Tour operators' Green Practices in E-Business use: Analysis through ICT Sourcing, Operational Practices and End-of-Life Management among Tanzania's Tour Operators

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Abstract

This study investigated tour operators' green practices in e-Business use, tracing from the ICT sourcing, operational practices to end-of-life-management. A questionnaire to 148 respondents from tour operators in Kilimanjaro, Arusha, Dar es Salaam and Zanzibar, Tanzania was supplemented by in-depth face-to-face interviews to selected cases. The study revealed green e-Business being haphazardly practiced, limited to switching off computers in idle times, re-using papers and printing in both sides, sharing printers and more use of laptops/iPADs than desktops, and few using i-Cloud and virtualization. End-of-life-management practices included offering old PCs as charity, transferring obsolete computers to other units and storage of obsolete ICT equipment in special rooms awaiting tendering procedures. Formulation of appropriate policies and regulations on sourcing, operations and end-of-life-management are called for to guide and reinforce the practices, including provision of incentives/subsidies. Vendors need to design affordable green e-Business applications, while operators need to cultivate "green" culture to exploit green e-Business opportunities.

Keywords: Tour operators; Green Practices; Green E-Business; Sourcing, Operational Practices; End-of-Life-Management.

Introduction

E-business defined as transformation of an organization's processes to deliver additional customer value through application of technologies, philosophies and computing paradigm of the new economy (Andam, 2003), has resulted into its growing use in various business sectors (Laudon and Traver, 2006). Attributed by its ubiquitous nature, E-Business growth is further stimulated by an increasing demand for data processing and data storage driven by factors including growth of Internet communication and entertainment use; increase in online shopping as well as related transactions; increase in electronic transactions in financial services like online banking and electronic trading; shift to electronic for companies' records; growth in global commerce as well as services; and adoption of satellite navigation together with electronic shipment tracking. Combined with changes in business practices and human behaviour, E-Business can be used to proactively cut carbon emissions including reducing commuting and use of paper works (Masele, 2011; GeSI, 2008). In turn, it has become an informational, operational and strategic technology that not only promises for enriched economic gains through simplifying transaction processes but also enhanced environmental protection through elimination of significant processes that emit Green House Gases (GHGs) thereby warranting sustainability (Padayachee, 2008; Velte *et. al*., 2008).

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In tourism sector, e-Business is being employed in almost every activity of the chain both for inbound and outbound logistics (Kamuzora, 2006). In assessing through tourism value chain, one can demonstrate that e-Business can be applied right from destination selection, bookings, payments, pre-delivery support activities (including handling visa requirements, detailed information about destination and many others) and transfer arrangements to/from the airport to post-delivery supports activities (Masele, 2011). Where green, e-Business enhances the triple bottom line economically, socially and environmentally (Coroama and Hilty, 2009). E-Business applications can be used for a number of other sustainability purposes including information management, tourist satisfaction, interpretation, effective partnerships, community participation and energy consumption (Ali and Frew, 2010). For information management, they include Computer Simulation; Destination Management Systems (DMS), Economic Impact Analysis Software; Environmental Management Information Systems (EMIS); Geographical Information Systems (GIS); Global Positioning Systems (GPS); Tourism Information Systems; and Information Management of Weather, Climate as well as Oceanic Changes. For example, there are Information Technology (IT) systems that can track, measure and report a business environmental footprint and energy consumption. GPS-based vehicle, transport and logistics systems can improve the environmental footprint of transport as well as logistics operators. These and the like are some opportunities tourist companies may exploit to benefit not only economically but also eco-sustainably. Tourist satisfaction is another opportunity for sustainable tourism development. Literature asserts that if a destination manager has sound methods of monitoring and analyzing environmental data, route used by the tourist, frequency of use, timings as well as how tourists account for time, space and place can support planning to ensure tourism is highly sustainable for destinations.

Since technologies behind E-Business use energy too, usage of Information Communication Technology (ICT) to transact businesses contributes to Greenhouse Gases (GHGs) emissions including other environmental related problems (Padayachee, 2008 and Siikavirta *et. al*., 2003). Consequently, they add to firms' operational costs caused by not only increased mass of data storage and processing but also due to mounting energy bills to run ICT operations (Siikavirta *et. al*., 2003; Padayachee, 2008; Webber and Wallace, 2009; Velte *et. al*., 2008; Harris, 2008; Lamb, 2009; Baroudi *et. al*., 2009). Molla and colleagues (2009) add that each stage of the IT life cycle from manufacturing to usage and disposal has environmental negative implications. Besides, where irresponsibly disposed of, the resultant e-waste ends up filling land with hazardous chemicals such as mercury, phosphorous, cadmium, barium, lead and others (Babu, Parande, and Basha, 2007; Murugesan, 2008; Velte *et. al*., 2008; Molla *et*. *al*., 2009; Yu *et. al*., 2010). It means that any ICT usage that is environmentally unfriendly is hazardous because it leads to harmful pollution and toxic materials being released into the environment. Already ICT is reported to contribute to up to 3 percent of global Carbon Dioxide (CO_2) gas emissions, an amount that is equivalent to that contributed by the aviation industry (Goasduff and Forsling, 2007; Gartner, 2007; OECD, 2009; Vaduz and vom Brocke, 2013). Furthermore, costs of electricity related to ICT usage are reported to be rising (Baroudi *et. al*., 2009) and electronic wastes are emerging to be one of the fastest growing wastes (Babu, Parande, and Basha, 2007) that require serious attention. It further means that true sustainability with electronic business will only be achieved if applications themselves are truly green.

