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Green E-Business Adoption in Developing Countries: A Conceptual model

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1. Background information

Of the past recent, the use of e-business has been up-taken amazingly in various business sectors considering its characteristics of ubiquity, universal standards, global reach, richness, information density, interactivity, and personalization or customization of messages (Laudon & Traver, 2006). The growth is said to be stimulated by the increasing demand for data processing and storage, that is driven by several factors including: growth of the internet communication and entertainment use; increase in online shopping and related transactions; increase in electronic transactions in financial services such as online banking and electronic trading; shift to electronic of company records; growth in global commerce and services; and, adoption of satellite navigation and electronic shipment tracking in tracking. It has in turn been promising both for economic gains and environmentally sustainability (due to reduced commuting and use of paper works).

However, concerns are emerging following this heavy usage of ICT to transact business, that the e-business technologies use energy too (Ali and Frew, 2000; Padayachee, 2004 and Siikavirta et al, 2003) and thus can contribute to Green House Gases (GHGs) emission and other environmental related problems. Studies document that the increased usage has lead to increased mass of data storage and processing. It is estimated that, disposal and use of ICT equipments contribute to around 2% of global carbon dioxide (CO2) emissions, an amount that is equivalent to that contributed by the aviation industry. As the use of ICT to transact business grows, its emissions are likely to increase and, further estimate indicate that, ICT will be responsible for 3% of global emissions by 2020 (Goasduff and Forsling, 2007). Furthermore, costs of electricity related to ICT usage are reported to always rising. Besides, electronic waste is emerging as one of the fastest growing waste (Babu, Parande, and Basha, 2007) that requires serious attention.

Both in the developed and developing countries the situation is alarming. Yu et al (2010) forecasted that the global generation of obsolete personal computers will reach 400-700 million units in developing countries, and at 200-300 million units in developed countries by 2030. This is scaring not only to environment but also to the human health as the hazardous substance associated with computing equipment is dizzying (Tedre, Chachage and Faida, 2009). The substances for example include asbestos, cadmium, hexavalent chromium, lead, organotin, polybrominated biphenyl (PBBs), polybrominated diphenyl ethers (PBDEs), polychlorinated biphenyls (PCBs), polychlorinated dibensodioxins (PCDDs), polychlorinated terphenyls (PCTs), red phosphorus, short chain chlorinated paraffin (SCCPs), arsenic, brominated compounds (including TBBPA), chlorinated compounds, mercury, phthalates (including DEHP, DBP, BBP, and DINP), brominated flame retardants (BFRs), and sulphuric acid. The effects of those substances on humans are disastrous. It should however be noted that, although the most

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economically productive parts take place in the industrialized world, the most heavily polluting parts of the life span of computing equipment usually take place in the developing world, where regulation is lax or non-existent (Leung, Duzgoren-Aydin, Cheung, & Wong, 2008; and Yu, Gao, Wu, Zhang, Cheung, &Wong, 2006 cited in Tedre, Chachage and Faida, 2009). Even if the IT equipments, could still have a long way to go if re-used, or recycled, before its final waste disposal, they rarely get a dignified end in a proper recycling manner in developing countries (Leung, Duzgoren-Aydin, Cheung, & Wong, 2008), thus posing a lot of environmental and health threats..

From these facts, needs for green E-Business applications adoption escalate. Researches by Molla et al. (2011), Lamb (2009) and Dedrick (2010) cite the Green E-Business advantages including: reduced energy consumption; reduced equipment and systems management costs for data centers; reduces carbon footprint and therefore combating climate change; serves the environment and hence brings sustainable development; serves for corporate social responsibility (CSR); in turn, it offers for competitive advantages. This means green e-business if adopted will bring both sustainability for environment and competitiveness for the adopting firms. To realize this vision, motivators and inhibitors for green E-Business adoption need to be identified. This paper is part of an ongoing PhD study, and is into the course to reveal these factors.

2. Problem statement

Unlike the existing models' contexts in which resources are private, the environment is a public resource, with implications for how users approach technological systems intended to enhance its sustainability (Melville, 2010). Thinking for the new motivational factors for green e-business adoption becomes imperative given the environmentally threats which ICT usage for business transaction poses.

