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**GREEN COMPUTING AND WELLBEING OF EMPLOYEES OF INDIGENOUS OIL COMPANIES IN RIVERS STATE****BESTMAN, Anthonia Enefaa**Department of Office and Information Management  
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This study examined the relationship between green computing and wellbeing of employees of indigenous oil and gas companies in Rivers State. The study adopted a correlational research design and collected primary data through a cross-sectional survey, using a structured questionnaire. The population of the study comprised 270 employees of 26 registered indigenous oil servicing companies in Rivers State. The study derived a sample of 161 employees using the Taro Yamen formula. The reliability of the instrument was determined using of the Cronbach's Alpha coefficient with a threshold of 0.70. The hypotheses formulated for the study were tested using the Spearman's Rank Order Correlation, relying on the Statistical Package for Social Sciences (SPSS). The study found that green computing and wellbeing of employees of indigenous oil and gas companies in Rivers State have positive and statistically significant relationship. The study thus concludes that green computing significantly influences employee wellbeing; and recommends that indigenous oil companies in Rivers State that seek improved wellbeing of employees should institute and encourage the use green computing infrastructure.

**Keywords:** Employee wellbeing, employee longevity, employee creativity, green computing

**INTRODUCTION**

Employee wellbeing is a basic challenge confronting organizations in developing countries. Ability to access affordable food, clean portable water, energy, shelter, job security for present and future employees, education for children, etc. These are basic to employee wellbeing; and employers must provide employees with wages that enable them access and enjoy them. Employers must also create rewarding working opportunities for present and future employees, since the growth and sustenance of firms depends, ultimately, on employees (Iganigan & Unemhilin, 2011). Human capital development practices and processes face several problems that inhibit their effectiveness for organizational growth and sustainability. First, the inability of Human Resource Managers to properly identify and determine training and development needs is a serious human capital development problem as it not only leads to under development of employees but also under-selection of employees for training. Second, poor assessment of training and development needs often lead to poorly designed and packaged training and development programmes. Third, the use of incompetent trainers to help in the development of employees also undermines the efforts of management to have well-trained human resources in the organization. Fourth, lack of or inadequate training and development facilities as well as management commitment also pose a threat to human capital development. Fifth, irregular and poor implementation of training and development programmes for human capital also affect growth and sustainability. Furthermore, the

lack of environmentally friendly practices such as green computing negatively impacts employee wellbeing.

Green computing or its alternative “Green IT” have recently become widely trendy and taken on increased importance in organizational discourses. The conceptual origin of green computing is almost two decades old. In 1991 the Environmental Protection Agency (EPA) introduced the Green Lights program to promote energy-efficient lighting. This was followed by the ENERGY STAR program in 1992, which established energy-efficient specifications for computers and monitors (Elkington, 1999; Wilbanks, 2008). The swift growth of Internet-based business computing, often allegorically referred to as “cloud” computing, and the costs of energy to run the IT infrastructure are key drivers of green computing. Over the last several years the link between energy use and carbon generation and the desire to lessen both gave rise to green computing.

Increased energy use driven by rapid expansion of data centres has increased IT costs, and the resulting environmental influence of IT, to new levels. Enterprise data centres can easily account for than 50 per cent of a company’s energy bill and approximately half of the corporate carbon footprint (Mckeefry, 2008). Although energy use and its associated cost have been the key driver for green computing, a growing appreciation of the risks of climate change and increasing concerns about energy security have elevated green computing to a global issue. The new administration in the United States has stated intentions to endorse a “green energy economy” which will likely cap carbon emissions, increase energy costs and holds companies more accountable for their impact on the environment (Daoud, 2008).

Due to the immediate influence on business value, it is likely that green computing will remain focused on reducing costs while improving the performance of energy-hungry data centres and desktop computers. However, it is not likely that this first wave of activity will fully extend to the general minimization of the ecological footprint of IT products for companies and their customers. Ecological issues involving IT product design, supply chain optimization, and changes in processes to deal with e-waste, pollution, usage of critical resources such as water, toxic materials, and air shed will need to be more fully addressed. Although these first-signal activities are driven more by cost-reduction-based business value, there is growing potential for green IT products being the deciding factor in terms of the intangible benefits of “greenness” to customers.

