Applied Energy, Volume 83, Issue 4, December 2004, Pages 299-310.

Impact of corporate culture on plant maintenance in the Nigerian electric-power industry

M. C. Eti[a] and S. O. T. Ogaji[b+] and S. D. Probert[b]
[a]Mechanical Engineering Department, Rivers State University of Science and Technology, PMB 5080 Nkpolu, Oroworukpo, Port Harcourt, Rivers State, Nigeria.
[b]School of Engineering, Cranfield University, Bedfordshire, MK43OL UK.
[+]Corresponding author

Keywords: Maintenance, corporate culture, Nigerian electric-power industry, learning.

Abstract

Comparisons have been made of modern maintenance practices in the more developed economies with what occurs in Nigeria. Significant differences arise due to variations in corporate culture, pertinent learning opportunities and effectiveness's of strategic planning. The managerial implications of these divergences are discussed. A systematic, total productive-maintenance (TPM) approach needs to be adopted to allow corporate changes to be implemented at a rate commensurate with the organization's evolving culture. This paper advocates that maintenance should be managed, in each organization so as to cultivate a sense of ownership in the operators. Also autonomous maintenance teams consisting of operators, engineers and managers should be set up with the aims of improving personnel competence and equipment performance.

Abbreviations

EFQM	European foundation for quality movement
JIT	Just-in-time
MBNQA	Malcolm Baldrige national quality-award
NEPA	Nigerian electric-power authority
OEE	Overall equipment-effectiveness
RCM	Reliability-centred maintenance
TPM	Total productive-maintenance
TQM	Total-quality management

INTRODUCTION

Project maintenance should renovate each physical system so that it is able to fulfil the function or functions, for which it was designed; otherwise effort, time and hence energy may be wasted. Maintenance of equipment depends not just on those who undertake the maintenance function but also on designers, purchasers and operators. Thus, to achieve optimal performance of the system, all of these should possess a detailed understanding of what needs to be done, and to be able to, and willing to, do whatever is needed when required.

The development and execution of a maintenance strategy consists of three processes:

- Formulate an effective maintenance process for each component (i.e. via work identification).
- Acquire the resources needed to execute the strategy effectively (i.e. people, spares and tools).
- Execute the strategy (i.e. acquire and deploy the means needed to manage, and maintain the resources efficiently)[1].

The need to increase equipment "uptime" (i.e. the periods when it is functioning normally) at least cost has necessitated a radical change in the tactics of maintenance. The organization should implement a proactive profit-focused approach to narrow the gap between actual and ideal costs for maintenance. Excessive downtime has always adversely affected the productive capacity of the Nigerian electric-power industry, thereby increasing operating costs and leading to a deterioration of customer service and satisfaction. The effect of downtime is being aggravated by the worldwide movements towards just-in-time (JIT), lean operations and total-quality management (TQM) processes.

Maintenance, being a significant employer of personnel, can account for up to 40 per cent of the total cost of Nigerian electric-power generation. According to the annual International Competitiveness Report, there are major differences in maintenance effectivenesses and individual outputs between individual countries. Consultants frequently quote 15 per cent as being the maintenance cost gap between those of field leaders and the world-class average performance. In addition, the average potential for improving production, by implementing a proper maintenance scheme, has been estimated to be 6→8 per cent [2]. For Nigeria, the corresponding figure is far greater.

Two strategies, which offer a path for achieving long-term continual improvement, rather than the promise of a quick fix, have attracted increasing interest within modern industries. These are reliability-centred maintenance (RCM) and total productive-maintenance (TPM).

RCM is a process which helps determine what must be done to ensure that any physical asset continues to do whatever its designers, and subsequently its users, want it to do [1]. In essence, two objectives are met: (i) determination of the maintenance requirements of the physical systems and (ii) then ensuring that these requirements are met as cheaply and effectively as feasible.

