

A GOVERNMENT DRIVEN APPROACH TOWARDS GREEN IT ECONOMIES

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Abstract

The growing threat on the environment driven by an accelerated growth in economic activities has amplified the role of government in enhancing sustainability. To business and the industry leaders, the global economic challenges have compelled them to reconsider how they do business to gain an economic advantage and as a drive towards enabling a socially responsible business environment. This has forced businesses and industry to consider and act on a broad range of socially responsible and sustainable programs. As a majority business and industry align their goals by embedding sustainability mechanisms as key pillars to economic empowerment, most global governments seem to be lagging behind in providing the necessary facilitation in their economies. In the field of Information Communication Technology (ICT), the integrating and enabling role of ICTs has been considered critical in managing the global carbon footprint by exploiting their innovative capabilities thus providing sustainable solutions to the environment. Even in this area, the government has been considered a late adopter thus limiting its ability to provide solutions that is critical in this vital area. This paper therefore analyzes the role of government in building a sustainable economy using ICT and provides an action plan for governments in developing economies. This is based on data collected from both primary and secondary sources. Descriptive and inferential statistics was used to analyze the data and to draw conclusions. The action plan evaluates the role of government on green ICT from the perspectives of legislation, policies and regulations, Incentives, Education and social economics, support for business process integration and Implementation and usage of green ICT .

Keywords: Green ICT; ICT; Sustainability; Business process; industry.

INTRODUCTION

In the last eight years, the role of ICT in enhancing sustainability has received closer focus from the research community, environmental organizations, practitioners as well as governments. The continued rise in ICT usage has surpassed global predictions. In the year 2014 alone, an estimated 351 million units were sold globally (www.gartner.com). The continued growth in the usage of computers presents a challenge to the reduction of global greenhouse gas (GHG) emissions as ICT is considered to contribute about 2-3% of the GHG (Brooks, Wang, & Sarker, 2012). Efforts therefore seem to be targeted on reducing the environmental footprint of ICT. This concept is referred to as green IT. Green IT focuses on how to reduce the negative ecological impact of information technologies (Osch & Avital, 2010); this is also referred to as *greening IT*. ICT permeates every level of an organizations management (Njeru et al., 2015), this broad application creates an environment where the innovative capability of ICT can be harnessed to reduce the environmental footprint of other non-IT related GHG emissions, this is referred to as green IS. There has been concerns that focus has been more on green IT which offers softer benefits, thus, the research community has continued to encourage firms to consider green IS which

offers more benefits for both the environment and industry (Boudreau, Chen, & Huber, 2007). The government has been considered a critical player in supporting the adoption of green IS in an economy (OECD, 2009), this is through proper legislative frameworks that rewards organizations that entrench sustainability within their business practices; inclusion of green ICT within their ICT policies and provision of support for implementation of green ICT in business and industry where possible (IPPC, 2014). A few governments have been able to recognize the potential of green ICT and developed policies and frameworks to support its adoption within their economies; however, a majority of global governments seem to lag behind. The objective of this paper therefore is to galvanize governments to invest in research on the adoption and usage of ICT for environmental sustainability and to facilitate the adoption with the aim of building sustainable green ICT driven economies.

REVIEW OF RELATED LITERATURE

Sustainability

The topic on sustainability has been around for a long while (Brocke, Watson, Dwyer, & Elliot, 2013). According to Robert, Parris, & Leiserowitz, (2005), the last half of the twentieth century saw the emergence of four key themes from the collective concerns and aspirations of the world's people: peace, freedom, development, and environment. These four aspirations turned out to be greatly intertwined hence the world leaders later realized that none of these aspirations could be achieved without the other. The aspiration for global peace was driven by the need to secure the world from the new threats of nuclear weapons just after the end of the Second World War. Global peace was sustained, but local war still continued decade's later (Robert et al., 2005). The aspiration for freedom was driven by a search and a need to instill democratic governance (WCED, 1987), indigenous communities and the rights of women, children and other minorities (Robert et al., 2005). The drive towards economic development was inspired by the need to improve the standards of living for a majority of global citizens who consisted of two thirds of the world population. It is only later when the threats on human life became so real due to decades of environmental mismanagement that focus shifted to the environment. The World commission for economic development (WCED) formed in 1983 but whose report was published in 1987 (*Our common future*), thus argued that "*The environment does not exist as a sphere separate from human actions, ambitions, and needs, and attempts to defend it in isolation from human concerns*" (WCED, 1987, pp10). Major international meetings were held there after as a follow up. These included the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 (United Nations, 1992); The Kyoto protocol on climate change in 1997 (United Nations, 1997); the World Summit on Sustainable Development in Johannesburg, South Africa, where the commitment to sustainable development was reaffirmed (United Nations, 2002); the Copenhagen climate change conference in 2009 (United Nations, 2009) and the United nations framework convention on climate change which will be held from November 30 2015 in Paris, France. This was reinforced by global civil rights activists such as the Nobel peace Wangari Maathai who argued that;

