and even the physical appearance of the productive system (McQueen, 1999).

The quality of maintenance significantly affects business profitability. The factors involved include safety, and customer service, not just plant costs and availability. Increased downtime affects adversely the capability of physical systems by reducing their average rate (i.e. speed) of output, so increasing the operating costs and lowering the average customer's satisfaction with the service. With system availability becoming critical, issues such as reducing operating costs as well as the strategic importance of employing better and, if feasible, optimal maintenance schedules need to be more universally recognized and implemented.

### **What are Best Maintenance Practices?**

Best maintenance practices are defined in two categories: standards and methods. Standards are the measurable performance levels of maintenance execution; methods and strategies must be practiced in order to meet the standards. (McQueen, (1999). The combination of standards with methods and strategies provides the elements of an integrated planned maintenance system. Achievement of the best maintenance practice standards (Maintenance Excellence) is accomplished through an interactive and integrated series of links with an array of methods and strategies.

Surprisingly, as Kaplan, R.S. and Norton, D.P. (1996) noted, there are a number of people who do not know the meaning of maintenance—at least the way they practice maintenance would indicate this. In practice, the prevalent interpretation of maintenance is to "fix it when it breaks." This is a good definition for repair, but not maintenance. This is reactive maintenance. Proactive maintenance is the mission.

To change the organization's basic beliefs, it must identify the reasons why it does not follow these best practices in maintaining its equipment. Two of the more common reasons that a plant does not follow best maintenance repair practices are:

Maintenance is totally reactive and does not follow the definition of maintenance, and the maintenance workforce lacks the discipline to follow best maintenance repair practices or management has not defined rules of conduct for best maintenance practices (Friedman, H. and M.A. Piette, 2001).

#### Philosophical and Theoretical Shifts.

To achieve Best Practices, within the maintenance and production organizations, there must be both a technological and an organizational philosophical shift in the way that departments conduct their daily business. Unless both the technical and organizational shifts occur at the same time, the cycle of change cannot be sustained. The organization will slip back to its old ways, failing to achieve these Best Practices in Maintenance (Simon, R. 1995).

#### Overview Indicators:

These indicators are normally valuable for upper management, and are broad based. To be more effective, each is broken down into sub-indicators for analysis. The sub-indicators need to be shared with all employees. Some of the various sub-indicators are:

- Budget Compliance (Actual versus Forecast).
- Plant-wide Overall Equipment Effectiveness (OEE).
- Costs as a Percent of Sales or Operating Costs.
- Maintenance Costs as a Percent of Replacement Asset Value.
- Maintenance Dollars per Unit Produced.
- Percent Absenteeism.
- Safety, Environmental and Regulatory Performance/Compliance.
- Training Hours or Dollars as a Percent of Overall Hours or Dollars Expended.
- Employee Turnover (Hughes, B. 2002)

#### Proactive or reactive

The potential cost savings of best maintenance practices may be beyond the understanding or comprehension of some managers. They do not believe that repair practices directly impact on organization's bottom line or profitability. More enlightened bureaucracies have demonstrated that, by reducing the self-induced failures, they can increase production capacity as much as 20 percent. Other managers accept lower reliability standards from maintenance efforts because either they do not understand the problem or they choose to ignore this issue. A good manager must be willing to admit to a maintenance problem and actively pursue a solution.

How can you actively pursue a solution? Be proactive, disciplined, accountable, manage to maximize available resources, and manage based on information. Adopting

a proactive approach to maintenance will improve its effectiveness dramatically and more rapidly than instituting an aggressive program of maintenance effectiveness improvement within the confines of the organizational and cultural environment of an existing, predominantly reactive maintenance program (Lee, K. 2002).

**Strategic Attributes of Proactive Maintenance**  
Planning for the implementation of best maintenance practices is essential (Robert 2002). Timelines, personnel assignments, documentation, and the other elements of a well-planned change must be developed before changes begin to take place. Proactive maintenance attributes, to success include:

- Maintenance skills training
- Work flow analysis and required changes (organizational)
- Work order system
- Planned preventive maintenance tasks/procedures
- Maintenance engineering development
- Establishment, assignment, and training of planner-scheduler
- Maintenance inventory and purchasing integration
- Computerized maintenance management system
- Management reporting/performance measurement and tracking
- Return on investment (ROI) analysis (Ohno, 1988) and Tsang, 1988)

#### **The Nigeria's Experience- The Overview**

In Nigeria, the practice of maintenance is not new. Infrastructure wise, every design comes with provisions for maintenance. In architecture, water resource, aviation, maritime, and other aspects, the place of maintenance cannot be compromised. In all sectors of our infrastructure, the problem is lack of commitment on all parts in entrenching the values and culture of maintenance.

Regardless of regime or political party in power, the need for best practice cannot be overemphasized. We don't know what the future holds, but one can aptly say that regime orientation plays significant role in determining the population response to policy as well as the environment. The Buhari regime of the 1980s was a reason good enough to serve as example. The period witnessed instances where machines were looked after, environment (periodic sanitation exercise e.t.c.) was protected, queues were joined by every citizen regardless of what he or she wanted to buy. Vehicles were not overloaded; contractors had no chances of supplying sub standard goods and service providers had to go strictly in line with consumer protection and other related considerations. The question remains if it is possible for maintenance practice to be put in place without a corresponding measure of discipline.

In Roads construction, roads meant for light vehicles are eventually used by heavy a vehicle which leads to deterioration of such roads before the expected time and escalation of the tendency to have roads and related accidents.



