
Green Data Centre and Employee Wellbeing of Indigenous Oil and Gas Companies in Rivers State Nigeria

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Abstract: *This study examined the relationship between green data centre and employee well-being of Indigenous oil and gas Companies in Port Harcourt. The study utilized a cross-sectional research survey design. Primary source was sourced through self-administered questionnaire. The population of this study was made up of two hundred and seventy employees of the twenty-six registered indigenous oil servicing companies in Port Harcourt. The study sample of one hundred and sixty-one was arrived at using the Taro Yamen's 1970 formula. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70 selected. Data generated was analyzed and presented using both descriptive and inferential statistical techniques. The hypotheses were tested using the Spearman's Rank Order Correlation Coefficient. The findings revealed that green data centre and employee well-being of Indigenous oil and gas Companies in Port Harcourt. The study thus concludes that green data centre significantly influences employee well-being of Indigenous oil and gas Companies in Port Harcourt. The study recommends that employee should be encouraged to use cloud computing which enable data saving in case the organization system experience breaks down or crash in system.*

Keywords: *Green Data Centre, Employee Well-Being, Indigenous Oil and Gas Companies*

INTRODUCTION

In recent years, commercial, organisational and political landscapes have changed fundamentally for data centre operators due to the confluence of apparently incompatible demands and constraints. The energy use and environmental impact of data centres has recently become a significant issue for both operators and policy makers. The public perception of climate change and environmental impact has changed substantially, delivering real commercial impact for corporate environmental policy and social responsibility. Unfortunately, data centres represent a relatively easy target due to very high density of energy consumption and ease of measurement in comparison to other, possibly more significant areas of IT energy use. Policy makers have identified IT, specifically data centre energy use as one of the fastest rising sectors (Newcombe, 2009).

Green data centres have become increasingly popular in recent years due to their capability to reduce energy costs, reduce environmental impact, and improve business efficiency. As stated by Shuja, Bilal, Madani and Khan (2014) green data centres use innovative technology to reduce energy consumption, such as advanced cooling systems and server virtualisation. In addition, the

use of renewable energy sources such as solar, wind, and hydropower to power data centres can also contribute to a reduction in energy costs. Furthermore, green data centres are designed to reduce their environmental impact by making use of energy-efficient components and reducing the amount of waste produced. This can help to reduce carbon emissions, as well as water and air pollution associated with traditional data centres. Moreover, green data centres can improve business efficiency by providing reliable and secure data storage and access. This can allow businesses to quickly access and process data, which can result in higher productivity and improved customer service. In conclusion, green data centres have the potential to offer numerous benefits to businesses, such as reduced energy costs, improved environmental impact, and enhanced business efficiency (Uddin & Rahman, 2012)).

The implementation of a green data centre has a range of benefits for the environment. As found by Shuja, Bilal, Madani and Khan (2014)), green data centres can reduce energy consumption by up to 35%. This is an impressive reduction, especially when considering the amount of energy used by traditional data centres. Additionally, the energy efficiency of a green data centre can result in a reduction of greenhouse gas emissions, which are the primary cause of climate change.

The purpose of this study is to investigate the relationship between green data centre and employee wellbeing of indigenous oil and gas Companies in Port Harcourt, Rivers State Nigeria This study was guided by the following

- i. What is the relationship between green data centre and employee longevity of indigenous oil and gas Companies in Port Harcourt?
- ii. What is the relationship between green data centre and employee creativity of indigenous oil and gas Companies in Port Harcourt?