"In a few decades, the relationship between the environment, resources and conflict may seem almost as obvious as the connection we see today between human rights, democracy and peace. When you think of all the conflicts we have-whether these conflicts are local, whether they are regional or global, these conflicts are often over the management, the distribution of resources. When resources are degraded, we start competing for them, whether it is at the local level in Kenya, where we had tribal clashes over land and water, or at the global level where we are fighting over water, oil and minerals. So, one way to promote peace is to promote sustainable management. We need to promote development that does not destroy our environment"

(Wangari Maathai)

In 1987, the World Commission on Environment and Development sought to address the problem of conflicts between environment and development goals by formulating a definition of sustainable development (WCED, 1987; Harris, 2003). The commission defined sustainability as *development that meets the needs of the present generation without compromising the ability of future generation to meet their own needs*. Based on this definition, sustainable development has continuously been considered on three fronts namely; economic, social and environmental. Thus, for balanced growth to be of an economy there needs to be a balance between these three aspects. This however does not mean that this broad consideration does not introduce new challenges for economies, both developed and emerging.

In the 80's, the warning was about the continued destruction of our environment and the threats that it posed for the future generation; today, that reality is with us. It's not about what we are doing to protect future generations (WCED, 1987), it's about what we are doing for this generation and the future. Prolonged droughts, hurricanes, melting glaciers desertification, rising seas, shrinking lakes and unpredictable weather patterns are some of the global changes already underway. It is worth noting that even in the current technology and age; we still cannot feed a majority of the world population. This is why (WCED, 1987) notes that: "Scientists bring to our attention urgent but complex problems bearing on our very survival: a warming globe, threats to the Earth's ozone layer, deserts consuming agricultural land. We respond by demanding more details, and by assigning the problems to institutions ill-equipped to cope with them. Environmental degradation, first seen as mainly a problem of the rich nations and a side effect of industrial wealth, has become a survival issue for developing nations. It is part of the downward spiral of linked ecological and economic decline in which many of the poorest nations are trapped. Despite official hope expressed on all sides, no trends identifiable today, no programmes or policies, offer any real hope of narrowing the growing gap between rich and poor nations. And as part of our "development", we have amassed weapons arsenals capable of diverting the paths that evolution has followed for millions of years and of creating a planet our ancestors would not recognize".

The conflict between the environment and development was first acknowledged in the 1980. This was supported by continued global campaigns for balanced development approaches with the argument that a world in which poverty is endemic will always be prone to ecological and other catastrophes (Robert et al., 2005). It thus called for conservation as a means to sustain development and especially with regard to sustain species, ecosystem and resources. Therefore, no economy can be able to fully achieve the benefits of economic develop while continuing to ignoring implementation of sustainability goals. The research community has gone further and simply defined sustainable development as linking what is to be sustained with what is being developed. This creates an emphasis on the three pillars of sustainable development (social, economic and political), that were identified by WCED.

Developing countries have been left to bear the blunt of decades of environmental degradation three decades after the world commission for economic development (WCED) predicted this trend (Kevin et al., 2015). The WCED report further notes that Meeting essential needs requires not only a new era of economic growth for nations in which the majority are poor, but an assurance that those poor get their fair share of the resources required to sustain that growth. Such equity would be aided by political systems that ensure effective citizen participation in decision making and by greater democracy in international decision making (WCED, 1987).

Sustainability and ICT

In December 2008, the OECD working party on information economy presented a report on ICTs and the Environment (OECD, 2009). The report aimed at helping governments understand and respond to new developments and concerns of the environment and the role of ICT in developing sustainable economies based on analysis of 92 government initiatives across 22 OECD member countries including

the European Union. In December 2009, Copenhagen, Denmark hosted the United Nations Climate Change Conference where Green Information Technology was a topic of focus for the 192 member countries of the United Nations (Brooks, Wang, & Sarker, 2012). This was preceded by the identification of green IT as a strategic technology in 2008 (Brocke, Watson, Dwyer, & Elliot, 2013).