Firms today, position products in terms of energy consumption and lower costs, but the real benefit over time may be in positioning on environmental and social responsibility of the company itself (Murugesan, 2008; Pohle & Hittner, 2008). Thus, the purpose of this study is to investigate the relationship between green computing and employee wellbeing of indigenous oil and gas Companies in Rivers State.

## **THEORETICAL FOUNDATION**

This study is premised on the diffusion of innovations theory. Diffusion of innovations theory seeks to explain how innovations are taken up in a population. An innovation is an idea, behaviour or object that is perceived as new by its audience (Bestman & Alfred, 2022). Diffusion of innovations theory takes a different approach than most other theories of change. Instead of focusing on persuading individuals to change, it sees change as being primarily about the evolution or “reinvention” of products and behaviours so they become better to fit the needs of individuals and groups. The theory explains why some innovations spread faster than others; and posits that five

factors determine the diffusion of an innovation: relative advantage, compatibility, complexity, trialability, and observability.

One of these factors is the relative advantage associated with the innovation. If an innovation is perceived to be better than an idea that it supersedes, then it is likely to diffuse faster. Also, if an innovation is perceived to be compatible with existing values and practices then it will diffuse faster (Robinson, 2009). In addition, simplicity and ease of use facilitates diffusion of innovation. New ideas that are simpler to understand are adopted more rapidly than innovations that require the adopter to develop new skills and understandings.

The other factor that can also influence the diffusion of an innovation relates to the degree to which it can be tried or experimented on a limited basis (trialability). The last factor that can influence the diffusion of an innovation relates to how easier it is for individuals to see the results of an innovation (observability), the more likely they are to adopt it. Visible results lower uncertainty and also stimulate peer discussion of a new idea, as friends and neighbours of the adopter often request information about it. This theory is important in explaining the diffusion of innovations that are essential in the management of the environment.

### **CONCEPT OF GREEN COMPUTING**

Green computing, green information technology and sustainable computing are terms used without distinction in meaning between them. The terms relate computers to the environment, whether through power consumption, or materials and processes involved in the construction/destruction of computers. The focus is on minimizing the negative impact of these factors. For example, when the term green computing is applied to computer power consumption, it means minimizing power consumption, hence, lessens negative impacts of consuming power. When the term green computing is applied to construction/destruction of computer equipment, it means designing, producing and handling equipment in the least harmful way. Thus, green information technology includes the dimensions of employee wellbeing, the economics of energy efficiency, and the total cost of ownership, which includes disposal and recycling (Murugesan, 2008).

Green computing also includes the goals of controlling and reducing the environmental footprint of computing by minimizing the use and discharge of hazardous materials, conserving water and other scarce resources, and reducing waste throughout the value chain (Zhong et al., 2010). Green computing encompasses information technology product use over its lifecycle, and the recycling, reuse, and biodegradability of obsolete products. These goals seek to minimize the ecological footprint of information technology products for firms and their customers (Harmon et al., 2010). Green computing applies not only to power efficiency, but also the choice and management of material used in the construction and disposal of computers.

In practice, green computing uses computing resources efficiently. Modern information technology relies upon a complex mix of people, networks, and hardware. Hence, green computing initiatives must be systematic in nature, and address increasingly sophisticated problems. Green computing is the utmost requirement to protect environment and save energy along with operational expenses in today's increasingly competitive world. Green computing taken focuses on providing society's computing needs in ways that do not damage natural resources. This means creating fully recyclable products, reducing pollution, proposing alternative technologies in various fields, and creating a centre of economic activity around technologies that benefit the environment. The huge amount of computing manufactured worldwide has a direct impact on environment issues (Nagaraju, 2013).