TPM is a process that has operators and maintainers working together as a team to improve product-quality, enhance equipment effectiveness, minimise downtime and reduce waste. This is accomplished by focusing on those aspects that prevent a plant from running at its optimal condition and by empowering the team with the authority and responsibility for the equipment's long-term upkeep. TPM reduces significantly the operational and maintenance costs by focusing on the causes of failure through the creation of a sense of ownership, by the plant's operators, maintainers and support staff that encourages the development of a "prevention at source" attitude. In essence, TPM seeks to reshape the organization in order to liberate its own potential for achieving improvements. TPM is concerned with the

fundamental rethink of business processes in order to reap reductions in cost, enhanced quality and increased speed of production.

Complications encountered when studying maintenance arise not only from the national culture but also from organizational/corporate culture: this is readily apparent at the Afam, Ogorode and Kainji Dam electric-power stations. These gas, steam and hydropower stations respectively are situated in the southern (Afam and Ogorode) and northern (Kainji Dam) districts of Nigeria.

This paper will discuss the impact of culture in the maintenance procedures of Nigerian organizations, compared with what occurs in the advanced countries that use business excellence models and adhere to ISO 9000: 2000 standards.

NEED FOR A HIGHER-QUALITY MAINTENANCE-CULTURE IN NIGERIA

Today's gurus of strategy urge companies to democratize the management process which was once the sole province of each company's senior officers [3], by handing over much more authority and responsibility to teams of line and staff managers (qualified in different disciplines). In order to keep the planning process close to satisfying market needs, today's strategists emphasize the importance of interacting frequently with key customer and suppliers. Such openness alone indicates a revolution is occurring in strategic planning, which in Nigeria has been amongst the most sacrosanct and clandestine of activities. But such a change is now necessary if industry is to produce exactly what the customers want and greater effectiveness achieved with lower energy costs. The global trend to implement lean management and TPM in order to achieve competitiveness applies also to maintenance, which should now be viewed as a profit centre.

Efforts by the Federal Government to improve availability and reliability of the electric-power supplies in Nigeria have been frustrated by a lack of a corporate culture in all facets of management in Nigeria. Achieving the implementation of proactive maintenance, in any Nigerian organization, requires a cultural transformation. Commitment of the concerned individuals, a supportive cultural environment and wise leadership are fundamental prerequisites for achieving high-quality maintenance. The training, fostering and competence building of the managers themselves are crucial to a successful overall quality-maintenance programme.

Managing people consists of more than controlling their activities: management should (i) provide appropriate leadership (ii) demonstrate its commitment, (iii) foster a culture commensurate with its vision and mission and (iv) make available the finance for the implementation of the programme [4]. Without these contributing factors, no quality-maintenance programme can succeed completely. The evolution of TQM, lean management and JIT, resulted in TPM. However, these concepts have not, as yet, been embraced in Nigeria. Successful implementation of a high-quality maintenance programme must include a recalibration of organization-wide aspirations as well as the introduction of appropriate training and autonomous maintenance. In order to ensure success, the basic principles of quality maintenance (e.g. involving cooperation, teamwork and commitment) must permeate

the entire organization. Production-equipment management, and ensuring its availability, requires a team effort. A factual quantitative approach to decision making, respect for all individuals, encouragement to innovate, and emphasis on improvement rather than focusing on blame for mistakes and errors, are signs of that a learning environment exists in that team.

INDIGENOUS-CULTURE PROBLEMS AFFECTING MAINTENANCE PROCEDURES IN NIGERIA

A developing society requires a departure (i.e. a change, which may well be novel) in the words used, in pertinent concepts and in ways of doing things. A society, surrounded by an improving competitive environment, is doomed if it does not introduce innovations which break inherent moulds of poor perception, old patterns of now inappropriate behaviour and previous, but now outdated, beliefs and and values [5].