The continued growth of ICT has raised new levels of concerns on the management of the environment (ACM, 2011). This is because 2-3% of the global greenhouse gas (GHG) emissions are caused by ICT usage (Molla et al., 2011). Global efforts by the stakeholders in this vital sector including the IT research community are thus geared towards eliminating these IT induced GHG emissions. This is the concept of green IT. Practitioners have proposed Green IT as a technological solution to support environmentally friendly business practices (Brooks et al., 2012). Thus, we can define green IT based on the definition by Murugesan (2008) as;

“the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems—efficiently and effectively with minimal or no impact on the environment. Green IT also strives to achieve economic viability and improved system performance and use, while abiding by our social and ethical responsibilities (pp. 25–26)”.

The research community has argued against limiting the role of IT in building sustainable economies by considering green IT specifically on the acquisition, use and disposal of IT systems and devices or by simply considering the energy consumption of IT and the disposal of obsolete computer systems Brooks et al., (2012), Boudreau., (2007). The general argument thus is that the role of IT extends beyond trying to reduce the carbon footprint of IT to finding ways in which ICT can be applied to reduce the carbon footprint of other non-IT related sources which amounts to 97-98% of the global greenhouse emissions Melville, (2010), Chen, Boudreau, & Watson, (2008) and Kevin et al, (2014). This is considered to be more beneficial Watson et al., (2010). This concept is referred to as green Information systems (green IS). Boudreau et al., (2007), defines green IS as; Green IS, in contrast, refers to *“the design and implementation of information systems that contribute to sustainable business processes*. Thus, even from the general definition of IT and IS, green IT is a component of green IS Kevin et al, (2014), meaning that green IS has greater potential than green IT as it tackles a much larger problem (Boudreau et al., 2007).

Green ICT as a key economic driver

The world today is so interconnected that states are fully dependent on others directly for the survival and stability. With this, changes in market dynamics in one economy quickly affect global supply chains in several other economies with profound effects on the poor and the most vulnerable (UNEP, 2012). It therefore makes sense that as we switch to a more resource efficient and Green driven Economy, one in which economic growth, social equity and human development go hand-in-hand with environmental security, business and industry will be a key driving force. Businesses therefore cannot afford to ignore the benefits that switching to a green economy would bring. For a long time, going green has been considered to have profound implications on economies. This fear on the economic impact of going green has been the major challenge of implementing protocols such as the Kyoto protocols especially by global economic powerhouses such as the US and China to note a few (Kevin et al., 2015). However, economies that have put more efforts in implementing green concepts show a different picture. These fears are unfounded.

On the part of green ICT, the assertion by Boudreau et al., (2007) clearly explains the benefits of implementation of green ICT in organizations. They note that: *“Green IS, and sustainable development,*

should not be seen as a cost of doing business. Rather, they are opportunities for organizations to improve productivity, reduce costs, and enhance profitability. Poor environmental practices result in many forms of waste. Unused resources, energy inefficiency, noise, heat, and emissions are all waste products that subtract from economic efficiency. Less waste means a more efficient enterprise. Firms that actively pursue green IS to create sustainable business practices are doing the right thing for their community, customers, investors, and future generations” (Boudreau et al., 2007, pp 3). Loeser et al. (2011) further argue that green IT practices can enhance energy efficiency and the consequent application of green technologies can decrease IT-related carbon dioxide emissions. Green IT is acknowledged as strategic technology that will play a fundamental role in reengineering business and production processes to reduce the environmental footprint of organizations. They further contend that a firm’s competitiveness can be improved through environmental commitment that differentiates from competitors and enhanced efficiency that comes along with higher productivity.

Green ICT and business strategy

Through the consistent implementation of Green ICT initiatives, competitive advantage can be created and thus Green ICT should be understood as an inherent part of an organization’s ICT strategy. ICT-based environmental initiatives can support low-cost strategies or facilitate competitive differentiation. However, the interrelation of business strategy, sustainability goals and IT constitutes a complex challenge (Loeser, Ere, Schmidt, Zarnekow, & Kolbe, 2011). Linking and aligning these strategic domains promises great opportunities for environmental protection and economic progress. Green ICT initiatives are considered recently as a means to reduce costs and risks whereas technology-based overall strategies aimed at the creation of competitive advantage and sustainable, profitable growth can hardly be found.