An important aspect of use of the IT technical infrastructure to solve sustainability problems is to ensure that applications themselves are "green" in their architecture. For example, Mattern,

Staake and Weiss (2010) insist on using ICT in a "smart" way so that it is actually ecological and energy efficient. Coroama and Hilty (2009) stress that "green ICT" and "ICT for green" should not be antagonisms because they are both important and they complement each other. The challenge for the future, as put forward by Coroama and Hilty (2009), lies in the appealing synthesis, "green ICT for green." That would not only protect the globe environmentally, but also would be that can offer interesting business opportunities for industry and guaranteeing a desirable lifestyle for citizens.

While it has been seen that ICT application (e-Business) is almost unavoidable in transacting tourism business, the extent with the tour operators' e-business application is green is not documented. This is a gap that this paper sought to fill. The following is the main research question, "To what extent is E-Business use by tourism operators in Tanzania environmentally friendly to support green initiative?" Later on in this paper, implications are stated not only to policy makers, but also to tour operators and other heavy E-Business users, ICT vendors and researchers. To answer the main research question, the study was guided by the following specific research questions:

i) To what extent is ICT sourcing has green considerations?
ii) To what extent are ICT operational practices green?
iii) To what extent are ICT end-of-life management practices green?

Literature Review

The potential of "green" technology to create sustainable business and society is widely accepted (Webber and Wallace, 2009; Harris, 2008; Olson, 2008; Gonzalez, 2005, Hart 1997; Lamb, 2009; Velte *et. al*., 2008). There is emerging evidence that business sustainability initiatives such as green strategy, green supply chain management and implementation of environmental technology can build positive brand image, mitigate environmental liabilities associated with a firm's products as well as services and influence on mindset of customers and investors (Sen *et. al*., 2006; Rao and Holt, 2005 cited in Molla, 2008). In particular, Green E-Business has the potential for competitive business opportunities by reducing carbon emissions; reduced equipment and systems management costs for data centres; reduced energy consumption; reduced carbon footprint thereby combating climate change; saves the environment thereby bringing sustainable development, improved corporate social responsibility (CSR); and improved overall business efficiency (Haris, 2008; Murugesan, 2008; Molla *et. al*., 2009; Lamb, 2009; Dedrick, 2010; Masele and Marx Gómez, 2012).

Atos Origin (2010) links Green ICT to efficient and effective business growth by providing a route to lower costs and productivity improvements as well as environmental benefits, including: (1) Reducing carbon emission thereby saving energy costs, making business less dependent on energy cost fluctuations, reduce carbon footprint thereby combating climate change; (2) Reducing space usage thereby requiring less office space, reducing managed floor space needs in data centres, including related power and cooling costs; (3) Reducing the amount of transport thereby enabling the workforce to work from any location (office, home or abroad) by putting in place the required unified communications and collaborations tools like Virtual Private Network (VPN) and improving connectivity with customers; (4) Reducing use of equipment and material by virtualizing infrastructure that lower costs and improve business agility; and (5) Reduced energy consumption thereby saving costs for paying for energy bills and the saved money can be allocated to other strategic business endeavours (see also Porter and Van der Linde, 1995). In so

doing, Green E-Business will truly serve the environment and hence, bring eco-sustainable development.

Although there are more complex initiatives such as virtualization and consolidation, companies may start with making small steps that can make a big difference including implementing some basic conservation energy approaches (Harris, 2008; Ruth, 2009). They include turning off computers when not being utilized and looking for ways to reduce time using computers (*ibid*.). Others are installing network printers and scrapped desktop printers (*ibid*.). It was found out that much energy is saved and it was apparent, when people shared printers to get their print outs (*ibid*.). Harris (2008) adds other specific suggestions such as not using screen savers since they use much energy. Turning off the computer servers at night, turning off the computer systems and turning others when going out for lunch or other errands and avoiding use of power strips to turn all devices can also save much energy (*ibid*.).

Techniques like virtualization, consolidation and cloud computing are regarded as viable options to reduce costs and improve IT as well as business agility. Well planned virtualization and consolidation enable organizations to deploy multiple server operating systems such as electronic mail (e-mail) applications, files and others all operated on shared server resources (Carey, 2008; Gartner, 2007). Masele and Marx Gómez (2012) equate consolidation and virtualization processes to the concept of "economies of scale" through efficiencies (in terms of energy and cost) gained from shared systems. In so doing, these innovations offer a great hope to adopting firms where they can simply "rent" what they need and somebody else can manage the dirty work thereby cutting costs for managing IT, to a great extent (Masele and Marx Gómez, 2012). Landis and Blacharski (2010) contend that cloud computing may inspire a new wave of entrepreneurship due to its ubiquitous nature, making it easier to do work at any time and from anywhere. One can connect instantly to the office from anywhere in the world, gain secure access to applications as well as data and shortly, get things done in a way that was never possible before (Laudon and Traver, 2006; Vossen, and Hagemann, 2007).

