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A STUDY OF GREEN IT READINESS IN INDIAN IT ORGANIZATIONS

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INTRODUCTION

In this era of globalization when individuals and corporations are pursuit of constant improvement, faster communication, and interconnection, IT performs a strategic role in business. Various theories have been proposed regarding the role of IT in business, such as Powell and Dent (1997): IT as an element of human resources; IT as an element of business resources; and IT as element of technology resources. These increasingly prevalent elements evoke two aspects of Green IT: *IT as part of the problem* and *IT as part of the solution*. Also, corporate social and environmental responsibility is gaining attention in businesses around the world. Along with public institutions and non-governmental organizations, NGO:s, businesses are redesigning their processes and reaching for business opportunities arising from a problem called climate change. Climate change means "increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level" (IPCC, 2007, p. 30). It is often quantified through green house gas emissions. In 2002 the global annual emissions were 40 GtCO2e1 and are expected to rise to approximately 53 GtCO2e per year by 2020. If no corrective action is taken, the rise may cost "at least 5 % of global gross domestic product (GDP) each year" (The Climate Group, 2008, p. 12). If corrective action is taken, the loss can be limited to about 1 % of global GDP per year (The Climate Group, 2008). Thus there are both environmental and financial reasons to take action. From business, and especially IT, point of view, this means business opportunities at the new, expanding green market. The alarming figures and high costs of climate change are driving governments and businesses towards mitigating this risk. Governmental

bodies change legislation to motivate people and businesses to act in an environmental friendly way. From business point of view, there are two alternate ways to react; reactive and proactive. Reactive businesses basically follow and act upon legislation whereas proactive businesses seek to exploit green business opportunities and change ways of working even before it is required by law. As with many business improvements, IT is one of the key enablers of low carbon economy as well.

Hence the term Green IT, which implies use of IT to control and redesign low carbon activities. It can be used for control as well as redesign of green operations.

Green IT refers to environmentally sound IT. It's 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. [San Murugesan, Jan-Feb 2008]

In the future, the strategic role of IT will depend not only on delivering economic value, but also on a capability to maintain a sustainable IT operation and on IT's support for the sustainability transformation of organizations. The importance of Green IT is strongly recognized through practitioner reports [CFO, 2009; Gartner, 2008] and Information Systems research [Dedrick, 2010]. Nevertheless, the capability that organizations need to build in managing and using IT in the context of environmental sustainability has yet to be researched. To date, no empirically validated framework that guides practitioners and researchers to explain the capability that firms need to build in order to Green their IT and the extent to which they have progressed along the Green IT path has emerged. Indeed, IS research is criticized for failing to provide meaningful assistance to ―those organizations unsure about how, where, and when to respond to imperatives for their [IT] applications and practices to become Green [Elliot and Binney, 2008, p. 1] and for being slow to recognize the problem of climate change and take action [Watson et al., 2010]. While the opportunities and potentials of Green IT might be attractive, a measure of the Green IT readiness (G-readiness) of organizations has not been provided in extant literature.

G-readiness is defined as an organization's capability in Greening IT (that is applying environmental criteria to its IT technical infrastructure as well as within its IT human and management practices across the key areas of IT creation, sourcing, operations, and disposal) in order to reduce IT, business process, and supply chain related emissions, waste and water use; improve energy efficiency; and

generate green economic rent. [Molla, Alemayehu; Cooper, Vanessa; and Pittayachawan, Siddhi (2011)]

G-readiness demonstrates the comparative levels of Green IT development among businesses and serves as one of the benchmarks for measuring an enterprise's progress to participate in the global low-carbon e-economy. Thus *G-readiness* is a measurement of the Green IT capabilities of an organization.

OBJECTIVES

Establish the rationale for undertaking the study in the background of work done on that theme or the logic of the originality of your research work; identify gaps in the knowledge and justify the need for the present study (use more space if needed).

Green IT has been one of the most sought after topics of research in these days. With the ever increasing awareness about the ill effects of the uncontrolled use of non-renewable sources of energy, managers across the countries are looking towards greening their IT as this is one of the factors which can reduce the carbon foot prints. The strategic role of IT will depend not only on delivering economic value, but also on a capability to maintain a sustainable IT operation and on IT's support for the sustainability transformation of organizations. The importance of Green IT is strongly recognized through practitioner reports [CFO, 2009; Gartner, 2008] and Information Systems research [Dedrick, 2010]. Nevertheless, the capability that organizations need to build in managing and using IT in the context of environmental sustainability has yet to be researched. To date, no empirically validated framework that guides practitioners and researchers to explain the capability that firms need to build in order to Green their IT and the extent to which they have progressed along the Green IT path has emerged. Indeed, IS research is criticized for failing to provide meaningful assistance to ―those organizations unsure about how, where, and when to respond to imperatives for their [IT] applications and practices to become Green [Elliot and Binney, 2008, p. 1] and for being slow to recognize the problem of climate change and take action [Watson et al., 2010]. While the opportunities and potentials of Green IT might be attractive, a measure of the Green IT readiness (G-readiness) of organizations has not been provided in extant literature.

There has been some research on the g-readiness of the organizations in other countries but in India which has become the center for many IT companies, there has not been a significant research to

ascertain the g-readiness of such organizations. India being a developing economy will sooner or later face the economic pressure due to the uncontrolled use of resources which is affecting the climate and hence the eco-system.