The principal problems facing the electric-power industry in Nigeria include how to (i) establish worthwhile aims (ii) organize operations effectively, (iii) delegate responsibility (iv) reward and motivate employees as well as (v) utilise available resources to ensure the achievement of the desired outcomes. The principal pertinent differences between what occurs in the industrialized countries and Nigeria concern co-evolution and the business ecosystem (with respect to creating networks of relationships with customers, suppliers and even rivals to gain greater competitive advantages). Each new business-environment change should encourage companies to adapt their strategies to meet these challenges. The advanced economies make use of value migration, strategic intent, game theory, and improving core competences. "White-space" opportunities, i.e. potential areas of growth that often fall between existing opportunities because they don't naturally match the skills of existing business units are prevalent in Nigeria. Instead of reactive maintenance or "fire-fighting", the management of the electric-power industry in Nigeria should see their present problems as opportunities to improve the industry. Unfortunately, such approaches are not generally welcomed in Nigeria, e.g. the idea of attitude migration for counteracting the excruciating decline in uptime operations should be valued: so too should changes from reactive to proactive maintenance. The present Nigerian management approach too often lacks a focus on customer service and wise business strategies.

Existing beliefs, assumptions and perceptions about maintenance in Nigeria unduly constrain what managers there can achieve. Human beings, who come together to perform certain collective acts, encounter common problems having to do with establishing acceptable but challenging aims, achieving coordination of the efforts of the workforce, and fostering motivation in individual members. Culture affects how problems are perceived and if or how they are resolved. A "can do" attitude does not permeate in Nigeria. Hence, the prime task of this study is to point out how corporate culture has become a managerial blind-spot in the Nigerian electric-power stations' maintenance operations. Maintenance management in Nigeria still esteems tough, individualistic, dominating leadership that often fails to perceive threats or opportunities. More effective management would be pivotal to organizing personnel to recognise pertinent opportunities and achieve worthwhile results rather than generate impasses, stagnation, bureaucracy and wasteful interpersonal friction. Too often, in

Nigeria, the present managers are a part of the problem, rather than facilitators for achieving a solution of that problem.

ORGANIZATION CULTURE

An organization can influence, by positive or negative rewards, the behaviours and values of its individual members, while the organization itself is constrained by those same individuals [6]. Over time, there is a tendency towards attaining uniformity of behaviour of individuals in the organisation.

Culture is the symbiosis of inherited ideas, beliefs, values and knowledge, which constitute the shared bases for social actions. Each organization has its own internal culture and social conventions and adopts values that reflect (i) the opinions of the directors and managers in charge and (ii) the business, political and social environments with which it has to cope. The culture of an organization arises through the development of norms and values that help it to survive and prosper in these environments. Cultures tend to mature (sometimes in undesirable ways) as the external environments evolve. Such desirable environmental-changes have included the information-technology revolution, rapid technological break-throughs, the increasingly-global markets, lowering cultural-barriers to communications and rising societal values. Moreover, environments may change faster than the culture and desirable maintenance procedures in an organisation. Necessary pre-emptive actions have to be taken with respect to the effects of alterations in the external environment before their maintenance impacts can be felt within the organization. Wise industrial-leaders realise this and so develop an open organizational culture approach to change, learning and rewards to prolong the lifetimes of their plant and equipment. This unfortunately only rarely happens in Nigeria.

ESTABLISHING A POSITIVE CULTURAL ENVIRONMENT

There is great danger in a culture in which the mangers (i) become isolated from the real world as well as (ii) tend to regard production as an elegant solution as an end in itself. Top managers endeavour to define their strategies through comprehensive business-planning arrangements, yet often, insufficient attention is devoted to creating and maintaining the cultural aspects of this strategy. The culture is developed by individuals in the organization; the acquired knowledge and skills being passed to subsequent generations. However, prudent behaviour normally only becomes part of the culture through learning and through validation as being acceptable and desirable by the majority. Learning depends on the available education provision and facilities as well as upon the willingness of personnel to avail themselves of the opportunities to acquire the desired skills [7]. It is therefore the responsibility of the organization's top managers to provide a learning environment, to encourage the maintenance staff to actively participate in the learning process, and to reward their profitable utilization of new knowledge thereby gained.