Info~Tech (2007) identified 11 technologies and initiatives as indicators of Green IT. They included "equipment recycling, server consolidation and virtualization, optimizing data center energy efficiency, print optimization, data center airflow management, rightsizing IT equipment, green considerations in sourcing and RFPs, hot aisle/cool aisle data center layout, budget allocation for Green IT projects, liquid cooling for IT equipment, DC powered IT equipment, airside/waterside economizer, carbon offsetting." In reviewing work done by Molla and colleagues (2009) to assess Green IT enterprise commitment, actions to Green IT, and Green IT governance as well as that by Info~Tech (2007), the following indicators for Green IT were extracted: Presence of clear Green IT policies regarding-sourcing, operations, and end-of-life-management; budget allocation for Green IT projects; preference to print on both sides of a piece of paper; knowledge/awareness on status of power management features of IT systems regularly used; turning off computers when not in use; preference in recycled IT equipment for one's personal use; presence of virtualized as well as consolidated server including data storage; use of blade server with racks; and having an IT consumption efficiency metric.

GeSI (2008) advocates reducing of e-Waste by increasing percentage of recycled materials that are used in various business transactions. It includes ensuring that equipment and other electronic products are managed such that their components would be re-used and waste is managed

appropriately (GeSI, 2008). For example, according to Harris (2008), a number of computer parts can be recycled including glass monitors, keyboards, CD-ROM drives, plastic cases, Cathode Ray Tubes (CRT), cables, copper in power cord, batteries and metals from circuit board as well as printer cartridges.

Green IT Reach-Richness Matrix

Analysis of the IT activity chain has been one of approaches towards setting interventions to minimize organizations' IT impacts on the environment. According to Molla and colleagues (2009), although end user firms' responses to environmental challenges vary, an organization's IT activity chain permeates from *sourcing* through *operations* to *end-of-IT life management.* The extent of such permeation is known as Green IT Reach (Molla *et. al.,* 2009). While some might just have environmental policies for public consumption, others Green wash their strategies through recycling practices (Molla *et. al*., 2009). Still others might approach Greening IT through either selective or comprehensive strategies thereby making significant investment in Greening their technological infrastructure (Molla *et. al*., 2009). The extent of maturity of Green IT *policies, practices and technologies* is referred to as Green IT Richness (Molla *et. al*., 2009). Combination of the two dimensions forms a "Green IT Reach-Richness Matrix" [Molla *et. al*., 2009) (see Table 1].

Table 1: Green IT Reach-Richness Matrix

		Green IT Rich Dimension – PPT (Depth)		
Green IT Reach Dimensions : Cradle-to-Grave (Breadth)		Policies	Practices	Technologies and Systems
	Sourcing	The extent to which an organization has articulated a guideline(s) for an environmentally preferable purchasing of IT	The practice of analyzing the Green track record of IT hardware, software and services providers, incorporating Green considerations in IT procurement decisions	Information systems that track monitor and analyze the carbon footprint of supplies such as supplier sustainability assessment tools.
	Operations	Encompasses the extent to which Green issues are encapsulated in policy frameworks governing the development and use of the IT assets and infrastructure of an organization.	Green IT operation practices refer to eco-considerations in operating the IT and network critical physical infrastructure in data centers and beyond and operational actions designed to improve the energy performance of corporate IT assets.	New technologies and systems for (a) reducing the energy consumption of powering and cooling corporate IT assets (such as data centers) (b) optimizing the energy efficiency of IT assets (c) reducing IT induced Greenhouse gas emissions (d) supplanting carbon emitting business practice and (e) analyzing a businesses' total environmental footprint.
	End of IT Life Management	End of IT life management policy	Practices in reusing recycling and disposing IT hardware	Information systems that track the disposal of IT in an eco-friendly way.

Source: Molla and colleagues (2009)

Maturity in Green IT Reach and Richness can demonstrate depth of a firm's Green IT strategy and commitment to main goals of eco-sustainability pollution prevention, product stewardship and use of clean technology (Hart, 1997 cited in Molla *et. al*., 2009). A combination of organizational motivation and institutional forces can influence breadth and depth of Green IT adoption. Such factors can help to gauge a firm's approach to sustainability, eco-efficiency, eco-effectiveness and eco-equity (Chen *et. al*., 2008). Eco-efficiency and eco-effectiveness were considered important motives to influence adoption of Green IT. Oresato (2006) argued that it might be contributed by desire for organizations to pursue leadership in setting up voluntary standards, environmental excellence and differentiation. Cross-cutting and energy conservation have been mentioned by a number of scholars (for example, Dedrick, 2010; Oresato, 2006. This study also borrowed the Green IT Reach and Richness Matrix in examining Green E-Business practices among tour operators for the study. The analysis comprised *sourcing, operations and end-of-life management* processes of IT activity chain to investigate available policies, practices, technologies and systems among tour operating firms.

The researcher is of the opinion that where sourcing, operations and end-of life management are done under well sought policies as well as put into actions with the aid of technologies and systems, it would, to a great extent, avoid consequent environmental effects that might be caused by the ICT. It may be possible to track, monitor and analyze Green record of IT hardware, software and services to be sourced (Molla *et. al*., 2009). OECD (2009) acknowledges the importance of policies from sourcing operational practices and end of lie management. It may include setting environmental requirements for ICT procurement, an act that will not only reduce the environmental impact of own ICTs, but also they can use their purchasing power to increase competition and innovation among ICT providers. A study by Chen and colleagues (2008) revealed that policies for purchasing energy-efficient IT, evaluating green track record of vendors in IT procurement decisions and disposing of IT in an environmentally friendly manner are among the most widely adopted Green IT practices in developing countries. The policies are also important to operations and end-of-life management (re-using, recycling and disposing) of ICTs and network critical physical infrastructure in data centers and beyond including operational actions designed to improve energy performance of corporate IT assets. With the aid of technologies and systems, firms may be able to reduce energy consumption for powering and cooling. As shown by Molla and colleagues (2009), it would be possible to optimize energy efficiency of ICT assets thereby reduce IT induced GHGs emissions; supplant carbon emitting business practices; analyze businesses' total environmental footprint; and track disposal of IT in an eco-friendly way.