In actual usage of the vehicles, the ethics are not complied with. A vehicle meant for five (5) passengers may be overloaded with seven (7) to Eight (8) passengers hence short life for the vehicle and vulnerable to complications and accidents.

In the manufacturing sector, quality is not adhered to leading to loss of consumer confidence and inferior quality of goods. Maintenance of quality remains a challenge where consumers prefer foreign goods than domestic ones.

Monumental buildings are not erected with consideration of pressure (load, wind and other possible hazards) hence reduced life span and eventual collapse. With an exception of few Nigerian cities notably, Abuja and Port Harcourt, one will be disappointed by the interior of such edifices and of course the strength. Lagos has been a witness of such unfortunate experience all due to lack of proper maintenance practice. Buildings are not maintained based on the prescribed pattern provided for in the initial design. Buildings designed for residential purposes are turned into industrial use where heavy machines will be installed and used. Anti vibration measure are not taken hence eventual collapse of the building.

In the health sector, it is either the machines and other pharmaceutical consumables are inferior or they are poorly installed. The maintenance of such machines may be undertaken by unskilled labour and or supervision may be ineffective in ascertaining the level of performance of individual units.

In the education sector, laboratory and technical equipments may be poorly managed or maintained thereby inducing habits of inadequacies and inefficiency in the system. These and other realities not mentioned have compelled us to as if there is any aspect of our life where the best practice is obtainable a hundred percent; if there can be proper maintenance without discipline and where lack of such discipline will protect us against deaths and destructions, loss of wealth and health and increased adversity and decreased prosperity.

#### **Maintenance Practice and Public Procurement in Nigeria : The Nexus**

The Public Procurement Act, 2007 include: The Two-Stage Tendering Process. It provides that a procuring entity shall engage in procurement by two-stage tendering in the following cases:- where it is not feasible for the procuring entity to formulate detailed specifications for the goods or works involved in the procurement; where the procuring entity seeks tenders, proposals or offers on various means of meeting its needs in order to obtain the most satisfactory solution to its procurement needs; or where the character of the goods or works are subject to rapid technological advances; or where the procuring entity seeks to enter into a contract for research, experiment, study or development; or where the procuring entity applies the Act to procurement concerned with national security and determines that the selected method is the most appropriate method of procurement; or, finally where the standard tender proceedings have been utilised but were not successful or the tenders were rejected by the procuring entity and the procuring entity considers that engaging in new tendering proceedings will not result in a procurement contract (Section 39 of the Act).

In addition, In the two-stage process, the invitation documents shall call upon suppliers or contractors to submit, in the first stage of the tendering proceedings, initial tenders which contain their proposals without a tender price. The procuring entity may also solicit proposals that relate to technical, quality or other characteristics of the goods, works or services as well as contractual terms and conditions of supply. Finally, the invitation documents may stipulate the professional competence and technical qualifications of the suppliers or contractors.

This will hopefully ensure that the game is played according to the rules. Ultimately, the law seeks that the process would result in the lowest priced and highest quality procurement. Risks inherent in the system, however, include the fact that the process can consume a lot of man-hours and result in a fruitless effort, not because the contractor did not follow the rules or even submit a qualifying bid, but because the procuring entity decided to reject all bids or cancel the procurement proceedings in the public interest (Ekueme, 2010).

#### Benefits of Procurement Reforms

- (a) Procurement system will become transparent and create equal access for bidders of public sector contracts;
- (b) Through efficient and effective management of Nigeria's economic resources, all avenues of wastages and leakages in the economy as a result of inefficiency in the award of Government contracts and procurements would be minimized thereby increasing Government revenue base.
- (c) It will enable Contractors have a fair hearing as there will be a statutory contract Appeal Board where aggrieved Contractors and Suppliers would file their protests; and
- (d) it will assist in the codification of all the relevant laws in the area of procurement as already done under the Corrupt Practices and other Related Offences Act, 2002. (Ekpemkholi, 2003)

The relationship lies in the future of all goods and services procured and infrastructures installed by the government bureaucracies and how they affect process of service delivery in Nigeria. The fact remains that the class of infrastructure installed and its sustainability depends on the maintenance practice in place. The qualitative the infrastructure, the sustainable. The fair the process of contract award, the competitive and qualitative. The public procurement reforms have succeeded in entrenching quality in the establishment of infrastructure and by extension, the quality standard make maintenance management a successful undertaking. Adherence to quality specifications as a procurement criterion in Nigeria ensures sustainable infrastructural quality and maintainability of such infrastructure. The roads, hospitals, schools and even categories of services provided will be based on the public

procurement act and the ultimate aspiration is that all levels of government and the private sector follow suit. In this case, the maintenance of our infrastructure will be in line with the best practices. People are empowered to question the quality of goods and services by taking part as observers in tendering process.

#### Conclusion

In Nigeria, maintenance practice is lacking in all sectors although a significant application is attainable in engineering and related components of the bureaucracies. In maintenance departments, only a handful may not be complying with the standards although lack of blending of the practice and complete management skills constitute serious challenges. From the preceding paragraphs, we should be able to understand that most if not all the elements paraded are either inadequate or nonexistent. But with the Public Procurement Act of 2007, the practices will be enhanced considering the emphasis laid on quality of goods and services procured by government agencies. The hope lies in the conditions surrounding procurement where DUE PROCESS is the watchword in spite of political and related malpractices. The conclusion one draws is that discipline must constitute the pivot upon which maintenance practice must predicate. It may appear incontestable to note that the culture of maintenance should come to stay if we must aspire for greatness as a nation.

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