

Electronic Applications as a Productivity Improvement Tool in Organizations

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Abstract

This paper examines electronic applications as a productivity improvement tool in organizations. The influence and impact of electronic applications as a productivity tool in organizations cannot be overemphasized. This is against the background of transition from analogue to digital era, characterized by significant advancement in science and technology. Technology has pervaded organizational and human systems thereby making human rhythms to succumb to technological rhythms. Technology has now been dictating the technicization of everyday life and the corporate organization is not an exemption. Strategies for the deployment of electronic applications, the areas of usage and the benefits of electronic applications, techniques of productivity improvement, the need for productivity improvement and the concepts of electronic applications, productivity, organizational productivity and productivity improvement was examined. Technologically enabled self-service contributes to increased productivity in organizations. The paper stressed that the level of productivity with electronic applications is determined by the extent of knowledge one have of such electronic applications and the degree of utilizing such knowledge in carrying out certain operations as designed for use. It takes the intelligence, leadership and drive of the people function to make an organization productive.

Keywords: Electronic Application, Productivity, Productivity Improvement, Organization.

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1. Introduction

Between the transition from 31st December, 1999 to 1st January, 2000, the world over was curious about the uncertainty that characterize human existence. Tensions, apprehensions, expectations were all at its height! This era, Year 2000 (Y2K), marked the era of digitalization and significant growth in technology. Twenty-two years after, how has this technology impacted the corporate world of work?

Technology, a branch of machinery, an entirely organized and interdependent assembly has now been dictating the technicization of everyday life, ranging from politics, governance, economics, bureaucratic administration, transportation, communication to advertising, tourism, to mention but a few. Over the past decades, the technological system has gradually become so intrinsic and all-pervasive that like the air we breathe, it often seems invisible. Technology is like a modern virus that has pervaded the human system, making us incomplete without these electronic devices/gadgets. In countless ways human rhythms have succumbed to technological rhythms, which we attempt to humanize by such words as user-friendly, though they have a habit

of ambushing us, like computer viruses. Technology is above all for use; if you have it, you use it.

No one can deny that our world is changing so fast. Technology has enabled information to flow rapidly around the world and to dramatically change when, where, and how we live and work. Global changes affect all aspects of our personal and professional lives. We inhabit global villages where events in any one part of the world quickly become news and actionable everywhere.

Over the last few years, digital and internet technologies have radically changed the way we work, requiring a tremendous change in all areas of corporate organizations. Almost every part of management, service delivery functions, and communication has been radically changed by technology-electronic applications. The implications of the dynamism associated with electronic applications is that: we have to educate ourselves and reinvent traditional practices; we must reinvent what we do and what we know; we have to become facile with technology, data, and research-thus we must be familiar with software, data, analytics, mobile tools, and all the vendors

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building innovative solutions; we have to turn ourselves outward into the business. This becomes a necessity as electronic applications is gradually taking the place of the human being. Technologically enabled self-service has become a productivity improvement tool via information and communication technology (ICT). And there is no question that the digital transformation of business will continue to accelerate. How we work, what we do, and how computers and data inform and aid our jobs will continue to change over time. Given this trend of technological transition, irrespective of any profession we are in, we must reinvent ourselves so that we can stay relevant, valued, and strategic in the organization of the future.

After two decades of the technological revolution, the covid-19 pandemic in late 2019 and early 2020 put the global communities to a standstill and practically all areas of human lives and business activities were grounded to a halt with the prolonged locked down as a means of curbing the spread of the covid-19 virus. This situation however emphasized the embrace of acceptance and adoption of modern technology in carrying out business activities wherein lots of organizations that could not survive or thrive went into extinction. Given this turbulent landscape, change leadership and an organization's productive capability need to be constantly evolving. In fact, the ability to manage unpredictable change demands is commonly cited as the biggest factor separating high and low performing organizations. [1] It is against this background that this paper seeks to examine electronic applications as a productivity improvement tool in organizations.

2. Conceptual Clarification

2.1 Electronic Applications: It refers to various electronic application tools which are used in the corporate world of work. It is a form of technology involving the use of information and communication technology in various operations, which seeks to improve services delivery, operational/administrative efficiency and effectiveness, and availability and accessibility of information to all parties to mention but few.