In this study, *Sourcing* was measured using the following three indicators: "GEBA1-We prefer ICT suppliers that have green track records,;" "GEBA2- We give weight to environmental considerations in ICT procurement;" and "GEBA3- Our organization engage with a professional service provider regarding Green E-Business." The indicators were adapted from Hall and Khan (2003); Chen and colleagues (2008); and Molla and co-workers (2009). *Operational practices* was also measured by the following three indicator variables as adapted from Molla and co-authors (2009); Chen and others (2008); Lamb (2009); and Landis and Blachrski (2010): "GEBA4- We put off data computers, data centers and other systems when not in use even if not told to do so;" "GEBA6- We optimize printing through shared printers;" and "GEBA7- We perform sever virtualization and consolidation." Besides, *End-of-Life Management* was

measured by three indicator variables as adapted from Hall and Khan (2003); Baroudi and co-workers (2019); and Molla and co-authors (2009): "GEBA8- Our organization recycle consumable equipments;" "GEBA9- Our organization reuse items (paper, computers and related facilities) in more than once;" and "GEBA13- Our organization dispose ICT in an environmentally friendly way" (see Table 2).

Table 2: Green IT/E-Business Practices' Constructs definitions and indicators

Construct	Indicators	Citations
Sourcing	1. GEBA1- We prefer ICT suppliers that have green track records 2. GEBA2- We give weight to environmental considerations in ICT procurement 3. GEBA3- Our organization engage with a professional service provider regarding Green EB	Hall and Khan (2003); Chen et al (2008); Molla et al (2009)
Operational Practices	1. GEBA4- We put off data computers, data centres and other systems when not in use even if not told to do so 2. GEBA6- We optimize printing through shared printers 3. GEBA7- We perform sever virtualization and consolidation	Molla et al (2009); Chen et al. (2008); Lamb (2009); Landis and Blachrski (2010)
End-of-Life Management	1. GEBA8- Our organization recycle consumable equipments 2. GEBA9- Our organization reuse items (paper, computers and related facilities) in more than once 3. GEBA13- Our organization dispose ICT in an environmentally friendly way	Hall and Khan (2003); Baroudi et al. (2019); Molla et al (2009)

Methodology

Recall, assessment for green E-Business practices was guided by the Green IT Reach-Rich matrix, which connotes that an organization's IT activity chain permeates from *Sourcing* through *Operations* to *End-of-IT-Life Management* (Molla *et. al*., 2009). The study was carried at tour operators in Kilimanjaro, Arusha, Dar es Salaam and Zanzibar. The tour operators in the said regions account for more than 85 percent of all tour operators in Tanzania (URT, 2007). Besides, majority of Small and Medium Tour Enterprises (SMTEs) had either main offices or minor branches in Dar es Salaam city, whose headquarters may be in Arusha – Mainland Tanzania or Unguja, Zanzibar (Elly, 2010). A firm was selected if it was in operation for at least three years as per Rogers (1995) who contended that technological adoption as a gradual process requires enough time to evaluate. Characteristics of business activities carried out in tourism force them to use various forms of ICTs (Buhalis and Law, 2008) including to communicate with and inform customers, partners and stakeholders from almost everywhere at all times around the globe. Masele (2011) posits that from destination selection to booking, payment, pre-delivery support activities, transfer arrangements from/to the airport and so forth all involve some form of ICT. Unlike many other firms in Tanzania, tour operators are well established as well as registered (Olomi, 2001; URT, 2007; Elly, 2010), making it easy to establish sampling frame for random sampling, locating them and administering the questionnaires. In so doing, a five point Likert scale questionnaire (from 1- Strongly disagree; 2- somewhat disagree; 3- neutral; 4- somewhat agree; and 5- strongly agree) was answered by 148 respondents from selected tour

operators (see Table 3). The questionnaire was supplemented by in-depth face-to-face interviews in order to capture word of mouth explanations about phenomenon under investigation. Using Statistical Package for Social Sciences (SPSS) version 20, internal consistence and convergent validity of the instrument were confirmed. Correlation was run among variables representing sourcing, operational practices and End-of-Life Management. Qualitative answers were analyzed using content analysis.

Table 3: Firms' Distribution by Location

Area	Frequency	Percent
Dar es Salaam	13	8.8
Kilimanjaro	55	37.2
Arusha	49	33.1
Zanzibar	31	20.9
Total	148	100.0

The study's test for reliability as presented in Table 4 obtained a Cronbach's alpha coefficient of more than 0.819 for each indicator variable, if the item was delete, while a composite reliability based on standardized items was obtained to be more than 0.847, indicating that the instrument was reliable.

