

(Original Article)

Review of Connection between ICT Practices and Climate Change in a Developing Nation

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Abstract - The advent of ICT has had great impact and increasingly prominent roles in lives of individuals both in private and business. The various equipment involved in deployment of this technology have their various energy consumption and invariably emit harmful substances. Emissions from various ICT equipment among which are telecoms, computer systems and hand-held electronic gadgets reportedly accounts for a significant percentage of global carbon dioxide emission which resulted to climate change. This study looks into the means of promoting efficient, effective and ethical use of resources in combating the menace of climate change especially those that emanate from the use of IT equipment in a developing economy targeting Nigeria as a case study. The population involved IT professionals in Nigeria. A structured questionnaire consisting items to elicit their awareness about effect of ICT on climate change and means of combating this menace was administered on the sample. Data gathered were analysed quantitatively. The prominent role of IT practitioners which is very vital in this direction is also investigated. Despite the awareness and concern of the respondents to the phenomenon, there are divergence opinions on necessary actions both at individual and organizational levels to reduce the emissions. Various recommendations are made including conservation and reduction in power consumption through increase in utilization, recycling and re-usability of equipment that could be adopted at various managerial levels of any establishment.

Keywords — Climate change, ICT, IT equipment, IT professionals, Recycling

I. INTRODUCTION

There are many occurrences that tend to change the normal settings of the earth. The long-term change in weather of a region can be referred to as climate change for that place. Climate change is a well-established phenomenon which has attracted research attention in the recent past. Some causes of the change are natural while some are caused by man. Among the natural causes is the changes in Earth's orbit and in the amount of energy emitted by the sun. Ocean changes and volcanic eruptions are also regular causes of climate

change ([1];[2]). The more appalling of the causes are those made by man.

Recent findings point to the fact that greater greenhouse gas concentrations in the atmosphere through unrestricted emissions will provoke severe climate alteration and ocean acidification ([3]; [4]). These changes have direct impact on world ecosystem and invariably on the life cycle of every living organism. Thus, climate change therefore poses major technical, socio-economic and environmental challenges which will have severe impacts on nations' pathways towards sustainable development ([3]; [5]; [4]; [2]). One of such sources of this menace is emission from IT equipment.

The advent of ICT has had great impact and increasingly prominent roles in lives of individuals both in private and business. However, it has its own shortcomings as well. The various equipment involved in deployment of this technology have their various energy consumption and invariably emit harmful substances. Emissions from various ICT equipment among which are telecoms and computer systems reportedly accounts for a significant percentage of global carbon dioxide emission. Globally, ICT generates 2% of the world's carbon emissions ([6]; [5]). Thus, the need for a holistic approach to the deployment of IT for sustainable computing across various establishments especially in third world countries is very imperative. Sustainable computing is much concern not only with the cost of purchasing IT equipment, but also emphasises on the environmental impact and the wholesome benefits of technology systems. This paper reports an investigation of IT practitioners' opinions on the review of the connection between ICT practices and climate change in a developing Economy. The following research questions are addressed:

- To what extent are IT professionals concerned about climate change?
- What are some of the processes IT professionals follow to increase their awareness of green IT?
- To what extent they are practicing Green IT in their professional and personal lives?
- How do they perceive their working environments preparedness to Green IT application software development?



II. MATERIALS AND METHODS

Data were collected through a survey of IT professionals in Lagos state using a structured questionnaire consisting items to elicit their awareness about effect of ICT on climate change and means of combating this menace. Nigerians IT practitioners formed the target population for the study. Eighty people were sampled across various sectors of the economy ranging from Education and research, Manufacturing, Communication services, Transportation and other professions. The structured questionnaire was subjected to scrutiny under three experts in the field of computer science and information technology to ensure its face and content validity. The corrections made were incorporated into final draft of the questionnaire. In order to make the instrument reliable, test-retest method was used, the two results got after two weeks interval were collated and analyzed using Cronbach’s Alpha, $\alpha = 0.87$ co-efficient value showed its high reliability.

III. RESULTS

Data analysis using a descriptive approach to explore whether there are significant differences in participant’s responses due to industry distribution, occupation, and working experience and bar charts visualization analysis were used.

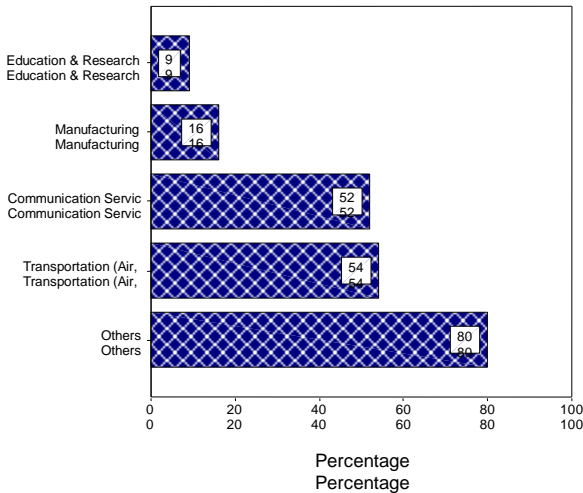


Fig 1: Industry Distribution of Respondents

The respondents come from a number of industries. Therefore, more than 80% respondents are from communication services, transportation and other industries like oil and gas Banking etc (see Figure 1)