2.2 Productivity: There exist divergent views on the definition of the concept of productivity. In this vein, Nkogbu [2] noted that the quest to find a single definition, which is equally applicable to all organizations, is fruitless. Nevertheless, some definitions are hereby reviewed.

Nkogbu and Offia [3] gave a comprehensive conceptualization of productivity. They posited that productivity ranges from efficiency, to effectiveness, to reduced rates of turnover and absenteeism, to high output measures, to measures of client or customer satisfaction, to intangibles such as disruption in the workflow and to further intangibles such as morale, loyalty and job satisfaction. According to Ojo [4],

productivity means the relationship between output and all factors of production required to achieve it. Prokopenko [5] defined productivity as the relationship between the output generated by a production or service system and the input provided to create this output.

According to Ulrich [6], productivity refers to a ratio of output to input. According to him, input may include labour hours or costs, production costs and equipment costs while output may consist of sales, earnings, and market shares. However, firms assume that or have shown that productivity is affected by employee's knowledge, skills, abilities, attitudes, motivation and behaviours. To Neugarten [7], productivity is defined from three major perspectives that dominate the field: the economic, the industrial engineering, and the administrative. To the economists, productivity means more yield to the society must be obtained from present resources and that efficient resource use is therefore paramount. Industrial engineers, on defining productivity, focus on work measurement and performance standards and tend to focus their efforts on those factors which are operational and quantifiable. As per productivity to the administrator, they are more concerned with organizational effectiveness than with the society.

Mali [8] sees productivity as "the measure of how resources are brought together in organizations and utilized for accomplishing a set of results". Productivity is reaching the highest level of performance with least expenditure of resources. According to Menon (1956) in Obisi [9], productivity means an organized mass attack on waste of every type and in every sphere. Thus, it implies development of an attitude of mind and a constant urge to find better, cheaper, quicker, easier and safer ways of doing a job, providing service, and manufacturing an article. It aims at the optimum utilization of the available resources to yielding as many goods and services as possible at the lowest possible cost. Inyang [10] defined productivity as the output and input ratio within a given time frame and with special attention to quality and the efficient use of resources.

The National Productivity Centre, as cited in Oduwaiye [11], defines productivity as doing the right things the right way, getting more output within less input, getting more output with the same input, punctuality and promptness, elimination of wastes in all forms, justifying your pay, improvement in all aspects of life, producing more and more of better quality.

Summarily, productivity means the ability to bring out THE BEST in self and others as well as the activities one engages in.

2.3 Organizational Productivity: Organizational productivity refers to the output or performance of organizations [1]. It varies from private to public sector organizations. According to him, organizational productivity can be viewed from two different perspectives. They are the financial and non-financial

perspectives. The financial performance indicator includes sales turnover, market share, earnings per share (EPS), profitability, return on investment (ROI), return on assets (ROA), total revenue generated; whereas non-financial performance indicator includes customer satisfaction, innovation, workflow improvement, skills development, time and quality in service delivery, effectiveness and efficiency in services, etc. To him, productivity in public sector organizations is mainly viewed from the non-financial perspectives as against the financial perspective in private sector organizations.

2.4 Productivity Improvement: It is to doing the right things better and making it a part of continuous process. Productivity improvement can be achieved in a number of ways:

- If the level of output is increased faster than that of input, productivity will increase.
- Productivity will be increased if the level of input is decreased faster than that of output.
- An organization may realize a productivity increase from producing more output with the same level of input.
- Producing more output with a reduced level of input will result in increased productivity.

Any of the above scenarios may be realized through improved methods, investment in machinery and technology (including electronic applications), improved quality, and improvement techniques and philosophies such as just-in-time, total quality management, lean production, supply chain management principles, and theory of constraints.