Integrating sustainability into core business activities can generate a positive return on investment. These returns go beyond the financial component and contribute to the socio-economic and environmental wellbeing necessary for business to grow and operate successfully (UNEP, 2012). The embedding of green ICT goals within the overall organization strategy is critical to the implementation of green ICT practices within the business. This is because green ICT should not be viewed as being independent from the organization but its goals should be given closer attention as other corporate goals (Kevin et al., 2015). ICT is a critical enabler of all business practices; hence its implementation is critical for any organization aiming to achieve a competitive advantage (Loeser et al., 2011)

Governments and green ICT adoption

An increasing number of governments are seeing ICTs as a critical component of their strategies for tackling environmental problems. Governments have widely acknowledged the important contribution of ICTs in reducing CO2 emission and energy consumption in households (OECD, 2009). Governments are increasingly committed to identifying their levels and sources of emissions and setting goals to optimize their operations, eliminate obsolete systems and replace them with ones that are more effective, efficient and low carbon. Some of these governments which have taken lead roles in enhancing the adoption of green ICTs in their economies are shown in Table 1.

COUNTRY	Year	Title	Motivations
OECD	2009	Assessing Policies and Programmes on ICT and the Environment	Analyze how green ICT can be used as a key driver for economies based on an analysis of existing government programs in OECD member countries
ESCAP	2009	Green ICT: A “Cool”	To bring to the attention of decision and policy

		Factor in the Wake of Multiple Meltdowns	makers that ICT, in particular green ICT, has an important role to play in stimulating economic activities, advancing social development goals and promoting sustainable development
BRITAIN	2009	Greening Government ICT. Efficient, Sustainable, Responsible	Entrench sustainability mechanisms throughout government offices by the entrenchment of green ICT practices.
BRITAIN	2009	Greening Government: ICT Strategy: A sub strategy of the Government ICT Strategy March 2011	Provide a cost effective and energy efficient ICT estate, which is fully exploited, with reduced environmental impacts to enable new and sustainable ways of working for the public sector.
BRITAIN	2010	Government ICT Strategy: Smarter, cheaper, greener	Find ways in which ICT can enable transformation of the way the public sector runs and operates
AUSTRALIA	2010	Australian Government ICT Sustainability Plan 2010-2015	Identify which the available environmental standards should be adopted as mandatory for relevant ICT acquisitions: develop government ICT energy consumption targets and consider ICT sustainability mechanisms
ESTONIA	2012	The role of green ICT in enabling smart growth in Estonia	To give information about the current state and growth potential of green ICT in Estonia, its development and application from the perspective of public and private sector
EUROPE	2011	GREENING GOVERNMENT THROUGH ICT: Insights from Europe	Identify some of the most important levers through which the low carbon value added by green ICT could be increased.

Each of these government publications offers great insights from which other governments can borrow from in enhancing the green ICT approaches within their economies. The government alone in almost every economy is the largest ICT consumer (UK, 2008); hence every government can on its own make great savings in terms of resources through the implementation of ICT.

Many governments are introducing aggressive environmental policy, encompassing everything from greenhouse gas reduction and natural resource protection to clean power initiatives and incentives for energy efficiency (Info-Tech research Group, 2009). The threat posed by uncontrolled environmental usage has amplified the role of the government in facilitating proper usage of the environment and management of the limited natural resources. According to research, a more resource efficient and Green Economy provides the framework for a stronger and more sustainable business approach, at the heart of which lies the necessity to ensure sustained financial growth over the long-term. A Green Economy requires step changes in resource efficiency, investment in clean technologies, the development of alternative products, services and materials, and the ability to obtain value from unavoidable waste (UNEP, 2012). This means that enhancing environmental friendly business practices

goes behold the question of governments trying to legislate to a drive by organization trying to find better ways of doing business, cutting on their operation costs, offering more environmental friendly products and services to their customers which in the long learn gives these businesses a competitive advantage (Kevin, Kamau, Wanyembi, Dinda, & Njagi, 2015).