The fostering of a "can do" culture entails the creation of a learning process that fosters and promotes the ideals and principles of TPM. Such an aspiration requires a significant paradigm shift, wherein each employee is viewed not as a dispensable cog within a plant but

as a proactive participant in the management and decision-making processes. This will lead to rapid positive reactions to developments in technology and techniques.

MAINTENANCE PROBLEMS IN NIGERIAN ELECTRIC-POWER STATIONS

The following problems are frequently encountered:

- Maintenance is not treated seriously at board level, or even by local management.
- Maintenance processes lack a business culture (e.g. no business plans, ineffective or superficial budgets, and unfocused reports).
- Maintenance technicians and even team leaders lack adequate management skills.
- Maintenance operations tend to be isolated, with little or no integration with the activities of other departments.
- Absence of adequate planned preventive maintenance methods
- Preoccupation with introducing advanced maintenance methods, while relevant basic maintenance practices are not being implemented.

Top management should set the overall strategic direction, not via vague performance criteria, but via the formulation of quantitative objectives with respect to such factors as quality control and delivery schedules. These should be agreed at each level of the organization, with those closest to the plant operations formulating the maintenance policies. The role of the management should be to provide appropriately trained personnel with the tools to help them make the right decisions, and to ensure that the decisions are sensible, defensible and economic.

The Nigerian electric-power industry still uses traditional maintenance planning to compile maintenance schedules for all equipment and plant. Moreover, these schedules only rarely reach the shop floor because of the following reasons:-

Technical validity: The planning personnel that compose the schedules are usually out-of-touch with the equipment and may never had hands-on experience of maintenance activities. Consequently, the business often posses little first-hand knowledge of the functions, failure modes, and consequences of component deterioration for which the schedules are being written. That is, the schedules are mainly generic in nature, poorly written and lack essential detail.

Ownership: Personnel on the shop floor (i.e. supervisors, technicians and artisans) at present tend to view schedules as unwelcome bureaucratic paperwork, which consequently does not receive the respect and hence attention required.

Maintenance activities in the Nigerian electric-power industry are at present largely reactive, i.e. “fire-fighting”, to solve the problem, whatever it is, as quickly as possible and being in a state of readiness to deal with the next outbreak whenever it happens. The problems are expected but not prevented. Indeed, the view within this maintenance culture is that problems occur due to factors beyond practical and resource control: it is accepted that something will always go wrong and nothing much can be done about it in advance. The occurrence of the

problem is often coupled with reactive responses – once the failures occur, the "fire-fighting" team is brought into action. However, because little is done in such a culture to anticipate problems or seek long-term solutions, the whole exercise becomes repeated far more often than it should be. Also because the effort and resources go into fire-fighting rather than prevention, faults occur. The basic approach would be different in a culture of long-term and continual improvement. Electric-power generating plants are expensive: the consequences of a breakdown or malfunction are more immediate and costly than in less sophisticated plant. High plant-utilization is desirable because; productivity depends on keeping the equipment working at peak-performance level, for the maximum time. TPM is appropriate for this type of maintenance function. Integrated plant requires conforming actions by highly-skilled committed workers. High levels of competence are consistent with good management styles, i.e. high involvement, employee participation, and self-managing teams. In a TPM environment, the aim is to focus on equipment defects, so as to reduce the occurrence of early deterioration, faults or even failure.

TPM

TPM implementation is not a short-term fix. It is a continual one, in order to cope with an evolving work environment: the plant and equipment should exist in a clean, neat, safe workplace, which is achieved through a "pull" as opposed to a "push" culture-change process. The challenges for today's maintenance managers in the Nigerian electric-power industry are to (i) establish standards for maintenance and reliability practices, (ii) create an appropriate information-retrieval system that collects and stores pertinent facts, (iii) measure performance as well as (iv) create an enthusiastic and initiating enabling environment**.**

Measuring and improving equipment performance is a major challenge in many factories and processing plants [8]. The basic performance measure associated with TPM is the overall equipment effectiveness (OEE) [8], which provides a measure of both effectiveness (doing the right things), and efficiency (doing those things right) with the plant and equipment. . Three basic indicators of the OEE are:

- Availability (or uptime) as well as an indication of how much downtime is planned and unplanned
- Performance efficiency (i.e. actual versus design capability)
- Rate of set-quality output (e.g. yield per hour).