Table 4: Reliability Test

	Scale Mean if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
GEBA1	28.99	.677	.577	.819
GEBA2	28.79	.519	.432	.836
GEBA3	28.93	.711	.626	.816
GEBA4	29.13	.623	.492	.826
GEBA6	28.88	.513	.333	.837
GEBA7	29.14	.570	.486	.831
GEBA8	28.83	.553	.457	.833
GEBA9	28.91	.330	.205	.855
GEBA13	29.05	.591	.422	.829

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.848	.847	9

To measure for sampling adequacy (to test if the sample was large enough to carry out Factor Analysis), the KMO test was used, while Bartlett's test was used for hypothesis test that the sample was drawn from the population in which the correlation matrix was zero. According to Kaiser (1974), the KMO value is supposed to be greater than 0.5 and the p-value for the Bartlett's test should be less or equal to significance level (0.05) if factors are to be considered adequate for analysis. Results from this study revealed that KMO value was 0.843 greater than 0.5, while the p-value for Bartlett's test was 0.000 less than 0.05 (Table 5). Hence, the model was suitable for the study dataset.

Table 5: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.843
Bartlett's Test of Sphericity	Approx. Chi-Square	513.736
	df	36
	Sig.	.000

Data analysis process for this study started by first running Factor Analysis (FA) to assess factor loading so as to extract maximum variance from theorized items (see also Amer, 2012; Hair *et. al*., 2010). Principal components analysis was used in order to enable the researcher reduce the number of items while keeping as much original item variance as possible (Amer, 2012). The outcome was rotated using Varimax rotation and a cut-off point of 0.40 was used for cross-loadings (loading exceeded 0.50). Items that did not load strongly on intended factors were dropped and were not considered in subsequent analysis (see also Hair *et. al*., 2010). Results presented in Table 6 indicate that factor loadings of each indicator variable used in the study were more than 0.7.

Table 6: Factor Analysis

	Component		
	1	**2**	**3**
GEBA1	.801		
GEBA3	.795		
GEBA2	.771		
GEBA6		.825	
GEBA4		.790	
GEBA7		.739	
GEBA9			.865
GEBA8			.741
GEBA13			.723

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

To quantitatively express the extent to which two variables are related, the study considered it important to calculate correlation coefficient between them. According to Ho (2006), correlation studies are attempts to find the extent to which two or more variables are related. Generally, whenever two variables are significantly correlated, the researcher may use the score on one variable to predict the score on the second (*ibid*.). The correlation was run to find out whether or not relationship between variables used in the study exists and determined its magnitude as well as direction. Results for correlation analysis for indicator variables representing sourcing, operational practices and End-of-Life Management variables are given in Table 7. Table 7 indicates that correlations between variables under study are positive and statistically significant at 0.05 level (2-tailed). For example, the minimum correlation level between GEBA2 and GEBA7 was more than 0.163 ($r>0.163^{*}$, $p< .005$). It means that as consideration for green in sourcing increase, so there will be an increase consideration in operational practices and end-of-life management. The significant relationship indicates also that the two variables co-vary (Ho, 2006).

Table 7: Correlations and Co-variation among Variables

Correlations									
		GEBA1	GEBA2	GEBA3	GEBA4	GEBA6	GEBA7	GEBA8	GEBA9	GEBA13
GEBA1	Pearson Correlation	1								
	Sig. (2-tailed)									
	Covariance	1.496								
	N	148								
GEBA2	Pearson Correlation	.537**	1							
	Covariance	.716	1.187							
	N	148	148							
GEBA3	Pearson Correlation	.673**	.563**	1						
	Sig. (2-tailed)	.000	.000							
	Covariance	.925	.689	1.261						
	N	148	148	148						
GEBA4	Pearson Correlation	.639**	.453**	.599**	1					
	Sig. (2-tailed)	.000	.000	.000						
	Covariance	.861	.544	.742	1.215					
	N	148	148	148	148					
GEBA6	Pearson Correlation	.356**	.423**	.371**	.337**	1				
	Sig. (2-tailed)	.000	.000	.000	.000					
	Covariance	.462	.488	.441	.394	1.122				
	N	148	148	148	148	148				
GEBA7	Pearson Correlation	.416**	.163*	.379**	.403**	.325**	1			
	Sig. (2-tailed)	.000	.048	.000	.000	.000				

	Covariance	.597	.208	.499	.521	.404	1.377			
	N	148	148	148	148	148	148			
GEBA8	Pearson Correlation	.373**	.230**	.512**	.298**	.267**	.570**	1		
	Sig. (2-tailed)	.000	.005	.000	.000	.001	.000			
	Covariance	.461	.253	.580	.332	.286	.675	1.019		
	N	148	148	148	148	148	148	148		
GEBA9	Pearson Correlation	.170*	.200*	.165*	.175*	.411**	.280**	.235**	1	
	Sig. (2-tailed)	.039	.015	.045	.034	.000	.001	.004		
	Covariance	.233	.245	.207	.216	.488	.368	.265	1.255	
	N	148	148	148	148	148	148	148	148	
GEBA13	Pearson Correlation	.428**	.255**	.491**	.409**	.312**	.555**	.498**	.238**	1
	Sig. (2-tailed)	.000	.002	.000	.000	.000	.000	.000	.004	
	Covariance	.606	.322	.639	.522	.382	.753	.582	.308	1.339
	N	148	148	148	148	148	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Findings and Discussion

Recall, this study was set to assess the extent ICT sourcing practices have green considerations among tour operators in Tanzania; to assess extent ICT operational practices are green; and to assess the extent ICT end-of-life management practices are green. The findings are provided based on objectives of the study. As pointed out before, green ICT practices were classified according to rich-reach matrix, which asserts that the organization's IT activity chain permeates from sourcing through operations to end-of-IT life management (Molla *et. al*., 2009).