3. Objectives of the study

3.1 General objective

The main objective of this study is to develop model that can explain green e-business adoption among the SMEs in developing countries

3.2 Specific objectives include

- To review the adoption model's aspects and the way they can explain green e-business adoption
- To review the models relating to public good management and see if the aspects can be combined with those of adoption model for explaining green e-business adoption
- To suggest a new model that comprehensively explains green e-business adoption

4. Theoretical review

4.1 The Unified Theory of Acceptance and Use of Technology (UTAUT) model

The 'Unified Theory of Acceptance and Use of Technology (UTAUT)' was relatively recently developed by Venkatesh et al in 2003. Venkatesh et al (2003) reviewed eight prominent technology adoption models to develop a new unified model called the Unified Theory of Acceptance and Use of Technology (UTAUT). The eight models reviewed and consolidated and that earlier research had employed to explain IS usage behavior included Theory of Reasoned Action, Technology Acceptance Model, motivational

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model, Theory of Planned Behavior, Combined Theory of Planned Behavior/Technology Acceptance Model, Model of PC Utilization, Diffusion of Innovation Theory, and Social Cognitive Theory.

In his UTAUT model, Venkatesh et al. (2003) postulated two direct determinants of technology use: 'intention to use' and 'facilitating conditions'. 'Intention to use' was in turn influenced by 'performance expectancy', 'effort expectancy' and 'social influence' and together with 'facilitating conditions' are four key constructs that are direct determinants of usage intention and behavior. Gender, age, experience and voluntariness of use acted as moderators of the impact of the four key constructs on usage intention and behavior (Venkatesh et. al., 2003). Subsequent validation of UTAUT in a longitudinal study found it to account for 70% of the variance in usage intention (Venkatesh et. al., 2003).

However, given contextual differences between private IS use (e.g., for personal efficiency) and IS use for public resources (e.g. for environmental conservation) (Melville, 2010) users' approach to adopt technological systems intended to enhance its sustainability may be different. For example, as Bottrill (2007) points out that, although a voluntary web-based system for promoting recycling practices introduced within an organization could perceived ease of use and useful, a user's attitude about the need for recycling (perhaps rooted in socialization) may also represent an important predictor (Melville, 2010). This is different from typical contexts of IS use (e.g., for personal efficiency) in that there is a social welfare element at play in which users may display altruism thus informing a fundamental challenge of including the regulative and legislative aspects to impact on attitude and later to behavior intention and actual use. Van der Heijden (2004) for example questions on role of, preexisting beliefs about environment sustainability beyond its ease of use and usefulness and their influence on adoption. Nonetheless such factors as facilitating conditions including monetary incentives and psychological factors such as self-worth, and corporate social responsibility, need to be examined (Bock et al. 2005). Besides the role of persuading, influencing and enforcing towards green e-business adoption need to be looked.

4.2 Technological-Organizational-Environmental (TOE) Model

The TOE model by Tornatzky and Fleischer (1990) has three context groups: organizational, technological and external environment. The organization context included organization attributes such as organization turnover, size, centralization, formalization, the presence of innovation–enabling processes such as informal communication and strategic behavior of top management, quality of its human resources, amount of slack resources available internally and complexity of the organization's managerial structure (Shen, Hawley and Dickerson., 2004). Technological context is related to the internal and external technologies which are relevant for possible adoption by the organization (Chong and Ooi, 2008) and the current state of technology in the organization. These may depend on the type of technology, the perceived advantage that technology has, and ease of use that technology is. This current state of technology can be expressed in both material (e.g., equipment owned by the organization) and immaterial (e.g., methods currently in use). External environment is the attribute related to the environment where the companies conduct their business in, such as the industry it is in, market structure and characteristics including its competitors, accessibility to the resources supplied by others, the external support available for adopting new technologies and government regulations (Shen et al., 2004; Chong and Ooi, 2008). These three context group elements are posited to interact with each other and to influence technology adoption decisions (Depietro et al., 1990).

Although, the TOE model has been used by a large number of studies to investigate the adoption of, for example, Electronic Data Interchange (EDI) (Kuan and Chau, 2001), open systems (Chau and Tam, 1997), and e-business (Zhu and Kraemer, 2005) e.t.c., it doesn't include individual aspects, which other adoption theories deem important to affect intention to use of a technology. Moreover, Bose and Luo (2011),

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criticize it that it doesn't provide a concrete model rather than giving taxonomy for classifying adoption factors in their respective contexts.