The design and installation of equipment as well as how it is operated and maintained affect the OEE [8]. The OEE rating for critical components provide a measure of equipment performance and how well maintenance is conducted. OEE rating for critical plant and equipment should be tracked: it thus requires measures of availability, efficiency, flow rate, quality rate, start-up pressure and temperatures. OEE is a number for providing relative comparisons of equipment performances. The real benefits come from identifying the factors of the OEE, which lead to a root-cause analysis and may even eliminate the causes of poor performance. It is all about collecting, and analyzing pertinent data concerning critical components.

LEARNING TO COPE WITH CHANGE

To remain internationally competitive, firms must sustain a high rate of internal learning that both refines current practices and leads to the adoption of better procedures in the workplace. Government agencies are continually being required to provide a broader range of services, faster and without the allocation of extra resources [9]. External benchmarking programmes are popular ways of identifying wise practices and have the benefits of demonstrating what is realistically achievable. The learning processes involved in establishing and implementing such programmes also provide benefits for those practising them. Drew [10] identified areas of success achieved from various forms of benchmarking, but also noted some potential barriers

According to Harvey and Denton [11], six developments are resulting in the popularity of organizational learning:

- The changing importance of the factors of production
- The accelerating pace of change in the business environment
- Knowledge viewed as a means of achieving a competitive advantage
- Customers being more demanding
- Dissatisfaction with existing management paradigms
- Increasing intensity of competition.

Learning needs time and patience. Senge [12] stated that a discipline is a body of practices, based on some underlying theory or understanding of the considered activity. He suggested that the five pertinent disciplines are:- building a shared vision, personal mastery of relevant tasks, working with mental models, team learning, and systems thinking. The first step in creating a learning environment should be to appoint a leader (i.e. a mentor) with the appropriate knowledge and teaching abilities, and who is able to assist others to understand complex situations [13].

The learning organization (i) needs a clearly-stated purpose, (ii) provides persuasive internal and external communications, and (iii) offers training in all aspects of the business. Its flexible structure and processes should facilitate innovation, creativity and risk taking [14]. Systematic problem-solving, experimentation, understanding gained from past experiences, learning from others, transferring knowledge and measuring the effectiveness of learning should permeate the whole organisation [15]. However, it is clear that any such evolution needs the transformation of culture [16]. Paschal and Athos [5] proposed three essentials for effective learning: (i) enduring values; (ii) trust; and (iii) empowerment. Nonaka [17] showed that learning in Japan is for everybody and forms part of the local culture. Senge [16] pointed out the advantage of a learning organization: it provides the intrinsic motivation to achieve improvements through the "creative tension" between visions and current reality. Dervitsiotris [18] maintained that the learning organization focuses more on process thinking, pursues a shared vision by the convergence of mental models in greater depth, and group problem-solving is developed more thoroughly.

The continuous achievement of high quality is one aim of each learning organization [19]. The Deming prize, the Malcolm Baldrige National Quality Award (MBNQA) and the European Foundation for Quality Movement (EFQM) awards indicate the recent evolution of