Nwankwo and Chinedu (2021) construes green computing as (i) the systematic application of eco-sustainable criteria in the design, production, sourcing, use and disposal of ICT technical infrastructure (ii) as well as within the human and managerial components of ICT infrastructure in order to reduce ICT, business process and supply chain related emissions, waste and water use; improving efficiency and generate green economic rent. Over the years, IT has fundamentally altered our *worklife* and improved our productivity, economy and social wellbeing. Today, Enterprises, governments and societies at large have a new important agenda: tackling environmental issues and adopting environmentally friendly practices. IT has been contributing to environmental problems, which most people do not realize. Computers and other IT infrastructure consume significant amounts of energy, which is increasing daily, placing a heavy burden on electric grids and contributing to greenhouse gas (GHG) emissions.

### EMPLOYEE WELLBEING

Employee wellbeing has grown to become a key issue as companies strive to make sure their employees remain happy and motivated. As a happy workforce is a productive workforce. Human resource professionals know that people are the heart of any successful enterprise, especially in tough economic times. People provide creativity and innovation, but these intangible contributions are rarely reflected in financial statements. Unlike structural capital, human capital never really belongs to the firm. People can walk out of the company doors at any time unless companies find ways to keep them by promoting their welfare.

Wellbeing refers to the state of being comfortable, healthy, or happy (Oxford English Dictionary, 2015). The term wellbeing at work addresses such issues as organizational commitment, quality of working life and absence of burnout (Kara et al., 2013); absence of occupational stress (Dobrevá-Martinova et al., 2002); positive feelings one has towards oneself in a work environment (Van Dierendonck et al., 2004); absence of depression and anxiety, positive mood (Shier & Graham, 2011). Researchers have synthesized these factors into broader concepts of wellbeing that include job satisfaction, emotional exhaustion, and job balance (Kuoppala et al., 2008; Skakon et al., 2010). Diener (1984) has used the term subjective wellbeing to describe a person's overall experience in life and suggested that it essentially reflects a person's self-described happiness.

Diener (1984) also explained the dynamics of subjective wellbeing. First, wellbeing is defined by external criteria as some ideal conditions that differ across cultures. Second, subjective wellbeing is labelled as life satisfaction because in attempts to determine what leads to positive evaluation of life, researchers have discovered that this subjective form of happiness is a global assessment of the quality of one's life guided by a one's own criteria. Components of employee wellness programs vary greatly among companies, but the expected benefits that are sought remain similar, ranging from decreased health care costs (Berry et al., 2010; Capps & Harkey, 2008) to reduced absenteeism and turnover (Miller, 2010; Poll, 2006) and enhanced productivity and company image (Baicker et al., 2010; Lee et al., 2010).

Employee welfare is crucial to quality service delivery. If welfare programs and services are inadequate, it would negatively impact service delivery and performance of employees. Employee welfare measures also include additional incentives provided by firms, such as housing, medical facilities, recreational facilities, cultural facilities, libraries, gyms and health clubs with the hope of improving employees' satisfaction index (Finger, 2005). Adequately designed and implemented employee welfare programmes or packages results in employee

wellbeing, and which frequently manifests in longevity and improved creativity of employees; both of which are essential to organizational wellbeing. In this study therefore, employee longevity and employee creativity are adopted as indicators of employee wellbeing.

### **Employee Longevity**

McGuire and McDonnell (2008) suggested that employee welfare facilities help significantly in enhancing self-confidence and intellectual level of employees which eventually increase employee productivity and help them to stay longer in the organization. This action will certainly lead to improved motivation, making the employee to be challenged to take on more challenging tasks and responsibilities. Torjman (2004) argued that welfare facilities and especially recreation services, account for healthy individuals besides increasing their happiness and emotional quotient. Once employees are happy, Torjman (2004) argues, they will have a positive work attitude, which leads to higher service delivery within the organization. Workplace wellness programs generally include any health promotion intervention, policy, or activity in the workplace designed to improve the health of workers (Csiernik, 2011; Lee et al., 2010). Common examples of wellness initiatives include health enlightenment programmes, health coaching, health screenings, health-related fairs, on-site fitness facilities, and/or healthy food options in vending machines (Lee et al., 2010). Often employers offer incentives to encourage workers to participate in health programmes. Miller (2012) suggests that about 73% of employers use some type of incentives to engage employees in health improvement programs.