A number of government and non-governmental institutions are providing guidelines for implementation of green ICT (Molla, 2008). This means that the government has a lead role in providing the necessary legislative frameworks that are essential to guide organizational implementation of green ICTs. It should be noted that the core drivers of green ICT implementation are factors external and internal to the organization. These include and are not limited to government legislation, customer demands, competitors, technological changes and a desire to lower costs (Kevin et al., 2014), (Orsato, 2006). At the same time, the recognition by organizations that greening their operations (green IT) is not a cost of doing business but rather it can be a means by which organizations can be able to lower the cost of production (UNEP, 2012).

ICT is the critical enabler that will allow governments to take advantage of the opportunities in today's hyper-connected, integrated and information-rich world to create responsive 21st century State Services. The future for government ICT is envisaged as information-centric rather than the technology-centric model of today, transcending agency boundaries to deliver smarter customer-centered services (Government of New Zealand, 2013). The use of ICT to build a low carbon future for our governments and societies offers a unique opportunity. Keeping up to date with technological developments and supporting innovation will deliver environmental, societal and economic benefits now, and in the future (The climate Group, 2011).

From simple data input and processing tasks in an organization, to communication via mobile devices through manufacturing, product design and engineering, transport control and management systems through accounting and finance functions, the enabling role of ICT cannot be underestimated. ICT permeates every level of an organization and government. Its integrating and enabling capability of individual, business and government functions makes it one of the most essential technologies of our times. Consider this, major economic drivers such as transport, energy, manufacturing, and construction contribute heavily to the environmental pollution. How therefore can we apply ICT in these areas for a better cleaner environment? Various terms from green construction, green manufacturing, green energy and green transport have been coined (Kevin et al., 2015).

Economics for green IS

Today, companies around the world are looking at ways to implement ICT solutions to both improve their own productivity and provide new sustainable offerings to their clients, and are realizing significant benefits in the process (Karen et al., 2013). Global bodies, government agencies and non-governmental organizations have set themselves the goal of identifying and accelerating scalable ICT-enabled energy solutions and helping policymakers to shape the strategies and policies to support businesses in implementing more energy efficient systems.

Green Information systems (ICT applications) can reduce the environmental impact of organizations. This includes ICTs for new way of production and collaboration like teleworking and teleconferencing applications, cloud computing, supply chain integration or moving businesses and governments to the Internet (OECD, 2009). Brooks et al., (2012), opines that adopting green computing technologies should not be viewed as a cost for businesses but rather, as an opportunity that offers many benefits to organizations including lower costs of production, increase in revenue and better environmental practices which are essential in enhancing the corporate social responsibility position of a company. However, the potential cost savings of green ICT applications, such as videoconferencing resulting from

local and trans-border travel reductions cannot be realized without having adequate infrastructure to make a conversation effective enough to make it a viable substitute hence global governments have the responsibility of laying down the necessary infrastructure to support business initiatives (Ernst & Young, 2012).

Sustainability has been able to work on corporate social responsibility, there is evidence of the multiple ways in which sustainability delivers business value to companies that have adopted it as a strategic principle (IPPC, 2014). There is therefore no doubt that there is a clear business case for an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. The long-term prosperity of businesses is tied directly to our ability as a society to make the transition. Critical choices need to be made now, to decouple economic growth from environmental impact and resource use, to prepare for the economic reality of tomorrow, and to enable business to seize the scale of the opportunity (UNEP, 2012).

In the findings of UNEP on the business case for green economy, UNEP (2012), notes that as we switch to a more resource efficient and green economy, one where economic growth, social equity and human development go hand in hand with environmental security, the government, business and industry will be a key driving force. This statement is two-fold; it highlights the key role that businesses have on sustainable development and also enhances the regulatory role of governments in ensuring that businesses and industry are just in the use of natural resources. The drive to make profits does not overshadow their critical role in ensuring the protection of citizens as regards provision of a clean environment. Some of the benefits highlighted include: more resilient supply chains, New investment opportunities, Increased consumer demand for sustainable goods and services, Sales growth and duration of sales, Training and job creation, Reduced dependency on natural resources and Mitigation against the negative financial risk from environmental impact (UNEP, 2012)

RESEARCH DESIGN

Primary data was collected from four ICT consumer organizations in Kenya. This was based on the distribution of a five scale likert scale questionnaire consisting of eight questions. The questions were framed to assess the considered role of governments in the adoption of green ICT within these organizations; and also assess the extent of implementation of ICT in the organizations as well as identify the core drivers of ICT adoption within these firms. Secondary data from eight government sanctioned reports as shown in Table 1 were interrogated. This was to provide an international perspective of governments on green ICT best practices and identify the major driving force. Descriptive statistics was used to analyze the results and draw conclusions.