4.3 The Institutional Theory

Institutional theory has long been used to explain why organizations look alike after starting out differently. The theory focuses on the process by which certain ways of thinking and doing become accepted practice or embedded in institutions (Scott, 1987). It focuses on the deeper and more resilient aspects of social structure: the processes by which structures, including schemas, rules, norms and routines, become rule-like social facts. Thus, the theory explains how organizations become more isomorphic by adopting similar practices that are considered legitimate (DiMaggio and Powell, 1983). The institutionalization process-defined as the process by which actions are repeated and given similar meaning by self and others (Scott, 1987), can be motivated through three kinds of pressures established as authoritative guidelines for social behavior. These are mimetic, normative and coercive pressures (DiMaggio and Powell, 1983).

Recently there have been attempts to employ Institutional theory to provide a useful theoretical lens to study the organizational response to environmental issues (Chen et al, 2010; Butler and Daly, 2009; Chen, Boudreau and Watson, 2008). Both formal (such as government and professional associations) and informal (such markets forces, schemas, norms, routines and rules of competition) are regarded as key potential drivers of innovation acceptance (King et al, 1994) which with time become established as authoritative guidelines for social behavior (Scott, 2004). In so doing, Institutional theory's theoretical viewpoint promises for understanding on how organizations may sustainably use Green Information and Communication Technologies. Like what Butler and Daly (2009) asserts- while environmental 'concerns' shape Green IT responses across multiple organizational fields, due to the ubiquity of IS, the concept is yet useful.

Butler and Daly (2009) assert that, applications of institutional theory to the phenomenon of Green IS indicates a small but growing proportion of IS practitioners responding to normative and cultural-cognitive influences and making their IS infrastructures environmentally responsible. Nonetheless, Butler and Daly (2009) posit that, while many IS studies with institutional perspective focus on a specific technology (such as electronic data interchange) with a direct bearing on adopters, institutional theory can be applied to the adoption of variety of IS practices with both pragmatic and moral implications. Yet, examination of environmental technologies adoption with Institutional theory alone leaves aside other important factors such as individual, technological and managerial and the way they may influence adoption, unexplained, which may hold interesting influence for organizational Green E-Business adoption.

4.4 Synthesis

Although UTAUT, and TOE are rich models in explaining innovation adoptions, Green E-Business case at hand calls for a more comprehensive model that would be in position to unify the primary and secondary characteristics of the four key domains of adoption, - technological , managerial, organizational, and, individual/managerial elements.

The TOE model with its three context groups: organizational, technological and external environment (Tornatzky and Fleischer, 1990) is challenged by Bose and Luo (2011) that, it does not provide concrete model that describe the factors that influence the organizational adoption decision despite being primarily used to study the adoption of innovations. It rather provides taxonomy for classifying adoption factors in their respective context, and it neglects the individual and/managerial factors. Thus, a more comprehensive model needs to be formulated.

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The UTAUT model by Venkatesh et al (2003) with its postulation on two direct determinants of use: 'Intention to use' (influenced by- 'performance expectancy', 'effort expectancy' and 'social influence'), and 'facilitating conditions' (Venkatesh et. al., 2003) though for several contexts is regarded as a comprehensive model, is also criticized when comes to Green technologies adoption studies. That, given contextual differences in which resources including Information Systems (IS) are private, the environment is a public resource, thus its approach towards technological systems adoption to enhance its sustainability, may be different (Melville, 2010). This justifies for inclusion of authoritative guidelines including normative, coercive and mimetic pressures to reinforce the behaviors explained by the Institutional theory.

The Institution theory with its focus to explaining why organizations look alike after starting out differently, instigate that certain ways of thinking and doing become accepted practice or embedded in institutions (Scott, 1987). However, the instigation of external pressures-mimetic, normative and coercive pressures as the only authoritative guidelines for social behavior (DiMaggio and Powell, 1983) raises censures as well. That, although these pressures are considered important factors to drive green IS practices, examination of environmental technologies adoption with Institutional theory alone leaves aside other important factors such as individual, technological and managerial influence, unattended, which may hold interesting results for organizational Green IT adoption. Thus, coalescing together the three models was thought important to explain green e-business adoption.