Table 2.1: Table Showing the Summary of Productivity Definitions

S/N	CONCEPT	SUMMARY
1	Objective concept of productivity	<ul style="list-style-type: none"> • It can be measured, ideally against a universal standard. • It can be used for tactical reasons such as project control or controlling performance to budget. • Organizations can monitor productivity for strategic reasons such as corporate planning, organization improvement, or comparison to competitors.
2	Scientific concept of productivity	<ul style="list-style-type: none"> • It can also be measured in quantitative terms, which qualifies it as a variable and therefore, it can be defined and measured in absolute or relative terms. • Can be logically defined and empirically observed. • It is much more useful as a concept dealing with relative productivity or as a productivity factor.
3	Measure concept of productivity	<ul style="list-style-type: none"> • Useful as a relative measure of actual output of production compared to the actual input of resources, measured across time or against common entities. • Productivity measure describes how well the resources of an organization are being used to produce input. • As output increases for a level of input, or as the amount of input decreases for a constant level of output, an increase in productivity occurs.
4	Efficiency concept of productivity	<ul style="list-style-type: none"> • Productivity is often confused with efficiency. Efficiency is generally seen as the ratio of the time needed to perform a task to some predetermined standard time. However, doing unnecessary work efficiently is not exactly being productive. • It would be more correct to interpret productivity as a measure of effectiveness (doing the right thing efficiently), which is outcome-oriented rather than output-oriented.
5	Partial concept of productivity	<ul style="list-style-type: none"> • Partial-factor productivity is the ratio of total output to a single input. • Considers a single productivity input in the ratio. • Output/labor, output/machine, output/capital, or output/energy.
6	Multi Factor concept of Productivity	<ul style="list-style-type: none"> • Utilizes more than a single factor. • Multifactor productivity is the ratio of total output to a subset of inputs: • A subset of inputs might consist of only labor and materials or it could include capital.

7	Total Factor concept of Productivity	<ul style="list-style-type: none"> It is measured by combining the effects of all the resources used in the production of goods and services (labor, capital, raw material, energy, etc.) and dividing it into the output
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3. Requirements for The Deployment of Electronic Applications

Given the importance of electronic applications as productivity improvement tools in organizations, some fundamental requirements listed here under are worthy of consideration prior to its deployment. They include:

1.Skills: Electronic application project, especially informative-intensive, needs a variety of skills. A major consideration for the deployment of electronic applications requires skills inventory, i.e., analysis and interpretation skills. Skills inventory start with problem definition, the process by which an organization describes current symptoms and uncovers the processes, policies, and practices that are contributing factors. At this stage, process analysis, system audits, stakeholders' analysis, customer satisfaction surveys, performance reviews, statistical trending, or similar activities are needed. In later stages, analysis of user needs, business process alternatives, work flow, etc. become more important.

2.Strategy: The deployment and application of electronic applications must have a strategy for it to be successful and result-oriented. Strategy is concerned with mission-critical objectives, with an emphasis on customers and stakeholders. Strategy place a high value on human, organizational, and technological resources and seek maximum return on those investments, rather than minimized costs. The first element of strategy is a clear and agreed upon description of the business policy, or programme need that is the reason for the effort. It also addresses existing reality. Hence a strategy for electronic applications should have a reasonably long life so that it can guide action into the foreseeable future.

3.Technology: Technology choices have powerful immediate and long-term implications. These choices influence many aspects of an organization, including skills and staffing patterns, work processes, and the choices and operations of other technologies. New technology usually comes with new business rules, practices and processes that become resistant to change after implementation. Nevertheless, the status of existing technology infrastructure is another critical factor in the decision about which technology to choose and how to deploy it. Changes in the type and number of users, responsiveness, capacity, level of security, types of connection, and interfaces will all need to be considered in both acquisition and implementations.

4.Data Challenge: This requires managers to bridge the gap between business needs (i.e. programme initiatives and work practices) and the relevant data available to support them. Data is the raw material for decision-making and planning. Turning data into usable information requires an understanding of what work must be accomplished as well as the data available to

help.

5.Policies: Information policies in the form of laws, regulations, executive orders, and other official statements guide actions and decisions about why, how, when, and who uses information. Within this premise, electronic applications policies should include policies that promote information stewardship and policies that promote information use.

6.Cost: This kind of exercise involves three kinds of relationships to be considered in estimating the cost. The first is managing the relationships inside the day-to-day working environment of the exercise. The second has to do with maintaining relationships with immediate sponsors/stakeholders. The third is managing relationships in the larger environment. Identifying external stakeholders, securing strategic partnership with them, and maintain those relationships all require more time and money.