RESEARCH FINDINGS

As revealed by the theoretical literature and secondary data, Green ICTs have the capability to leverage the competitiveness of business and industry. Through the implementation of green ICT, organizations have the capability to cut on costs through direct savings hence improve their competitiveness in the market through price leadership. This in turn improves the competitive position of an economy. As well as leading by example, some administrations are beginning to think about the economy-wide picture too – how green ICT can be deployed across industry and where best government can contribute to realizing a smarter future. This therefore underpins the importance of any government in the adoption of green ICT in their economies. For long, governments have been accused of being late adopters, thus progress made by some of these governments such as the UK government can directly be linked to the high level of practice and adoption of green ICT in their economies.

Green IT driven strategies have the capability to improve the competitiveness of a country's products. A country's competitiveness of its products in the global market can be improved through environmental commitment that differentiates from competitors and enhanced efficiency that comes along with higher productivity. Use of green IT also encourages the much needed proper utilization of scarce resources such as energy in an economy which can be directed to other essential sectors. More so, the social responsibility requirement of industry and business is not a favor but a right for the communities in which these businesses operate.

Government and green ICT adoption in Kenya

Government intervention in ICT sector through incentives encourages high uptake of ICT in many organizations by making them cheaper which could be otherwise expensive without such incentives. In this regard, this study sought to investigate whether there were such government policies and guidelines on incentives towards green ICT in various organizations in Kenya. From the research findings, majority indicated that the government played critical role in information system implementation in their respective organizations with a mean of 4.04. This translates to 81% strongly agreeing that government played a critical role in the ICT implementation in their organizations. Similarly, majority of the respondents indicated that there was a clear government guideline for information system use in their organizations with a mean of 3.91 which translates to 78.2%. This shows that majority of the respondents were in agreement that there was a clear government guideline for information system use in their organizations. This was largely considered based on the provision of an ICT strategy by the government

In addition, respondents indicated that government provides incentives to encourage green information systems practices with a mean of 3.30 as well as provision of relevant information on ICT with a mean of 3.18. All parameter evaluated had a mean score above 60% indicating that respondents were satisfied with government intervention in promoting ICT in various organizations. However, considering that this result fell within the 'neutral' range, it we interpreted it as an indication by the government to fully participate and provide guidelines for the adoption of green ICT. The results are as illustrated in the Figure 1.