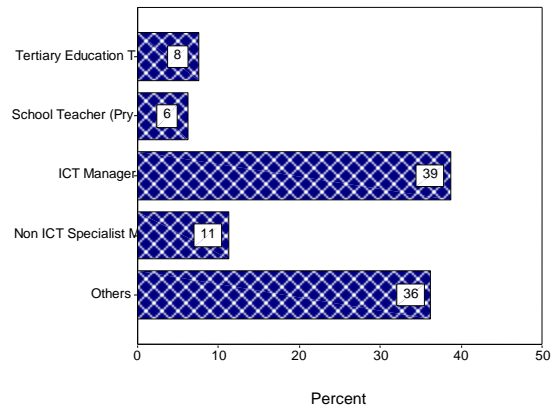


Fig 2: Occupation Distribution of Respondents

The highest percentage of respondents are found among ICT managers (Figure 2), follow by other occupations

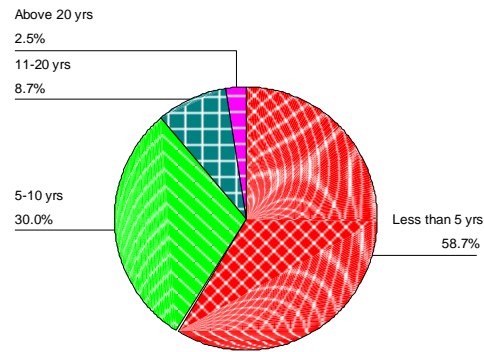


Fig 3: Work Experience Distribution of Respondents

Figure 3 shows that more than half of the respondents have been working that is not less than 5yrs, followed by 5-10yrs work experience respondents

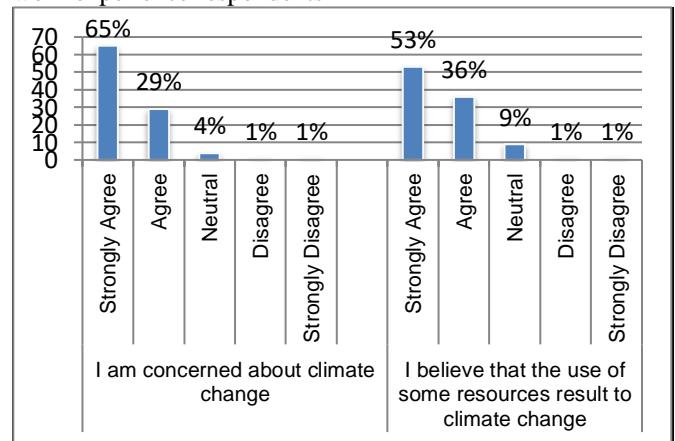


Fig 4: Concerning ICT Professionals about climate change

The concern of ICT professionals about climate change is always an important and critical issue from time to time. The results show that more than 90% of respondents are concerned about climate change and also believe that the use of some resources may result to climate change (see Figure 8). This result is in consonance with [8] international survey of Asia, Europe, USA and the rest of the world and [5] Green IT attitude and actions among Australian IT professionals. The [8] finding showed that more than 50% of the survey respondents were strongly concerned about climate change and [5] finding shows 80% of participants are concerned about climate change which is the same as the current finding. To [2], that conducted a research titled “Consumer attitudes to climate change” their findings show that two-third of the respondents (66%) said that they were either fairly or very concerned about climate change. [4] gave reason for concern in climate change when they said “The relationship between global mean temperature increase and damage to or irreparable lost of unique and threatened system: some unique and threatened system may be irreparably harmed by changes in climate beyond certain thresholds”. Findings from [7] on the attitudes on climate change showed that 66 % of people think that change is occurring.

carbon footprint but also to be an integral and core part of a business’s overall Green strategy.

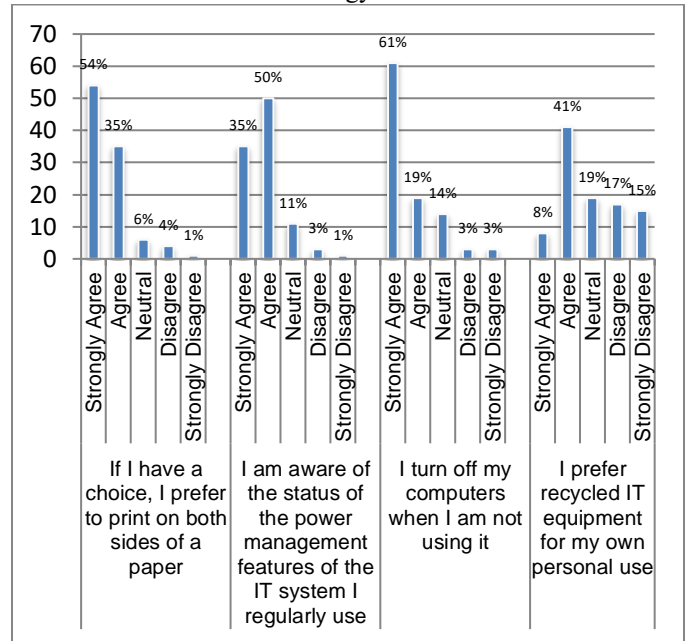


Fig 6: Practicing Green IT in different professionals and private lives

The respondents were asked to what degree they are undertaking Green ICT actions. The results in Figure 11 indicate that 89% of respondents are taking actions to reduce paper, 85% are aware of the power management features of the IT system, 80% do turn off their computers when they are using them while 49% of respondents recycled IT equipment for their use.