5. Empirical literature review

5.1 Green E-Business: Meaning and Importance

The term "Green E-Business" comes from two terms- 'Green' and 'E-Business', Where by the term 'Green' is used most often to refer to new technology and products that improve the sustainability of the natural environment (Simula, Lehtimaki & Salo, 2009). For example, Bose and Luo's (2011) referred Green IT to as the use of IT resources in an energy-efficient and cost-effective manner. Ijab et al (2010), considered greening as a process that aim at reducing energy consumption, water use, waste generation, and consumption of natural resources. It aims at substituting the use of toxic materials with non-toxic materials and non-sustainable practices/processes with more sustainable ones. The second term 'E-business' refers to as the application of ICT to enhance one's business processes over a computer-mediated network. Alam and Zaheer (2011) elucidate three primary business processes enhanced by e-business: (1) Production processes - which include: procurement; ordering and replenishment of stocks; processing of payments; electronic links with suppliers; and production control processes, among others; (2) Customer focused processes - which include: promotional and marketing efforts; selling over the Internet; processing of customers' purchase orders and payments; and customer support, among others; and (3) Internal management processes - which include: employee services; training; internal information sharing; video-conferencing; and recruiting etc.

Thus, the term 'Green E-Business' is operationally defined in this paper as the use of e-business for business transaction, ecologically and energy efficiently to meet the triple bottom line environmentally, socially, and economically. The study extracts and adopts indicators from Molla and Abareshi (2011) and Info~Tech (2007) including: *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 side of a paper; knowledge/awareness of the status of the power management features of IT systems regularly used; turning off computers when not in use; preference in recycled IT equipments for one's personal use; presence of virtualized and consolidated server and data storage; use of blade server with racks; and, having an IT consumption efficiency metrics.*

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Studies (Chen, et al., 2008; Dedrick, 2010; Molla and Abareshi, 2011) acknowledge on the importance of Green IT applications for eco-sustainability. Researches (Molla et al., 2009; Lamb, 2009; Dedrick, 2010) cite the benefits that adoption of Green e-Business practices can bring, including reduced level of toxic material going to landfills; reduced energy consumption; reduced equipment and systems management costs for data centers; reduces carbon footprint and greenhouse gases emissions hence combating climate change; serves the environment and hence bringing sustainable development; serves for corporate social responsibility (CSR); and in turn, it offers for competitive advantages. Other studies consider organizational strategies such as eco-efficiency and eco-effectiveness as important motives to pursue business leadership, differentiation (Orsato, 2006; Dedrick, 2010) and improving employees' morale (Olson, 2008).

5.2 Factors affecting green technologies adoption

Literature cites a number of factors that are considered important to achieve energy efficiency and tackling their overall environment related issues in using ICT to transact business.

Studies by Molla et al (2009) and Dedrick (2010) indicate that companies generally will only consider adopting green IT practices when it makes economic sense to do so. This fact raises challenges for both vendors and policy makers in inventing affordable technology and policy respectively that eventually will be in favor of both economic gains and environment. They include provision no facilitating conditions that would lessen companies' burden in terms of subsidies provision and infrastructure development.

Legitimation is another factor, referring to the desire to satisfy government regulations and standards (be it politically driven or not) and stakeholders and comply with environmental norms and standards (Bansal and Roth, 2000). It may involve forcing some businesses to accept a technology or practice even if they do not have a strong intention to do so (Olson, 2008). Governments, in particular, can encourage the adoption of Green IT by legislations that create the framework for the law carbon economy (Chen et al., 2008) such as inclusion of environmentally-based taxes (Tyteca 1996; Molla et al., 2009). From this fact Molla et al., (2009) challenged the current situation whereby green regulations in most countries are voluntary, a fact that stands as a drawback to Green IT implementations in environmentally irresponsible firms. Molla et al., (2009) thus proposed for environmental regulations to become mandatory in order to reinforce the environmental consciousness behaviors, given the fact that environment is a public good. Similarly, he opines for introduction of specific environmentally-based taxes (e.g. carbon tax) to firms to pay for emission they contribute to the environment.