ICT Sourcing Practices

In assessing the extent tour operators' ICT sourcing practices are green, the study revealed that there are no ICT manufacturers in Tanzania such that all ICT equipment is imported. Besides, there were no environmental standards included in procurement specifications. In due regard, it was not an issue to determine competitiveness in the market. Results from the study revealed that competition was constrained by cost reduction targets. There was no policy on procurement thereby rendering green practices to rely on procurement officers' sentiment. Also there were no Information Systems (e.g., sustainablity assesment tools) to track, monitor and analyse suppliers'

Carbon footprint as well as greenness of ICT operations and End-of-Life Management. The indicator variables used in measuring Green considerations in sourcing included "GEBA1-We prefer ICT suppliers that have green track records;" "GEBA2- We give weight to environmental considerations in ICT procurement;" and "GEBA3- Our organization engage with a professional service provider regarding Green E-Business."

Findings from the study indicated that although most visited tour operators were online, their understanding and consciousness to impact of IT on environment were revealed to be very low and they did not even bother about reasons it even mattered. A similar trend was noted by Kibacha (2011) who states that maintaining quality and standards of electronic communications equipment in Tanzania is a challenge posed by poor user awareness with majority of Tanzanians opting for low quality (most counterfeits) communication equipment. Moreover, there was disregard on environment related matters. During interviews with computer sellers, for example, it was disclosed that,

> "Most customers emphasize on specifications depending on what they want to accomplish. In tourism, for example, specifications are related to functions they mostly wish to accomplish including bookings, reservations and other related aspects. No one mentions in his/her specifications about environmental aspects."

Although the Electronic and Postal Communication Act (EPOCA) of 2010 empowers the Tanzania Communications regulatory Authority (TCRA) to establish standards for any electronic communications equipment to be connected to any communication network, and undergoing equipment type approval certification, these standards were not adhered to. Had this requirement been implemented, it would have been possible for TCRA to test for environmental quality standards conformance through spot checking on imported communications equipment. Although there are some initiatives related to counterfeit communications equipment reduction; several challenges exist including user awareness with majority of Tanzanians in regard to opting for low cost (which is eventually low quality and most counterfeits) communication equipment (Masele, 2014).

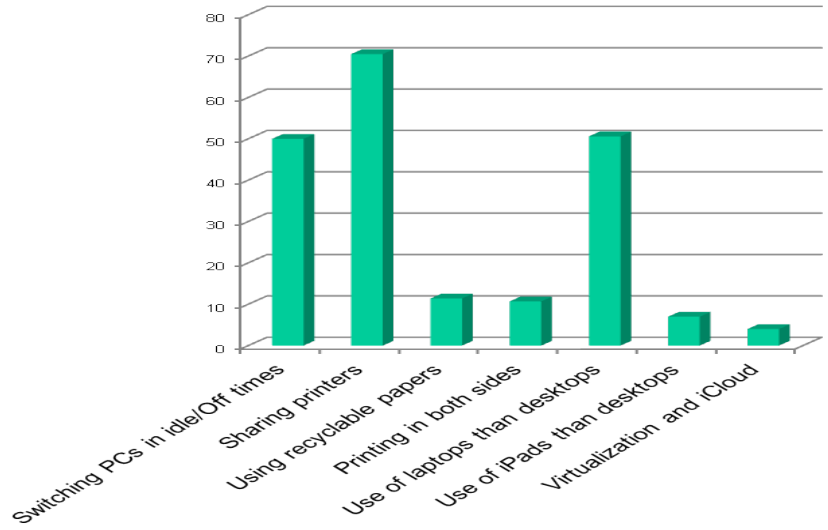
The study also noted that the procurement process under the Public Procurement Act (PPA) does not allow procurers to state the brand or vendor from which the ICT equipment will be procured. While this practice might be established out of good will to offer equal chance for all providers and to avoid colluding with only few vendors for personal interests, with its provision, it could be easier to spot out vendors with green track records (Masele, 2014). Under the GPSA regulation, qualified bidders are published online and/or in any government gazette for all government institutions to easily see and choose among many registered dealers. Unless environmental specifications are incorporated as conditions for procurement, the current arrangement ends up victimizing environment welfare. This inclusion may involve purchasing recyclable, reusable and energy efficient components, which are necessary for production of energy and materials efficient products. Studies by OECD (2009), for example, established that by setting up environmental requirements for ICT procurement, it would not only reduce the environmental impact of acquired ICTs, but also they can use purchasing power to increase competition and innovation among ICT providers. This study supposes the same such that Greening of E-Business can be controlled right from the sourcing point of view.

ICT Operational Practices

The construct "operational practices" was measured using the following three indicator variables that graduated factor analysis step: "GEBA4- We put off data computers, data centers and other systems when not in use even if not told to do so;" "GEBA6- We optimize printing through shared printers;" and "GEBA7- We perform sever virtualization and consolidation." It was revealed that Green E-Business was not only a new terminology but also not a priority and thus, it was not practiced. Where it did, Green E-Business applications were haphazardly considered and they were limited to switching off computers at idle times (49%) as well as re-using papers and printing on both sides (10%). About 70 percent reported sharing printers and more use of laptops than desktops (50%) to improve energy efficiency and to save operational costs. About 5 percent had started using iPADs rather than desktops. A very small percentage (2.5%) of users in regard to virtualization, i-cloud and use of smart phone were in their launch. Available virtualization practices observed in some companies, for example, involved using one host servers to virtually control the *domain controller* (for controlling PC connections in an organization) and *exchange server* (for mailing controlling). Figure 1 provides summary of results for the presented aspects. In addition, most organizations did not seem to track green credentials of their IT suppliers, a finding, which is more or less related to what Molla and colleagues (2009) revealed that no track was carried for green credentials of their IT suppliers. Although findings by Molla and others were in 2009, it is astonishing that they still hold true for tour operators in Tanzania.