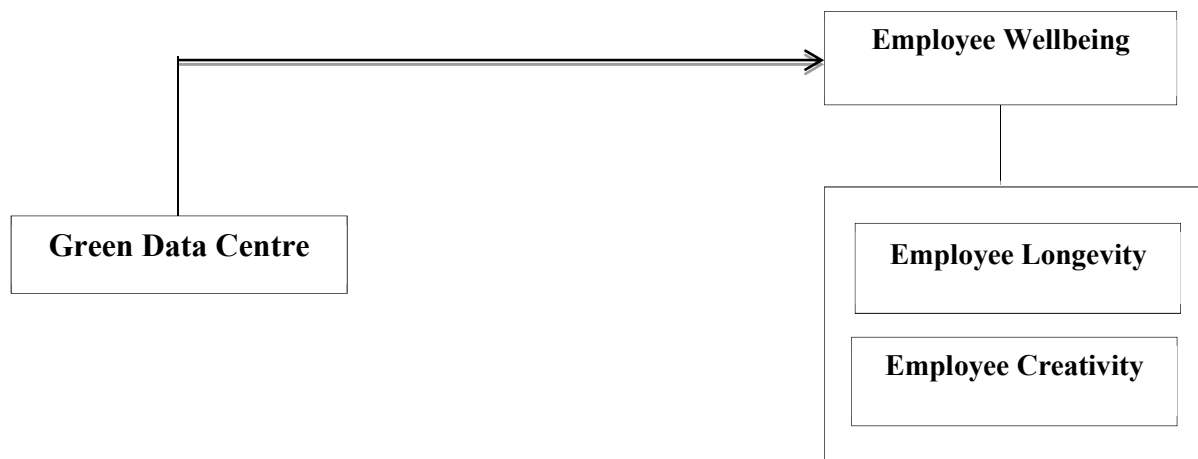


Fig.1: Conceptual framework for green data centre and employee wellbeing
Source: Desk Research (2022)

LITERATURE REVIEW

Theoretical Foundation

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. Diffusions of innovations theory take a radically different approach to 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. In this theory, it is not the people who change but rather the innovations. This theory also seeks to explain why some innovations spread faster than others. The theory posits that there are five factors that determine the diffusion of an innovation.

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. On the other hand if an innovation is perceived to be compatible with the existing values and practices then it will diffuse faster (Robinson, 2009). This implies that IT that are inclined towards environmental management are more likely to spread faster among commercial banks in Kenya. For instance most commercial banks are implementing paperless banking systems because they know it will reduce costs and also reduce paper work thus assisting in environmental management.

Robinson (2009) further asserts that simplicity and ease of use is one of the factors that determine the diffusion of an innovation into the population. Simplicity refers to the degree to which an innovation is perceived as difficult to understand and use. 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. 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, 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 technological innovations that are essential in the management of the environment.

Green Data Centre

The terms green computing, green information technology and sustainable computing seem to be used without distinction in meaning between them. The terms relate computers to the environment, whether through power consumption, or the materials and processes involved in the construction/destruction of computers (Bestman & Obadan, 2022). Data centers are the backbone of all digital operations and it is important that businesses strive to use resources in an environmentally conscious way (Uddin & Rahman, 2012). Green Data Centers are data centers which are built and operated using ecological principles, driving businesses to make an environmental effort to reduce their impact (Murugesan, 2008). The adoption of green data

centers has become increasingly popular for businesses looking to reduce their environmental impact. As Schulz (2016) explains, green data centers help businesses reduce their energy consumption and carbon footprint, as well as their cooling and operational costs. In addition, green data centers are more efficient and reliable, meaning businesses can save time on maintenance and repairs (Manganelli, Soldati, Martirano, & Ramakrishna, 2021). Furthermore, green data centers are more sustainable, meaning businesses can benefit from long-term cost savings. The technology used in green data centers is also much more advanced than traditional data centers, allowing businesses to take advantage of the latest innovations and trends. Finally, businesses can benefit from green data centers' lower carbon emissions, helping to reduce their overall environmental impact. Overall, the adoption of green data centers can be a great asset for businesses looking to reduce their environmental impact and save money in the long-term.

The implementation of green data centers has become increasingly important in recent years due to their ability to reduce energy consumption, cut operational costs, and promote environmental sustainability (Bilal et al., 2014). Data centers are used to store and process large amounts of information, and they require an immense amount of energy to function properly. By implementing a green data center, businesses can reduce their energy costs significantly. Additionally, green data centers can improve air quality, reduce water consumption, and reduce the amount of hazardous waste generated (Bilal et al., 2014). This can help businesses to reduce their environmental impact. Moreover, green data centers can improve the efficiency and lifespan of IT equipment, leading to improved performance and cost savings (Bilal et al., 2014). By making use of renewable energy sources, such as wind or solar power, businesses can also benefit from additional cost savings. In conclusion, the implementation of a green data center can provide numerous benefits to businesses, including reduced energy costs, improved environmental sustainability, and improved performance of IT equipment.