Studies by Info~Tech (2007), Molla and Abareshi, (2011), and Gartner (2008) acknowledge the role of managers' and business leaders' attitude (sentiment) towards environmental sustainability for green technologies adoption. Corbett (2010) used the concept of ecological embeddedness, which refers to a deep relationship with the natural environment and outlines that managers and organizations that are ecologically embedded will show commitment to the adoption of sustainable practices. This cadre is important as it is responsible for allocating resources (time, money, personnel etc) for various companies' projects including making green e-business a top management agenda on policy (on sourcing, use and end of life management) and strategy. In turn it will render to implementation actions including adequate resources allocation in terms of time, people, and finance for Green ICT.

Mithas et al (2010), Damanpour and Schneider (2006), and Chen et al (2008) recognized the influence of market forces in driving adoption either through the effects of network externalities or through creating a critical mass of users. A term eco-responsiveness motives is used to mean induced behavior (induced based coercion) to meet certain demands from the market environment such as green market opportunities which may be believably to lead to profitability rewarded by greenness of the company. Eco-responsiveness motives therefore can lead to Green E-Business preferences that associate a business to market accepted norms such as reducing emission, recycling, reuse and electronic waste management.

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This is true especially where competition pressure to win the same customers is high (Info~Tech's, 2007) because businesses are forcedly molded to use green strategies as a basis for competition, thus they set the green norms of competition that motivates their competitors' to adoption Green IT.

Literature also reveals the role of organization size (Damanpour, 1991; Molla et al., 2009). That, although organizational size on its own didn't seem to influence attitude towards Green IT, there was strong association between IT size (measured by the number of servers) and Green IT issues (Molla et al., 2009). Indeed as server size increases, an organization's concern to pollution prevention and product stewardship appears to increase correspondingly. This implies that organizations with larger server farms and data centers might lead the adoption of Green IT technologies and practices. Sector wise, environmental issues are quite complex and tend to vary from one industry to another including in terms of their stock of IT assets which can influence their desire to engage in activities to Green IT (Molla and Abareshi, 2011). That, small and service-oriented firms tend to have less IT facilities compared to larger firms

5.3 Developing Countries' Characteristics, Environmental Degradation Threats and Need for Green E-Business Applications

Developing countries are often characterized by development constraints including undeveloped infrastructure, limited access to finance, poor business development services, unfavorable legal and regulatory framework, and ineffective and poorly coordinated institutional support framework (The World Bank, 2008). To this extent, they are considered more vulnerable to environmental related disasters including climate change than the developed countries (Burton, 1996; Smit et al., 2001). This is partly caused by their low adaptation capacity emanating from their reliant on natural resources (NEPAD, 2010; Adger et al., 2002; Smit et al., 2001) to earn their daily life and because their economies are just emerging. Consequently, developing countries will be the most affected ecologically and economically by the consequences of global warming and the related outcomes, including droughts and spread of infectious diseases (Basu, 2005).

Nonetheless, as many countries in the developing world are seeking to mitigate the digital divide (Campbell, 2001), environmental concerns have arisen (Yu et al, 2010). Still, many countries are unable to afford new (and energy efficient) devices. This demand combined with high demand for raw materials, low labor cost for refurbishing, and poor environmental controls has led to a vigorous electronics reuse market in developing countries (Yu et al, 2010) resulting in recycling running a net profit. Consequently, key among these concerns has been the generation of hazardous wastes commonly associated with increased use of ICT and coupled with the growing market for used computers, which is thought as a way to enhancing access to information technology to low income people in the developing world. Organization business activities like sourcing, manufacturing, logistics, and marketing will have consequently negatives impact on the environment and society (Eltayeb, Zailani & Jayaraman, 2010). Moreover, ever-growing data amounts and performance expectations towards IT as well as the migration of paper-based tasks to electronic data processing continuously increase energy demands and waste streams, thereby raising attention to its global environmental impact (Gartner 2007). A need to counteract the practices arises including checking business practices and policies to improve IT stewardship and prevent ICT related pollution. Friedman (2007) argues that, these developments must be closely followed by legislation, customers, employees and other stakeholders for improved information systems management in order to overcome the risks posed by organizational IT use against economy, environment and society along with the problem of volatile and in the long-run rising prices for climate change adaptation.