4. Benefits of Electronic Applications

The benefits of electronic applications within organizations include:

1. Government that is cheaper- producing the same outputs at lower cost.
2. Government that does more- producing more outputs at the same total cost.
3. Government that is quicker- producing the same outputs at the same total cost in less time.
4. Government that works better- producing more outputs at lower total cost in less time and to a higher quality standard.
5. Government that is innovative- producing new outputs.
6. It familiarizes individuals with electronic information and educates them about the benefits of using advanced technology.
7. It enables telecommuting and transparency of information.
8. Provides integrated informative systems with social, cultural and economic aspects of the individuals.
9. It removes time and location barriers as it enhances data acquisition, transformation and retrieval, unlike the data chaos in a traditional service provider.
10. It promotes reuse of information and reduces operation time.
11. It reduces costs and improves information access for decision-making.
12. Allows searches of large volumes of heterogeneous data (documents, pages, database, messages, multimedia).

5. Areas of Usage of Electronic Applications

Electronic applications are used virtually in all

fields of profession. The areas of usage of electronic applications include Education, Administration, Governance, Government, Agriculture, Commerce, Engineering, Banking, Marketing, Security, Health, Management, etc.

Specifically, electronic applications can be used in: online voting in corporate institutes e.g. CIPM; biometric data capturing of employees; payroll administration; processing of permits/licenses e.g. DPR permit; online payment for goods and services; e-ticketing; hotel reservations and booking; flight bookings; payment of taxes; e-administration; e-recruitment; e-assessment (CBT); e-passport; e-learning; architectural designs; security (CCTV) etc.

Public and private sector organizations in Nigeria that make use of electronic applications include but not limited to the following: Joint Admissions and Matriculation Board (JAMB); Ministry of Petroleum Resources; Nigerian National Petroleum Corporation (NNPC); Nigeria Immigration Service; Nigerian Custom Service; State Governments across the federation; Federal Inland Revenue Service (FIRS); States Boards of Internal Revenue; Federal, States and Private Universities, Polytechnics, Colleges of Education; National Bureau of Statistics, Chevron Nigeria Limited, Shell Petroleum Development Company, Nigerian Stock Exchange, Banks, private recruiting firms, etc.

6. Why Productivity Improvement?

For governments at all levels, these are times of shrinking resources and rising demands from citizens. The litany of conflicting pressures is all too familiar by now. On the one hand, the public continues to demand more and better services. On the other hand, the cost of providing these services continues to rise steeply coupled with an increase in the cost of doing business. Also, the economic situation of the nation is worrisome hence the need for productivity improvement. According to Nkogbu (2015), pressures for organizational productivity have been aggravated by limited resources, leadership failures, wide spread poverty, unemployment, failed infrastructures, high rate of corruption, and high cost of public services, etc.

Given the importance of public goods, taxpayers and consumers/clients alike of government services are demanding for the best quality and value for their hard

earned naira. Government and organizations realize that in order to win the heart of the populace, they must “accomplish more with less”. The quest for effective and efficient service delivery has led government to adopt “rightsizing”, “downsizing”, “deregulation”, “commercialization”, and “privatization” amongst other strategies, all in the quest for improved productivity. Key components of such strategies include productivity and quality improvement programmes; streamlining of operations; mergers of ministries and departments with duplicative functions; and divestiture of businesses in which they are not competitive. Recent among the adoption of productivity improvement strategies is the use of electronic applications in service provision and delivery. As a result of the impact of information and communication technology (ICT) on productivity in the public sector, the quest for upscaling and upgrading of knowledge, skills, and abilities of employees for optimum performance of public organizations has become more important now than ever before.

Nkogbu observed that productivity improvement in organizations is dependent on some factors- systems, structures, strategies, practices, processes, technology and people. According to him, productivity in organization is a function of structures, systems, strategies, practices, process, technology which are contingent on the quality and quantity of people within a given period of time.

$$Pr = \frac{f\{St, Sy, Sg, Pt, Pc, Tc\}^p}{Ti}$$

$$ROI = \frac{Iv\{St, Sy, Sg, Pt, Pc, Tc, Pp\}}{Ti}$$

Where Pr=Productivity;
 St=Structure; Sy=System;
 Sg=Strategy; Pt=Practices
 Pc=Processes; Ti=Time
 Tc=Technology; Pp=People
 Iv=Investment.

In a similar vein, Nkogbu (2015) argued that return on investment, another terminology for measuring productivity in organizations, is dependent on the amount of resources invested on organizational structures, systems, strategies, practices, processes, technology, people within a given period of time. Thus, time is the measurement instrument of ROI.