the quality movement. Firms use the criteria for these accolades to guide their efforts towards becoming 'excellence' organizations. The requirements represent a holistic framework of practices and help focus organizations on satisfying a variety of assessment and analytical standards [20], as in benchmarking and the best-practice approach. There is a clear link between the interest in other companies' better processes and practices, via the development of inter- and intra-industry comparisons and the achievements of improvements in your industry. Excellence models have provided standards for comparisons and auto-evaluation [19]. These models have been used extensively in developed countries in management practices. Failure in implementation of such models has been as a result of poor management and weak strategies that are not easily recognized by the managers who are responsible for them [21]. Beechner and Hamilton [22] pointed out a lack of an integrated approach: i.e. misalignment of strategic planning, non-achievement of continual improvement and the absence of knowledge transfer could be some of the main causes of failure when trying to implement excellence models. A good dose of innovation and creativity may also be necessary to complete processes successfully [23]. It is therefore necessary to account for both internal and external factors to achieve the desired sustainability. It is interesting, however, that models have evolved into different versions that take into account some of the new knowledge of management and organizational excellence. Thus, for the EFQM model, there is an increased focus on the customer and other stakeholders [24]. Also the evolution of ISO 9000 puts emphasis on learning and knowledge. A recent focus on process management (the EFQM model [25]) establishes the bases to facilitate implementation.

Hyland and Beckett [9] reported on the use of learning by auditing to stimulate beneficial changes. Beer and Eisentat [26] maintain that for change processes to be effective, in terms of strategy implementation and organizational adaptation, there is the need to be systematic and to encourage open discussion in order to develop a sense of partnership among relevant stakeholders. They further advocated that strategic change is impeded in organizations by "buck-passing" routines and internal politics. Systematic change needs to incorporate elements of structure and process as well as elements of values, leadership and competence. A lack, or low level, of competence in initial questioning and assessment makes it difficult for organizations to identify underlying causes and develop systematic solution capacities and competences. Dunghy et al [27] identified (i) the specific skills that improve a firms capability of exploiting new technology and (ii) the distinctive or core competencies that increase a firm's competitive advantage.

In the maintenance process, OEE is often used as the objective function with which to compare the performances of processes. If employees understand and can confidently use such a tool, they can carry out learning audits. Debate and discussion associated with undertaking an audit assessment will make each person think about new, innovative practices, as well as trying to improve the effectiveness of existing procedures. There is a need for continual organizational learning, which must find easier ways of data capture and in some cases, data transfer. To stimulate learning within an organization, each individual needs to convert data into information or knowledge that can be encoded and transmitted in ways that are useful to other members of the organization. It should be easily retrieved and couched in the language and vocabulary of the organization [9]

CONCLUSIONS

The Nigerian electric-power industry, at present, lacks the desirable corporate and organizational cultures that have been adopted elsewhere in world leading plants.

Managers in the Nigerian electric-power industry should be more proactive in their approach to maintenance functions and so develop a maintenance culture, which embraces the following elements:

- Knowledge sharing and learning
- Clear objectives for TPM and RCM processes
- High levels of benchmarking and standardization
- Development of easily accessible, comprehensive databases to help in achieving the analysis and evaluation of each considered process.

A "bottom-up" approach to problem solving is believed to be a more effective way for sustaining continual improvement: it is often the workforce that first recognises the need to generate and introduce improvements [29]. The task for the Nigerian electric-power industry's maintenance managers is to adopt the best from the highly industrialized nations' maintenance-management strategies and absorb them into Nigerian corporate culture, which, too often is usually parochial and outdated. Traditional cultural moulds need to be broken in order for these industries to become greater contributors to Nigerian society and the world.

REFERENCES

1. Moubray, J. (2000), Maintenance Management: A New Paradigm http:www.maintenanceresources.com/RCM/.
2. Thomas, C. (2000), Maintenance: a business-centre approach, *Chris Thomas Associates, Madrid, http://:espania.com/cta*
3. Sidorowicz, R (2002), Strategic planning, file: //A \larry//htm
4. Laszlo, G. P. (1999), Implementing a quality-management programme: the three C's of success – commitment, culture and cost. *The TQM Magazine, Vol. 11, No. 4, pp. 231 – 237.*
5. Paschal, R. T. and Athos, A (1992), The art of Japanese Management, *Penguin Books, London*.
6. Krell, T. C. (2000), Organizational longevity and technological change, *Journal of Organizational Change, Vol. 13, No. 11 pp 8 - 13.*
7. Wilkins, R. H. (1994), The Quality Empowered Business, *Prentice – Hall, Englewood, Cliffs, New Jersey, NJ. pp. 267 – 269.*
8. Williamson (2003) So shat do you know about your overall equipment effectiveness? http://www.swspitcrew,com/html/june_oohlml
9. Hyland, P. and Beckett, R. (2002), Learning to compete: the value of internal benchmarking, *Benchmarking: An International Journal, vol. 9, No .3, pp. 293 – 304.*