Green Data Centers are becoming increasingly important as organizations prioritize sustainability and cost reduction. Through the use of technologies such as virtualization, decreased cooling requirements, improved power factor, and increased energy efficiency, organizations can reduce energy consumption and their impact on the environment without a significant cost increase. Energy consumption in data centers is highly dynamic and managing it via robust technologies is the key to reducing consumption of polluting resources while reducing the cost of operation. With advantages ranging from cost savings, to increased energy efficiency, and environmental sustainability, these green Data Centers are likely to become an industry standard.

Employee Wellbeing

Employee wellbeing has grown to become a key issue as companies strive to make sure their employees remain happy and motivated in their work. As a happy workforce is a productive workforce. Human resource professionals know that people or human capitals 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 looking at their welfare.

Well-being refers to the state of being comfortable, healthy, or happy (Oxford English Dictionary, 2015). The term wellbeing at work include burnout, organizational commitment, and quality of working life (Kara, Uysal, Sirgy, & Lee, 2013); occupational stress (Dobрева-Martinova, Villeneuve, Strickland, & Matheson, 2002); positive feelings one has towards oneself in a work environment (Van Dierendonck, Haynes, Borrill, & Stride, 2004); lack of depression and anxiety, and positive mood (Shier & Graham, 2011). Systematic reviews of the quantitative research have synthesized these findings into broader concepts of well-being that include job satisfaction, emotional exhaustion, and job balance (Kuoppala et al., 2008; Skakon et al., 2010). Diener (1984) has used the term subjective well-being to describe a person's overall experience in life and suggested that it essentially reflects a person's self-described happiness.

Diener also explained the dynamics surrounding the measurement of subjective well-being. First, well-being has been defined by external criteria as some ideal condition that differs across cultures. Second, subjective well-being has been labeled as life satisfaction because in attempts to determine what leads to the 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 person's own set of criteria. The components of employee wellness programs vary greatly from company to company, but the expected benefits that are sought remain similar, ranging from decreased health care costs (Berry, Mirabito, & Baun, 2010; Capps & Harkey, 2008) to reduced absenteeism and turnover (Miller, 2010; Poll, 2006) to enhanced productivity and company image (Baicker et al., 2010; Lee et al., 2010).

Employee welfare is crucial for quality service delivery. If the welfare programs and services are inadequate, it would negatively impact the delivery of services and performance of the employees. Finger (2005) argued that improvement of employee morale and spirit can be done by addressing the issues of morale. Employee welfare measures relates to certain additional activities which are provided by an organization like housing facilities, transformation facilities, medical facilities, recreational facilities, cultural facilities libraries, gyms and health clubs among others with the hope of winning the satisfaction index of an employee.

Employee Longevity

McGuire and McDonnell (2008) suggested that the employee welfare facilities help significantly in enhancing the self-confidence and intellectual level of an employee 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 among their happiness and emotional quotient. Once employees are happy, Torjman (2004) argues that they will have a positive attitude towards work leading 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 health outcomes of workers (Lee, Blake, & Lloyd, 2010), although we know little empirically about various programs or their associated outcomes (Csiernik, 2011). Common examples of wellness initiatives include educational endeavors such as newsletters or seminars, 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 will offer incentives to encourage workers to participate; survey findings suggest that close to 73% of employers use some type of incentives to engage employees in health improvement programs (Miller, 2012).

Employee Creativity

Creativity is defined here as the production or generation of novel and useful ideas, products, and processes (Zhou & George, 2001). Creativity refers to the ability to generate novel and useful ideas. In a company setting, creativity 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, the most important ones related to creativity are general intellectual abilities, thinking styles, personality traits and motivation. Mathew (2012) advocated that employee welfare measures serve as an oxygen for motivation of the workers and increase not only the effectiveness of the workforce 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 Data Centre and Employee Well-being

Green computing even includes changing government policy to encourage recycling and lowering energy use by individuals and businesses. Green information technology benefits the environment by improving energy efficiency, lowering Greenhouse gas emissions, using less harmful materials and encouraging reuse and recycling. Thus green information technology includes the dimensions of environmental sustainability, the economics of energy efficiency and the total cost of ownership, which includes the cost of disposal and recycling. 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 information technology is an economic as well as environmental imperative. And, as many green advocates will attest, it is our social responsibility as well. 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 and services. 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 energy efficient and green data center is gathering momentum as organizations have started realizing its importance in energy conservation and sustainable development. It is applied to new technologies that can help in cutting down data center energy costs and in saving energy, which is synonymous to 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 put forward:

H₀₁: There is no significant relationship between green data centre and longevity of indigenous oil and gas companies in Rivers State.