### **Employee Creativity**

Creativity is defined as the generation of novel and useful ideas, products, and processes (Zhou & George, 2001). Creativity in the workplace is mostly about putting knowledge, experience and the mind to good use in order to come up with something new that may lead to innovation. Individual creativity is the ability to develop creative ideas influenced by personal characteristics. Among the countless personal characteristics that relates to creativity, the most important ones are general intellectual abilities, thinking styles, personality traits and motivation. Mathew (2012) advocates that employee welfare measures serve as oxygen for worker motivation and increases not only workforce effectiveness, but also creativity in solving unique organizational challenges, which would eventually lead to attainment of higher performance level and high service delivery in an organization.

## **GREEN COMPUTING AND EMPLOYEE WELLBEING**

Green computing requires changing government policy to encourage recycling and lowering energy use by individuals and businesses. Green IT benefits environments by improving energy efficiency, lowering Greenhouse gas emissions, using less harmful materials and encouraging reuse and recycling. Thus green IT includes dimensions of environmental sustainability, economics of energy efficiency and total cost of ownership, which includes cost of disposal and recycling (Murugesan, 2008). Increased awareness of the harmful effects of Greenhouse gas emissions, new stringent environmental legislation, concerns about electronic waste disposal practices and corporate image concerns are driving businesses and individuals to go green. Green computing strives to achieve economic viability and improved system performance and use, while abiding by social and ethical responsibilities.

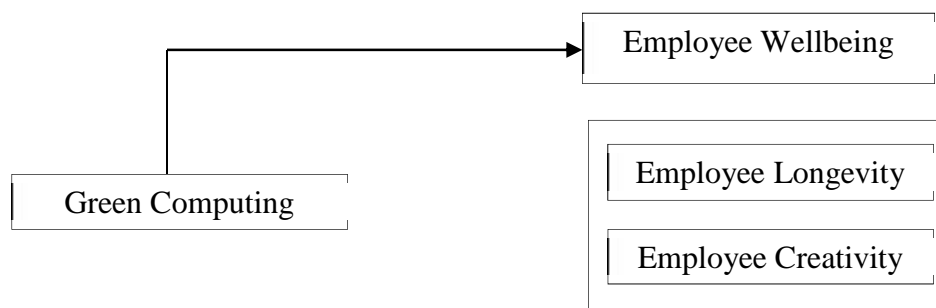
Green IT is an economic as well as environmental imperative. And, as many green advocates will attest, it is a social responsibility as well. The imminent introduction of more green taxes and

regulations will trigger a major increase in demand for green IT products and solutions. Hence a growing number of IT vendors and users have begun to develop and offer green IT products. As businesses and governments try to balance growth with environmental risks, “going green” in products, applications and practices will become a legal, ethical and/or social requirement.

Energy efficient green data centres are gathering momentum as organizations have started realizing its importance in energy conservation and sustainable development. It is applied to new technologies that cut down data centre energy costs and saving energy, which is synonymous with saving money. It has a big role to play in reducing power consumption in the data centre. Based on this position, the following hypotheses are formulated:

**H<sub>01</sub>:** There is no significant relationship between green computing and longevity of employees of indigenous oil and gas companies in Rivers State.

**H<sub>02</sub>:** There is no significant relationship between green computing and creativity of employees of indigenous oil and gas companies in Rivers State.



**Fig.1:** Conceptual framework for green computing and employee wellbeing  
Source: Desk Research (2021)

## METHODOLOGY

This study adopted a correlational research design and collected primary data through a cross-sectional survey. The instrument for primary data collection was a self-administered questionnaire. The population of the study comprise 270 employees of 26 registered indigenous oil servicing companies in Rivers State. The study arrived at a sample of 161, using the Taro Yamen’s 1970 formula. The final analysis was however, based on data gleaned from 146 copies of questionnaire which were found useful after data cleaning. The reliability of the instrument was determined via the Cronbach Alpha coefficient with all the items scoring above 0.70. Data presentation and analyses was done using both descriptive and inferential statistics. The hypotheses were tested using the Spearman’s Rank Order Correlation. The level of significance 0.05 was adopted as a criterion for the probability of accepting the null hypothesis at ( $p > 0.05$ ) or rejecting the null hypothesis at ( $p < 0.05$ ).