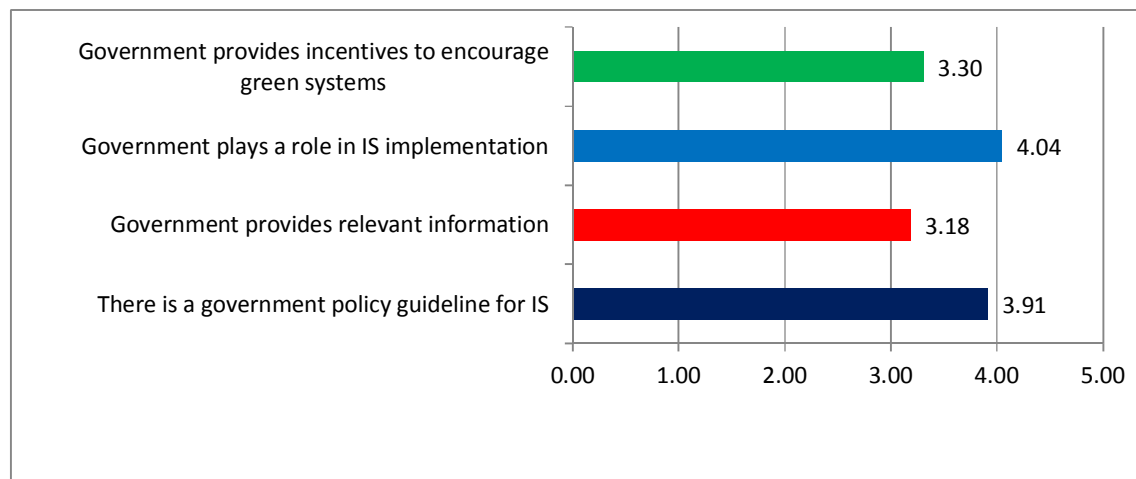


Figure 1: Government incentives towards green ICT

Integration of ICT into organizations' operations

A critical factor in the implementation of green ICT is the role of the industry and business in the usage of the technology. The adoption of a given technology is based on the perceived usefulness and benefits that an organization considers it will gain from the adoption of the new technology. The greatest challenge to the adoption of sustainable strategies is the consideration of sustainability approaches are a cost for the business. This is mainly due to the high cost of adoption and the fact that operating in an environment where there are little regulations and consideration on the usage of resources offers limitless opportunities in cost savings. This explains why a majority of industrialized nations have been the biggest obstacle in the implementation of the Kyoto protocol. The most important benefit of green ICT is that organizations tend to gain more by aligning their organization goals with green ICT. Everybody wins: the environment, the society and the organization. Green ICT continues to be viewed as one of the greatest technologies years after its conception.

Organizations that integrate ICT into their operations have an advantage of making their operations easier, effective, and accurate as well as support secure storage of crucial organization data. As regards green IS, the implementation of green IS in an organization is dependent on the investments in ICT infrastructure. Therefore, the more an organization has integrated ICT in its operations, the greater the potential savings and the chances of developing policies and frameworks to control their usage. On this note, the researcher sought to investigate whether their respective organizations had integrated ICT into their operations. The parameters evaluated included; use of Electronic Data Interchange (EDI) for carrying out electronic transactions, automation of various tasks in organizations, use of green technology and integration on ICT in the supply chains. This is shown in figure 2.

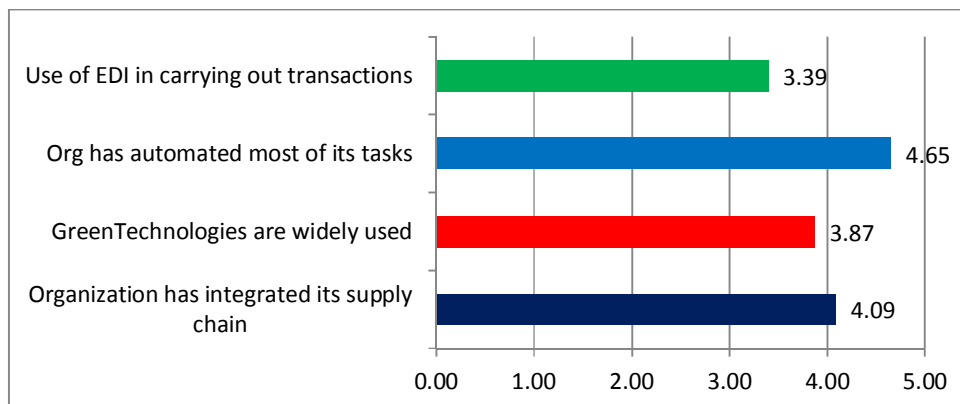


Figure 2: Integration of ICT into organizations' operations

The research findings indicated that majority of the respondents agreed that their organizations had automated most of the tasks in their respective organizations with mean score of 4.65. This being 93%, majority of the respondent strongly agreed that their organizations had automated most of their tasks. Similarly, majority of the respondents indicated that their organizations have an integrated supply chain with a high mean score of 4.06. This also indicates that 82% of the respondents strongly agreed that their respective organizations had integrated supply chain. On the other hand, use of electronic data interchange (EDI) and use of green technologies had a average mean score of 3.39 and 3.87 respectively indicating that majority of the respondent agreed that their organization used both EDI and green technologies in their operations.

DISCUSSION

Green ICT brings in more benefits to an organization and the government itself in terms of savings. Therefore, implementation of green Information Systems is paramount in achieving both short term and long term goals for an organization and for the government. While for the organization direct benefits such as cost savings and a competitive advantage can be gained by offering low cost products to its customers: the benefits has a gains by improving the competitive position of firms in the country and a better utilization of the much needed resources such as energy. This leads to an increase in economic activities which lead to improved standards of living for the citizens. Implementation of green IS can be done either at organization level or at government level through provision of incentives, skills and workmanship.

A review of several governments' secondary data as discussed above shows how critical the role of government is in green IS adoption and implementation. In this regard, majority of the respondents agreed that the government had a critical role in the implementation of green IS in organizations and that government policies and guidelines and incentives towards green ICT in various organizations were well outlined and efforts towards boosting IS adoption were also well spearheaded.