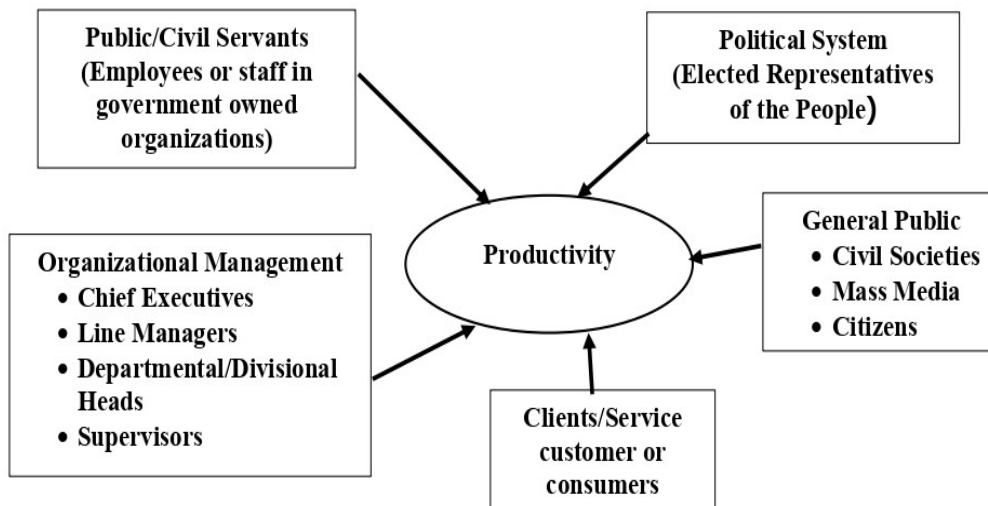


Figure 6.1: Conceptualized Model of Stakeholders of Productivity in Public Sector Organizations

Productivity Improvement: A Necessity Arising from The External Environment Of Organizations.

Today's organizational environment comprises a kaleidoscope of change. As Peter Drucker^[12] noted, "the only thing we know about the future is that it will be different". The external environment of organizations comprising economic, science and technology, social, political and cultural variables all have impacts organizations. Globalization has further integrated economies across nations thus making economies of various countries integrated and interdependent on one another. The pace of science and technology is unparalleled. The increasing global interconnectivity and workplace diversity have necessitated a sophisticated organizational response^[13] and puts adaptability at the centre of organizational strategies^[14] (Davies et al., 2011). The impacts of change drivers in the external environment are multi-fold and far-reaching. The changes are multi-fold as they may impact both organizations and individuals at the same time, albeit in varied ways. They are far-reaching as they may transform the way work is performed and the skills required.

Characteristics of the external environment of organizations include:

- **Complexity:** The external environment has many interconnected parts that can be overwhelming and confounding. It consists of several systems which have influence on the organization.
- **Uncertainty:** The organizational external environment is characterized by unprecedented trends which mean that long-term trajectories are more difficult to predict.
- **Volatility:** The external environment is unstable and presents challenges that are unexpected at great speed.
- **Ambiguity:** The external environment is hazy with many unknown unknowns and cause-and-effects are unclear.
- **Dynamic:** It means that external environment is unstable and is in a continuous change which cannot be determined with precision.

7. Productivity Improvement: The Organization's Response

Organizations around the world are experiencing disrupting changes in the demand for critical skills. Numerous studies have reported that the external environment of organizations is complex, uncertain, volatile, ambiguous and dynamic-CUVAD^[15-16] (Bennet & Lemoine, 2014; Johansen, 2007). To meet and respond to the CUVAD challenges in the external environment, organizations must be adaptive, agile and ambidextrous. To be adaptive, organizations need to be attuned to the external environment so as to sense and recognize changes and their various implications. Recognition for the need and type of change should be followed by the ability to internally accommodate and assimilate the change as the first step in adapting to the

new environment.

To be completely adaptive to its environment, an organization also needs to be agile. Agility is the dynamic capability of an organization to change strategic direction and organizational competencies. Agility also involves being flexible and fast in integrating new ways of working to operate in the new landscapes and rules of the game. The ability to both change and manage change is vital, but arguably an effective working environment requires an element of stability. Alongside the need for agility, organizations need to keep core operations functioning, which are likely to require an element of stability in both people practices and processes. So how does an organization balance the need for stability, while at the same time equipping itself to face a CUVAD environment? The answer: to do both at the same time.