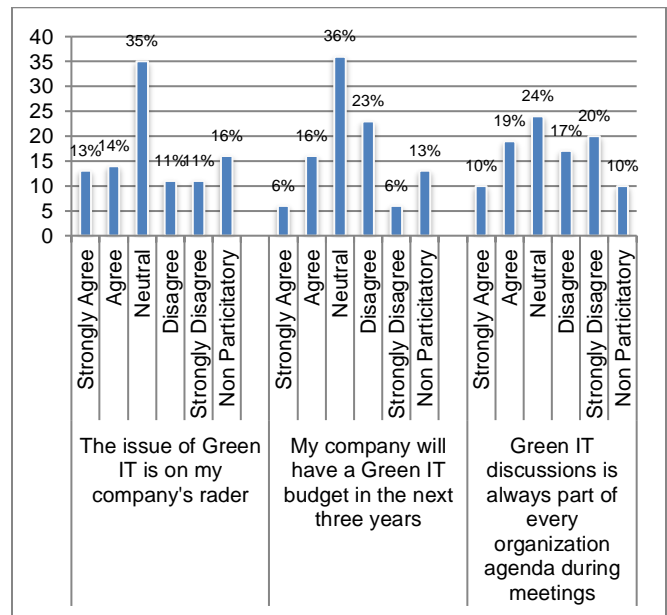


Fig 7: Working expeience preparedness to Green IT

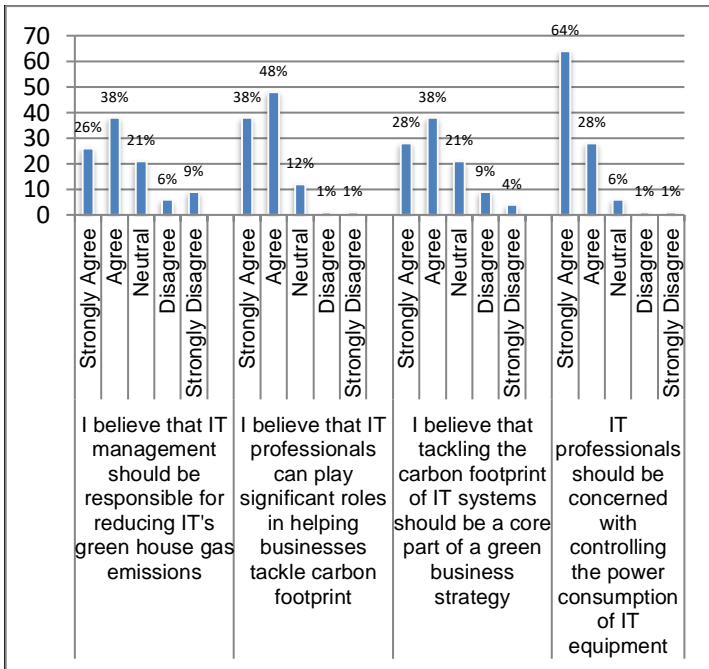


Fig 5: Processes of IT professionals and awareness of Green ICT

Respondents were asked questions regarding IT personnel and management’s role in ensuring green IT. The results in Figure 5 depicts that majority of the respondents believe that IT management goes beyond IT technical infrastructure’s

The organizations perception and preparedness towards Green IT lead to asking respondents questions relating to attention of management towards Green IT. The findings as showed in Figure 7 implied that 27% of the respondents are putting Green IT on the radar, 22% of them yet to emerge on their company's radar while 29% of the respondents do discuss ways of implementing it from one meeting to the other. Also, 20% had Green IT budget in the next three years while over 25% always discuss Green IT in their meetings.

IV. CONCLUSION

The study makes an appraisal of the connection of ICT equipment's deployment and use on climate change. The instrument administered was used to elicit information about the awareness, effect and roles expected to be played by IT practitioners in cubing the harmful effects of this equipment.

V. RECOMMENDATIONS

It is therefore recommended that:

- i. More awareness should be created among IT practitioners in various establishment about the health hazard of climate change
- ii. Government should role out policies to enforce adherence to laid-down rule and regulations on IT especially as it affects sustainable computing.
- iii. Green ICT approach should be adopted to equipment usage. This will not only reduce the energy consumption of ICT systems, but also leads to a

reduction in e-waste and aims to enhance the environmental sustainability of establishments.

- iv. Using automated power control on equipment to save energy when not in use
- v. ICT equipment should be switched off over a period of time especially when not in use

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