Through "going green" companies will not only serve the environment, but also they will enhance their reputation in the marketplace while reducing their operational costs, and increasing efficiency to boost

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productivity and sustainable development. This is among others; this study strives to activate Green E-Business adoption among firms in developing countries.

6. The GEBAM Conceptual Model

From the empirical and the theoretical reviews, this study extracts and groups the constructs mostly emphasized. The paper merges the three (UTAUT, TOE; and Institutional) models to avoid overlap and repetitions among the constructs between the models. In order to come up with one comprehensive Green E-Business Adoption Model (GEBAM), the important constructs are considered and the repetitions are obliterated. Moreover, the significant additional factors examined in previous empirical studies are integrated in the research framework. All the proposed determinant factors are categorized based on their attributes. Lastly, a schematic Green E-Business Adoption Model (GEBAM) is drawn representing the Green E-Business conceptual model. The GEBAM model proposed, postulates that organizational factor (size-employees and servers' number, organizational resources, organizational support, and organizational strategies); managerial factors (entrepreneurial attitude, commitment, technological experience and, self-efficacy); technological factors (performance expectancy, compatibility, perceived ease of use, apparentness-triability, observability & compatibility); and external environmental factors (normative pressures, coercive pressures, mimetic pressures and facilitating conditions) influence adoption and use of Green E-business Applications in Developing countries. The adoption in turn could be manifested in the sourcing/designing, operations and end-of-life management's policy and actions within the adopting firms in the study area. Figure 1, summarizes the scenario.

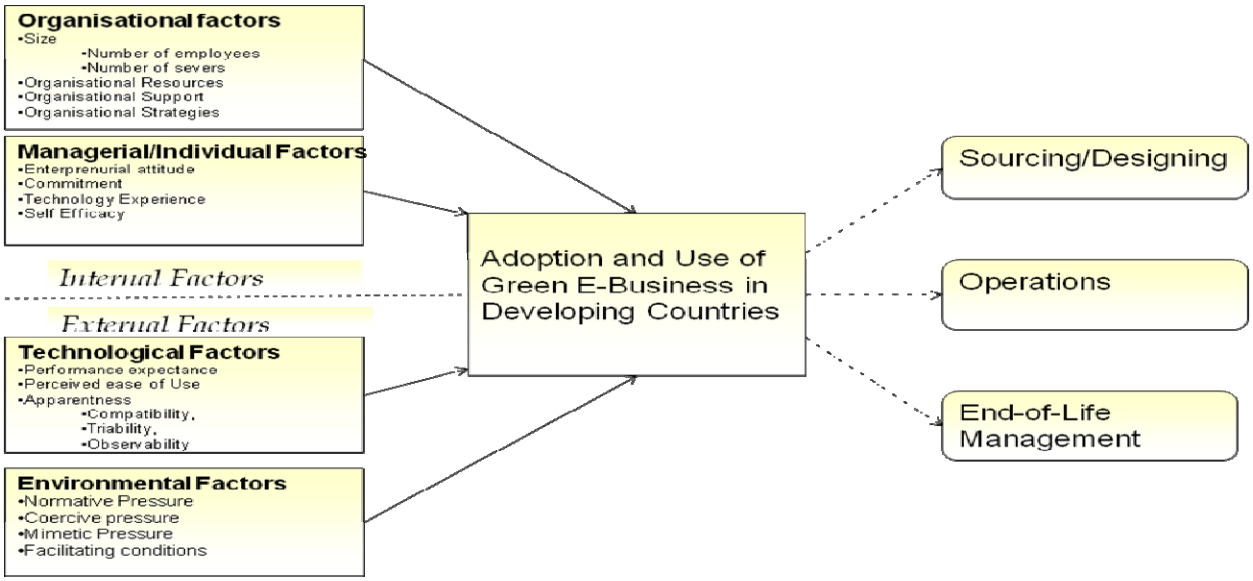


Figure 1
The GEBAM Conceptual Model

From the conceptual model the constructs are operationally defined in the Table below, from which the research instrument will be developed and the hypotheses are formulated. All the constructs are postulated to positively associate to green e-business adoption.