The researcher had to probe more to understand the meaning attached to obtained answers. It was revealed that all the initiatives were meant to save organizations' operational costs, while an environmental consideration came afterward. Although such initiatives were said to be saving a significant amount of energy, a fact, which is actually true, however, the exact amount that is being saved could not be told.

Figure 1 Green E-Business Operational Practices



Source: Field data

Nonetheless, promising initiatives were underway and some managers appeared to be so motivated and committed to ensure that Green E-Business was finally a usual business practice. For example, some companies in Arusha had dedicated to responsible tourism in order to fulfil their underlying mission of promoting ecotourism and environmentally friendliness. The Managing Director (MD) of the company, for example, narrated that,

> "In our office we have adopted a number of policies on reuse, recycle and conservation whenever possible. They include paper conservation efforts such as two sided printing**;** changes to energy efficient lighting**;** powering off computers during idle times**;** using recycled papers where possible; and providing information by e-mails as well as Internet to reduce print works."

A similar argument was presented by an MD at one of tour firm in Kilimanajro, who also seemed to be so positive in not only Green E-Business use but also on general environmental protection related matters. He revealed his company's philosophy regarding Green E-Business as "Reuse, Reduce, and Recycle; with No or Less printing". He added, "…all information is communicated through networks, and no printing is allowed, unless is very necessary to do so. We monitor "the no printing" bylaw, and whoever violates, he/she has to pay for it.. The MD further narrated that,

> "To avoid printing of many business cards for each and every tourist, our company has introduced use of magnetic cards, which can be easily postured on any magnetic surface in office and/or at home for everybody to see in a shared manner. Moreover, introduction of smart phone in the company has simplified business processes because a person is not forced to go to office and then switch on electricity to access a file for business transactions. That can be done wherever one is located at 24 hours."

The practice also supports what Molla and colleagues (2009) assert that relevance of Green IT and organization's positive attitude to reduce, re-use and re-cycle can be expected to transfer to real commitment towards Green IT.

However, manifested green ICT practices and processes were based on top management self-initiatives. Organizations, whose top managements were concerned on being environmental friendly, seemed to be really committed and manifested great intention to implement green E-Busines practices. Examples include Bushbucks; Ahsante Tours; Ranger Safaris and Zanzibar Unique. The companies also had green policies and demonstrated some GEB practices. They introduced iCloud, virtualization (domain & exchange server) and iPads. As a result, they could easily store and access documents online at 24/7 as well as simplify itinerary processes at all times and hence, they could avoid frequent drives to and from office for file checking. In due regard, they saved substantial amount of electricity and fuel thereby saving companies' costs and improve operational efficiency.

These findings are more or less similar to what Molla and co-workers (2009) found. They (*ibid*.) assert that when it comes to specific actions taken by organizations and IT departments, hardly 30 percent of participants believed that their organizations had implemented Green IT projects. The count was slightly less than that of respondents who believed that Green IT was on their companies' radar. However, even enforcement of a quick win Green IT actions, such as turning off computers when not in use, they were only strongly practiced in a quarter of organizations (Molla *et. al*., 2009). It may imply that at several organizations, green intentions had yet been translated into actual actions and investments in green initiatives.

ICT End-of-Life Management

The study operationalised the construct "ICT End-of-Life Management" by three indicators that graduated factors analysis as shown in Table 2. The constructs are "GEBA8- Our organization recycle consumable equipments;" "GEBA9- Our organization reuse items (paper, computers and related facilities) in more than once;" and "GEBA13- Our organization dispose ICT in an environmentally friendly way." Descriptive statistics analysis run by the study indicated that mean scores were 3.70, 3.68 and 3.53, respectively. The mean scores are below 4.00, indicating that responses were between neutral and agree. When the researcher asked firms verbally to reveal their budget commitments to Green IT/E-Business and the environment, most responded to have no idea and only few who did had highly vague responses. Besides, majority (except three companies) had no written policy on end-of-life management. At company level, the policies were mainly implied or abiding to general policies according to responsible authorities such as Ministry of Natural Resources and Tourism (MNRT) and National Environment Management Council (NEMC).

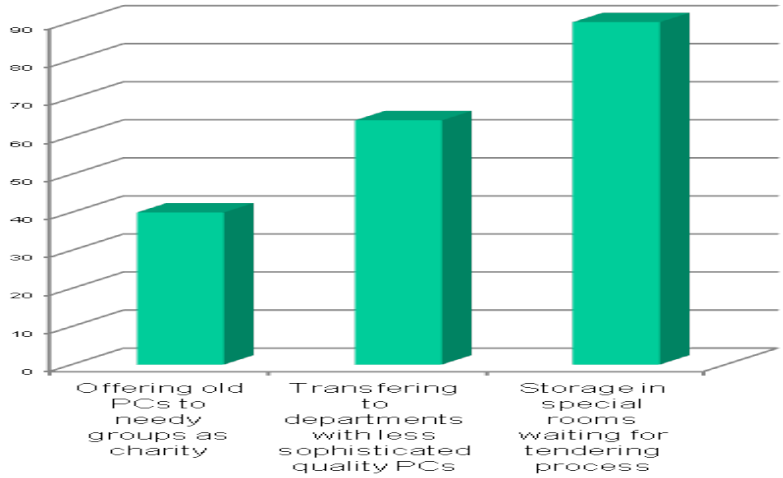
The findings further revealed that neither green disposal policy nor e-waste management procedures were stipulated. This study also wondered on inadequate number of e-waste dealers. The only companies dealing with e-waste management included Harmonic biospheres; Chilambo General Trade Company Limited; and Digital Links Tanzania. The companies were involved in refurbishment, dismantling and exporting e-wastes. Yet, these enterprises were unknown among tour operators under study.