From the research findings, there is no doubt that the government plays a very critical role in ICT implementation in organizations. Prior research has argued that green ICT implementation drivers are factors both internal and external to an organization key among them being government legislation, support and policies. The Kenyan government seems to have implemented various frameworks and policies for environmental protection. It is however essential to note that the government of Kenya doesn't have an elaborate green IS policy thou there are discussions on the same within the existing ICT policy but even so, the respondents considered it inadequate. This is supported by the weak showing of government policy and legislation in the proposed green ICT. This therefore means that the government needs to do more to effectively support organizations in the implementation of green ICT.

Success of green ICT implementation squarely relies on the ability of the government to intervene through incentives and organizations' willingness to adopt and revolutionize it. As such, many people in these sectors will have knowledge on green ICT and has willingness to adopt green ICT as a core component of every organization and integrate green ICT practices within the organizations' operation processes.

From the data collected, it is inherent that the major green ICT practices embedded within a majority of governments include:

1. Green ICT procurement: the application of ICT in procurement seems to have been greatly successful in some countries such as Kenya. The implementation of E-procurement and the emphasis that the same be applied in all government procurements has been considered critical in reducing and eliminating environmental wastes. Of most important is the savings in terms of resources for the government. But directly, savings on the environment have been critical. E-procurement eliminates unnecessary travel and printing: Thus, by setting environmental requirements for ICT procurement, governments can not only reduce the environmental impact of their own ICTs, but they can also use their purchasing power to increase competition and innovation among ICT providers. The ICT strategy of the United Kingdom, Australia and Estonia for example seem to have laid much emphasis on the concept of e-procurement too.
2. Disposal of obsolete ICT Computers: Several governments seem to have internalized the Reuse and disposal of obsolete ICT systems. The government of Australia, Britain and Australia has embedded the reuse and disposal of computing devices within their ICT strategies. Other governments have taken great steps in enhancing cooperation with private organizations as well as organizing international conferences to find out best practices on green ICT adoption. This

includes the government of Japan (2008), Denmark (2009), and the government of Estonia (2012). As governments are considered major ICT consumers in every economy, the adoption of proper disposal practices is thus critical in the success of ICT usage lifecycle. This however needs to be extended to the private sector. The reuse concept also needs to be emphasized as opposed to the acquisition of new ICT devices, repair and reuse of these devices would greatly lower the firms overall expenses hence improving their competitive advantage and revenue base.

3. Support for green ICT usage within business and industry in the economy: successful adoption of green ICT practices in an economy can be greatly achieved through the support by the government for the adoption of the same. Some countries have made critical steps by establishing standards for businesses in their economies as regards energy use and sustainability. This includes the establishment of Green IT promotion council of Japan which aims to improve cooperation between academia, government and industry experts; Intelligent Energy-Europe, a programme of the *Competitiveness and Innovation Framework Programme* (CIP), which funds innovation projects focusing on topics such as energy efficiency, new and renewable energy sources and new energy sources which targets Small and medium-sized enterprises (SMEs); the intelligent energy of Germany established through the ministry of Economics and Technology with emphasis on cooperation between industry practitioners; the Energy star of the United states and so many more.

Conclusion

Based on this research, it is thus our conclusion that for implementation of green ICT as a key economic driver;

1. Governments need to include green ICT policies and strategies in their ICT strategic plans. This will provide the much needed guidelines on ICT driven sustainability not just for the government but also for the business and industry within their economies.
2. There is need to move businesses beyond the concept of reuse and disposal of ICT infrastructure to find other innovative ways and technologies that ICT can be applied within an economy to reduce its carbon footprint
3. Governments have a responsibility to support businesses within their economies in the adoption of green practices. This can be through coming up with the necessary legislations to aid in the adoption of green technologies to giving incentives that would encourage business and industry to invest in sustainable technologies and processes
4. The view of governments in some economies as a late adopter whereas it is at the same time expected to play a lead role in adoption of new technology and systems is worrying. There is therefore need for governments CIOs to adequately play a lead role in advising what emerging technologies are in the market and provide mechanisms for introduction of the same within their economies.
5. The adoption of a majority of green ICT practices mostly depends on the end users. It is therefore important that the government encourages positive change regarding the use of technology: introduction of videoconferencing as opposed to travel: encouraging use of emails as opposed to regular mails and use of internal networks for internal communication as opposed to memos in offices and printing when it is only so important; mandatory duplex printing, reuse of resources such as envelopes should be encouraged and ensuring that computers are turned off overnight and when not in use. These are simple approaches that could end up saving millions of dollars within an economy.

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