### DATA ANALYSIS AND RESULTS

**Table 1: Correlations between Green Computing and Employee Longevity**

|                   |                       |                         | Green<br>Computing | Employee<br>Longevity |
|-------------------|-----------------------|-------------------------|--------------------|-----------------------|
| Spearman's<br>rho | Green<br>Computing    | Correlation Coefficient | 1.000              | .419**                |
|                   |                       | Sig. (2-tailed)         | .                  | .000                  |
|                   |                       | N                       | 146                | 146                   |
|                   | Employee<br>Longevity | Correlation Coefficient | .419**             | 1.000                 |
|                   |                       | Sig. (2-tailed)         | .000               | .                     |
|                   |                       | N                       | 146                | 146                   |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output

The result of correlation obtained between green computing and employee longevity is shown in Table 1. The correlation coefficient of 0.419 confirms the direction and strength of relationship between the variables. The coefficient represents a positive correlation between the variables. The test of significance shows that the relationship is significant at  $p\ 0.000 < 0.01$ . Therefore, the null hypothesis is hereby rejected. Thus, there is a significant relationship between green computing and longevity of employee of indigenous oil and gas companies in Rivers State.

**Table 2: Correlations between Green Computing and Employee Creativity**

|                   |                        |                         | Green<br>Computing | Employee<br>Creativity |
|-------------------|------------------------|-------------------------|--------------------|------------------------|
| Spearman's<br>rho | Green<br>Computing     | Correlation Coefficient | 1.000              | .456**                 |
|                   |                        | Sig. (2-tailed)         | .                  | .000                   |
|                   |                        | N                       | 146                | 146                    |
|                   | Employee<br>Creativity | Correlation Coefficient | .456**             | 1.000                  |
|                   |                        | Sig. (2-tailed)         | .000               | .                      |
|                   |                        | N                       | 146                | 146                    |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output

The result of correlation obtained between green computing and employee creativity is shown in Table 2. The correlation coefficient of 0.456\* confirms the direction and strength of the relationship. The coefficient represents a positive correlation between the variables. The test of significance shows that the relationship between green computing and employee creativity is significant at  $p\ 0.000 < 0.01$ . Therefore, the null hypothesis is hereby rejected. Thus, there is a significant relationship between green computing and creativity of employees of indigenous oil and gas companies in Rivers State.

### DISCUSSION OF FINDINGS

This study examined the connection between green computing and wellbeing of employees of indigenous oil companies in Rivers State. The results of the statistical analyses show that green computing has positive and statistically significant relationship with employee wellbeing through employee longevity and employee creativity. These findings corroborates the report of Gowa (2009) information technology provides a basis for better decision making concerning environmental management. The underlying assumption is that good information management practices enhances the environment and improves quality of life of the people.

Blars (2004) established that green information technology is an economic as well as environmental imperative; as well as a social responsibility. The imminent introduction of more green taxes and regulations will trigger a major increase in demand for green information technology products, solutions and services. Hence a growing number of information technology vendors and users have begun to develop and offer green information technology products. As business and governments try to balance growth with environmental risks, we will be legally, ethically and/or socially required to “green” our information technology products, applications, services and practices. The finding also corroborates with an earlier similar study conducted by virtual communication and organizational responsiveness of indigenous oil and gas companies in Rivers State and found that there is a significant relationship between virtual communication and organizational responsiveness of indigenous oil and gas companies in Rivers State.

### CONCLUSION AND RECOMMENDATIONS

In view of the results of the statistical analyses and the discussion of findings in the preceding section, the study concludes that there is a positive significant effect of green computing on the wellbeing of employees of Indigenous oil and gas Companies in Rivers State. Thus, the study recommends that indigenous oil companies in Rivers State that seek improved wellbeing of their employees should institute green computing infrastructure and encourage employees to same with a view to enabling data saving, energy conservation, waste reduction and cost reduction. The study also recommends that indigenous oil companies in Rivers State should provide and encourage staff participation in health sensitization programmes, recreational facilities, etc. in order to improve the wellbeing of employees.

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