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Table 1
The GEBAM Conceptual Model Constructs

Construct	Operational definition	Source
Organizational size	…organization's resources (servers etc.), transaction volumes or workforce size	Moll et al, 2009
Organizational support	…the extent to which a company helps employees using a particular technology or system	Weng and Lin, 2011
Organizational Strategies	….the creation, implementation and evaluation of decisions within an organization that enables it to achieve its long-term objectives	Celuch et al., 2007; Molla et al., 2009
Organizational Resources	…the possessions that a firm uses to implement its strategies to improve its efficiency and effectiveness. They include financial, technical human resources, material, infrastructure, information and knowledge	Kuan and Chau, 2001; Molla et al., 2009; Weng and Lin, 2011
Managerial (Individual) entrepreneurial attitude	…the extent to which one perceives entrepreneurial behavior and its consequences as valuable, beneficial and favorable. Measure in three main attributes -*internal control locus*, *creativity,* and *innovation*	Kangaharju, 2000; Georgellis and Wall, 2000
Top Management Commitment	…willingness to give one's time and energy to something that he/she/it believes in, or a promise or firm decision to do something that it must do or deal with, that takes its time	Mehrtens, Gragg and Mills, 2001
Technological experience	refers to "the period of time an individual has been using the technology in question	Venkatesh et al., 2000 and Kim and Malhotra, 2005
Self-efficacy	…is developed and defined as a judgment of one's ability to use a technology (e.g. computer in their study) to accomplish a particular job or task	Chiu and Ju, 2004); Compeau and Higgins, 1995
Relative advantage	…the degree to which an innovation is perceived as better than the idea it supersedes in enabling them perform their job	Louho, Kallioja and Oittinen, 2006; Venkatesh et al., 2003).
Complexity/ Effort expectancy	…the degree of ease or difficulty associated with the use of the system and is said to significantly affect technology adoption during early stages but becomes non-significant over periods of extended and sustained usage	Venkatesh et al., 2003; Rogers, 1995
Apparentness	…the degree to which the technology is clearly visible, understood obvious and seemingly real and true. Apparentness is measured by its Compatibility, Trialability and Observability	Venkatesh et al., 2003; Lee, King-Shey and Morttensen, 2011
Normative pressures	…the need to be accepted by others/community surrounding and to make a favorable impression on them	Kafatis et al (2009) and Celuch et al., 2007
Coercive pressures	…pressure exerted by both formal and informal forces exerted by other organizations, upon which an organization relies	(DiMaggio et al. 1983; 2005; Kilbourne et al. 2002
Mimetic pressures	…standard organizational responses to uncertainty when the course of action is unclear	DiMaggio et al. 1983; Banker et al. 1988; Lee et al. 2002
Facilitating conditions	….the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system	Venkatesh *et al,* 2003; Hoevenagel et al, 2007; Infate and Smirnova, 2009
Green E-Business Adoption	…the stage in which a Green IT/E-Business is selected for use by an individual or an organization. It is the choice to acquire and use a Green E-Business invention or innovation which involves a decision between fixed costs of adoption against the benefits expected	Hall & Khan (2003); Beal, et al (1957); Ozanne, et al (1971); Molla et al (2009)

7. A way forward

This GEBAM conceptual model constructs and variables were reached after an exploratory factor analysis, Varimax rotated through principal components at 0.50. The reliability of constructs was proved with a crombach's alpha above 0.8. The way forward is to validate the model through confirmatory data analysis. The Structural Equation Modeling (SEM) will be used due to its power to analyze a series of dependence relationships simultaneously representing both managerial and theoretical importance.

8. Conclusion

Being part of an ongoing PhD study, this paper has managed to review empirical literature, theories and models on technological adoption and public goods management, in order to see if they could be able to

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explain green e-business adoption. The three models included the UTAUT, TOE and the Institutional theory. The paper concludes that each model though provided rich information to explain technology adoption; each far misses some aspects to explain green technologies adoption. Thus a new conceptualized model that was suggested comprising of the organizational, managerial, technological and external environmental aspects that are postulated to influence green e-business adoption during sourcing, operations, and end of life management. Together thirteen hypothesis are formed, and they on their way to be proved or rejected in favor of their alternatives.

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