Organizations must be ambidextrous in their operations and learning. This is a balancing act that involves concurrently exploiting present capabilities while being explorative in breaking with the past and ready for new opportunities and trajectories of development. The adoption and deployment of electronic applications will help in a number of ways.

8. Productivity Improvement Techniques

A number of productivity improvement techniques were developed in Japan after World War II. Toyota, a giant Japanese automobile company was pioneer in development and application of various productivity improvement techniques under Toyota Production System (TPS). Taiichi Ohno developed the Toyota Production System (TPS) after World War II. Some productivity improvement techniques include:

a. JIDOKA: Jidoka is a Toyota concept aimed at describing the man-machine interface such that people remain free to exercise judgment while machines serve their purpose. The jidoka system shows faith in the worker as a thinker and allows all workers the right to stop the line on which they are working. Jidoka is often referred to as "automation with a human mind". The jidoka way of working consists of following three principles- Do not make defects; Do not pass on defects; and Do not accept defects.

b. KAIZEN Techniques: Kaizen (Continuous improvement) is a management supported employee driven process where, employees make a great number of continuous improvement efforts.

c. HEIJUNKA: Heijunka focuses on achieving consistent levels of production. It is defined as 'distributing the production of different [body types] evenly over the course of a day'. It incorporates the principles of line balancing by attempting to equate workloads, leveling demand out by creating an inventory buffer and replenishing that buffer. This productivity improvement technique believes in providing even work load for all employees. Heijunka has the capability of reducing lead times by minimizing time losses due to frequent process changeovers.

d. Work Standards: Work standards represent the best way of doing a job and it consists of set of documented policies, rules, directives and procedures established by the management for all major operations to enable employees to perform their jobs without errors and to enable management to minimize variations in output, quality, work-in-progress and cost. Three elements of standardized work are task-time, work sequence and standard work-in-progress. The key steps in implementing work standards are (i) identify the key issues in the current process (ii) map the process (iii) improve the process (iv) implement the process and (v) sustain the process.

e. The PDCA/SDCA Cycle: The PDCA (Plan-Do-Check-Act) cycle is an endless improvement cycle which demands that each team Plans (establish a target for improvement through action plan), Does (implement the plan), Checks (monitor and evaluate effects), Acts (Standardizes new procedures or set goals for further improvement). Since every process is initially unstable, it must be stabilize using SDCA (Standardize-Do-Check-Act) cycle. Thus, a SDCA cycle must precede every PDCA cycle to consolidate gains into current process before raising the standard threshold.

f. Suggestion Systems: This technique is the process owned by employees which is designed to benefit the company, by inviting employees to suggest / implement any idea, large or small, novel or mundane concerning any aspect of the company life. It is a kind of feedback mechanism system provided by employees on ways/methods of improving productivity.

g. Kanban: Kanban is a manual production scheduling technique controlled by a process or machine operator. Kanban means card in Japanese, is attached to given number of parts or products in the production line instructing the delivery of given quantity. The kanban card after all parts/products have been used up is returned by the operator to its origin. Production is controlled through demand originating from external customer.

h. Total Productive Maintenance (TPM): TPM is keeping machines in good working condition through systematic maintenance of equipment so that they fail less frequently and production process continues without interruption.

9. Conclusion

The level of productivity with electronic applications is determined by the extent of knowledge of such electronic applications one has and the degree of utilizing such knowledge in carrying out certain operations as designed for use. It takes the intelligence, leadership and drive of the people function to make an organization productive. Electronic applications are just one of the tools of productivity improvement. The quest for return on investment (ROI) is the quest for productivity measurement. An investment in electronic applications today might not yield the returns as expected in the short term but will surely will in the long run. A case in point is the deployment of electronic applications in the Central Bank of

Nigeria by the Human Resource Management team in the assessment for promotion of over 2000 employees. This strategy made the organization to save over N200 million. This singular innovation made Central Bank of Nigeria to win the Chartered Institute of Personnel Management of Nigeria (CIPM)'s 2015 HR Optimization Award.

Progress is a vehicle; those who refuse to get on board are left behind. To this end, how smart are you with your smart phone? How savvy are you technology wise? How prepared are you for the new e-app that will be developed soonest in your area of expertise?

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