H₀₂: There is no significant relationship between green data centre and creativity of indigenous oil and gas companies in Rivers State

METHODOLOGY

The study utilized a cross-sectional research survey design. Primary source was sourced through self-administered questionnaire. The population of this study was made up of two hundred and seventy employees of the twenty six registered indigenous oil servicing companies in Port Harcourt. The study sample of one hundred and sixty one was arrived at using the Taro Yamen’s 1970 formula. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70 selected. Data generated was analyzed and presented using both descriptive and inferential statistical techniques. The hypotheses were tested using the Spearman’s Rank Order Correlation Coefficient.

DATA ANALYSIS AND RESULTS

Bivariate Analysis

The level of significance 0.05 was adopted as a criterion for the probability of accepting the null hypothesis in (p> 0.05) or rejecting the null hypothesis in (p <0.05).

Table 4.14: Correlations matrix between Green Data Center and Longevity

			Green Data Center	Longevity
Spearman's rho	Green Data Center	Correlation Coefficient	1.000	.552**
		Sig. (2-tailed)	.	.000
		N	146	146
	Employee Longevity	Correlation Coefficient	.552**	1.000
Sig. (2-tailed)		.000	.	
N		146	146	

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

Source: SPSS Output

H₀₁: There is no significant relationship between green data center and longevity of indigenous oil and gas companies in Rivers State.

The result of correlation matrix obtained between green data center and longevity was shown in Table 1. The correlation coefficient of 0.552 confirms the direction and strength of this relationship. The coefficient represents a positive correlation between the variables. The test of significance shows that this relationship is significant at $p < 0.000 < 0.01$. Therefore, based on observed findings the null hypothesis earlier stated is hereby rejected and the alternate upheld. Thus, there is a significant relationship between green data center and longevity of indigenous oil and gas companies in Rivers State.

Table 1: Correlations Matrix between Green Data Center and Creativity

			Green Data Center	Creativity
Spearman's rho	Green Data Center	Correlation Coefficient	1.000	.615**
		Sig. (2-tailed)	.	.000
		N	146	146
	Creativity	Correlation Coefficient	.615**	1.000
Sig. (2-tailed)		.000	.	
N		146	146	

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

Source: SPSS Output

H₀₂: There is no significant relationship between green data center and creativity of indigenous oil and gas companies in Rivers State.

The result of correlation matrix obtained between green data center and creativity was shown in Table 1. The correlation coefficient of 0.615* confirms the direction and strength of this relationship. The coefficient represents a positive correlation between the variables. The test of significance shows that this relationship is significant at $p < 0.000 < 0.01$. Therefore, based on observed findings the null hypothesis earlier stated is hereby rejected and the alternate upheld. Thus, there is a significant relationship between green data center and creativity of indigenous oil and gas companies in Rivers State.

DISCUSSION OF FINDINGS

The finding of the study corroborates with the study on green data centre and employee well-being, according to Gowa (2009) established that information technology can provide a basis for better decision making concerning environmental management. The underlying assumption is that good information management practices which would eventually be positively reflected by an enhanced environment and improved quality of life of the people.

Blars (2004) in their empirical study established that green information technology is an economic as well as environmental imperative. And, as many green advocates will attest, it is our social responsibility as well. 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 and services. 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

This study concludes that there is a positive significant effect of green data centre on employee well-being of Indigenous oil and gas Companies in Port Harcourt.

The study recommends that there are a number of ways that a data center can be made "green", including:

- i. Utilizing energy-efficient servers, storage devices, and other equipment can help to reduce the overall energy consumption of the data center.
- ii. It also involves utilizing virtualization technologies can help to reduce the number of physical servers needed, which can in turn reduce energy consumption and the data center's environmental impact.

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