10. Drew, A, W. (1997), From knowledge to action: the impact of benchmarking on organizational performance, *Long-Range Planning, Vol. 30 No. 3, pp. 427 – 241.*

11. Harvey, Ch. and Denton, (1999), To come of age: the antecedents of organizational learning, *Journal of Management Studies, Vol. 36 No. 7, pp.897 – 919.*

12. Senge, P. M. (1999), It's the learning: the real lessons of the quality movement, *Journal of Quality and Participation, Vol 22, pp. 34 -40.*

13. Day, M. (1994), Can organizations have a learning disability? *Canadian Manager, Vol 19, pp.21-24.*

14. Stambaugh, D. M. (1995), Creating the learning organization – an essential ingredient for attaining customer loyalty, CPCU. Journal, March pp. 35 – 49.

15. Garvin, D. A. (1994), Building a learning organization*, Business Credit, January, pp. 19 – 28.*

16. Senge, P. M. (1990), The leader's new work: building learning organizations*, Sloan Management Review, Fall, pp. 7 – 23.*

17. Nonaka, I. (1991), The knowledge – creating company, *Harvard Business Review, Vol 69, pp 96-204.*

18. Dervitsiotris K. N. (1998), The challenge of managing organizational change: exploring the relationship of re-engineering, developing learning organizations and total quality management, Total *Quality Management, Vol. 10 No.3, pp 300 – 22.*

19. Hermel, Rh. and Ramis-Pujol, J., (2002), An evolution of excellence: some main trends, *The TQM Magazine, vol.15 No. 4,. pp. 230 – 243*

20. Goasdoue, J. (2001), Is quality taken for granted? *The British Journal of Administrative Management, January/February edition*

21. Heller, R. (1997), In Search of Europe Excellence, Harper Collins Business, London.

22. Beechner, A. B. and Hamilton, K. A. (1995), Infinity model for organizational excellence, *Proceedings of 53rd Annual Quarterly Congress, USA. pp.333-6.*

23. Jones, A. (1999), Quality is a winning formula, The John Simons Lecture*, The British Journal of Administrative Management, Sept. /Oct. pp. 10 – 13.*

24. EFQM (1999), Assessing for Excellence: a Practical Guide for Self-Assessment, *European Foundation for Quality Management, Brussels.*

25. ISO 9000 (2000), Quality Management Systems: Fundamental Vocabulary, Final draft International Standard Organization for Standardization, Geneva.

26. Beer, M and Eisentat, R. (1996}, Developing an organization capable of implementing strategy and learning, *Human Relations Vol. 49, No5, pp. 597-619.*

27. Dunghy, D., Turner, D. and Crawford (1996), Developing an organisation capable of implementing strategy and learning, Human Relations, vol. 49, No. 5 pp597-619.

28. Norton (1998), Beyond World Class*, Macmillan Press, London*

https://dspace.org/

Impact of corporate culture on plant maintenance in the Nigerian electric-power industry

Eti, Mark C.; Ogaji, Stephen O. T.; Probert, Sydney D.

2006-04
Elsevier
http://hdl.handle.net/1826/995
M. C. Eti, S. O. T. Ogaji and S. D. Probert, Impact of corporate culture on plant maintenance in the Nigerian electric-power industry, Applied Energy, Volume 83, Issue 4, December 2004, Pages 299-310.

Downloaded from a DSpace repository. https://dspace.org/