As shown in Figure 2, the most reported End-of-Life Management practices by the tour operators included offering old PCs as charity to schools, churches, friends and employees or transferring obsolete computers to other companies or within the same company but to different departments that do not require sophisticated quality PCs. Also they included storage of obsolete ICT equipment in special rooms waiting for tendering procedures. There was no Information System (like sustainability assessment tools) to track, monitor and analyze suppliers' carbon footprint and greenness of ICT operators including End-of-Life Management. GeSI (2008) noted that equipment that are repaired or refurbished for use in most developing countries, though are becoming important components in bridging the "digital divide," a lot of equipment - up to 75 percent, according to some estimates - are beyond repair. It means that they end up being disposed off. The study urges ICT equipment manufacturers, service providers and consumers for electronics to come up with new ways to deal with electronic waste in developing countries, either through public-private partnership or through industry collaboration. It is also an opportunity for green entrepreneurs who embrace environmental values to venture into such unexploited business in the market place.

Although, recently in 2009, a regulation on hazardous waste has been established (URT, 2009) under the EMA (URT, 2004), which, among others, includes e-waste management, the act emphasizes on handling, classification, packaging, labelling, transporting and movement. There is no e-waste management specific regulation. Available disposal policy insists that public offices must dispose their assets through tendering procedures. Yet, the law is silent with regard to private firms, like the case in the tour operators under study. Moreover, Section 257(1) of the Public Disposal Regulation of 2004 instructs that office equipment including ICTs to be tendered in open spaces and anybody interested as well as willing to buy is welcome to compete. Though such end-of-life management practice might be out of good will; especially for ICT,

consequently, it has serious negative environmental effects. This is because in those auctions, anyone (from internal or external) can buy used ICT product for his/her own intended use. As a result, some users end up taking just small parts of the bought product and the rest is thrown away in very unfriendly manners (Masele, 2014). Besides, as a member of the Basel Convention e-waste dealers, Tanzania must seek for notification to grant the permit under the Vice President's office (VPO) division to import and export e-waste (for whatever reasons including dismantling, refurbishment or exporting). Yet, with this procedure, it is difficult to monitor end of life use (disposing off) of the purchased item.

Figure 2: End-of-Life Management practices by visited tour operators



Source: Field data

It is only recently TCRA started working to come up with a policy guideline on matters related to e-waste. Besides, the EPOCA, enacted in 2010, empowers TCRA to establish standards for any electronic communications equipment to be connected to any communication network; undergoing equipment type approval certification process including laboratory tests while making it illegal to distribute or sell any communications equipment without warrant (at least 12 months). Kibacha (2011) argues that with locally established type approval laboratory, it will be possible for TCRA to do spot checks on imported communications equipment in Tanzania and test them for quality as well as standards conformance. In so doing, counterfeit communications equipment and probably environmentally harmful gadgets in the country can be reduced.

Conclusion and Implications of the Study

Every step of the tourism value chain - from destination selection, bookings, payments, handling visa requirements, transfer arrangements – to/from the airport and post-delivery support activities involve some sort of e-Business use. On the other hand, ICT use energy too that results to substantial amount of Carbon dioxide (CO_2) emission, while numerous components of ICT assets are made up of hazardous chemicals to the environment. Consequently, where such applications and disposals are not green, they contribute to Greenhouse Gas (GHG) emissions including many other environmental related problems caused by irresponsible disposals of e-wastes. While both going electronically and making electronic applications green by the tour operators are important for sustainable development, understanding the extent operators are

green in their E-Business application is even highly important in order to equip them with possible supporting factors. This study several implications to firms under study, policy makers, vendors and other green advocates. The study calls for responsible authorities such as the Ministry of Natural Resources and Tourism (MNRT), the Tanzania Communications and Regulatory Authority (TCRA), National Environment Management Council (NEMC), Tanzania Bureau of Standards (TBS) and others to come up with appropriate policies including regulations that would assist in guiding sourcing, operations and end-of-life management as well as enforce green behaviours among firms. Measures may include provision of facilitating conditions and providing green incentives/subsidies such as tax deduction on importation of environmental friendly ICTs and reward for green compliance. Researchers and vendors ought to design ease to use and affordable Green E-Business applications that meet both environmental goals and improve the adopting firm's market proficiency. They may also think of installing information systems to track, monitor and analyse not only suppliers' greenness but also their own green trends. Tourism associations and NGOs need to take initiatives to persuade tour operators on Green E-Business uptake including its implications through influencing policies formulation, advocacy and training for green. Cultivating "green" culture by firms will result to commitment among tour operators including allocating adequate resources (time, financial and personnel) for implementing Green E-Business. Besides, they need to come up with relevant internal green policies and regulations so as to guide and reinforce the desired practices respectively.

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