This study will try to bring more insight on the g-readiness of the top IT companies in India. This will help the decision makers in such organizations to take necessary steps towards greening their IT and help conserve the ecosystem in long run and help better sustainability of life on this planet.

BROAD AIMS OF THE STUDY AND SPECIFIC OBJECTIVE

The study aims to measure the Green IT readiness among top IT organizations in India as an early indicator to understand the implementation of Green IT initiatives in India. The study will empirically test the readiness of top IT organizations in India for their Green IT implementations.

Objective 1: The pervasiveness of Green IT awareness that affect the green IT readiness

Objective 2: The maturity of green policies measures the extent to which green IT readiness policies are developed throughout the organization and permeate the value chain.

Objective 3: The maturity of Green IT sourcing practices measures the extent to which environmental considerations are factored in IT and other purchasing decisions towards green IT readiness

Objective 4: The maturity of Green IT operation practices measures the extent of actions taken to reduce power consumption for Green IT readiness.

Objective 5: The maturity of Green IT disposal practices measures the compliance of equipment/machinery manufactures, users, and resellers in Green IT end of life management with respect to Green IT readiness

Objective 6: The maturity of Green IT technologies does not measures the organizations' acquisition of more environmentally effective technologies towards green IT readiness.

Objective 7: Green IT governance measures the management infrastructure to implement Green IT and become Green IT ready.

HYPOTHESIS

*State the hypothesis, **if any**, which the research intends to examine. In case the study does not contain explicit hypothesis it may be mentioned so.*

Based on the review of literature and the instrument developed by Molla et al [2009], following hypothesis has been formulated

H1: The pervasiveness of Green IT awareness does not significantly affect the green IT readiness

H2: The maturity of green policies does not significantly affect the extent to which green IT readiness policies are developed throughout the organization and permeate the value chain.

H3: The maturity of Green IT sourcing practices does not significantly affect the extent to which environmental considerations are factored in IT and other purchasing decisions towards green IT readiness

H4: The maturity of Green IT operation practices does not affect the extent of actions to reduce power consumption for Green IT readiness.

H5: The maturity of Green IT disposal practices affect the compliance of equipment/machinery manufactures, users, and resellers in Green IT end of life management with respect to Green IT readiness

H6: The maturity of Green IT technologies does not significantly affect the organizations' acquisition of more environmentally effective technologies towards green IT readiness.

H7: Green IT governance does not significantly affect the management infrastructure to implement Green IT and become Green IT ready.

REVIEW OF LITERATURE

Review some important and related Published Works and analyze them in context of you study (use more space if needed)

Businesses are under increasing pressure from competitors, regulators and community groups to implement sustainable business practices. Its been a strategic issue to balance economic and

environmental performance to be green and competitive. Hence there has been an increased discussion on green information technology (IT). It has always been a challenge to actually measure the green IT readiness (G-readiness) of any organization empirically similar to the lines on e-readiness. Without a clear understanding of g-readiness, organizations approach Green IT initiatives on an ad hoc and somewhat reactive basis which is undesirable. Molla et al. [2008], worked out a g-readiness framework which described the basic principles for empirical calculations to find out the g-readiness of an organization.

Corporate Social Responsibility and related concepts

From an organizational perspective, references to "corporate social responsibility" [CSR] and "sustainability" have become commonplace [Hendry and Vesilind 2005]. The literature on sustainable business practice and corporate social responsibility indicates that organisations' capability to comply with the mounting demands of different environmental groups and government regulations and practice socially oriented moral management is a major concern and an issue that might affect competitiveness [Carroll 1991; Gartner 2008; Rao and Holt 2005]. Businesses use sustainability and CSR initiatives such as green supply chain management, environmentally preferable business practices; environmentally friendly technologies, and an aggressive stance towards CO2 emissions, to demonstrate their commitment to the environment [McWilliams et al. 2006]. Returns from such initiatives include building positive brand image, mitigating any environmental liabilities associated with a firms products and services and influencing the mindset of customers and investors [Rao 2004; Rao and Holt 2005; Sen et al. 2006]. Consumer buying habits are increasingly driven by ethical concerns. Green issues may not only have an impact on consumer buying power, but also affect how both the public and private sector award competitive tenders [Whitby 2007].

Development of Green IT framework and related principles

The necessity for individual organizations to understand their readiness for adopting Green IT strategies and polices has been demonstrated in the existing literature. Mines and Davis [2007], for example, predicts that where current green regulations are voluntary, in the future such regulations will become mandatory.

Greening IT naturally starts with IT and business leaders' sentiments towards climate change, CSR and business and environment sustainability [Info~Tech 2008a; Rao and Holt 2005]. Info~Tech's [2008a]

global Green IT attitude and action survey of 1260 IT professionals indicates that only 50% of participants are concerned about climate change.

The attitude of mangers and business leaders towards environmental sustainability is a key factor in understanding not only the challenges of Green IT but also the opportunities associated with it [Gartner 2008].

G- readiness instrument formulation

Based on the review of the above literature five important properties of success in greening IT – attitude, policy, practice, technology and governance were argued – which together create the critical quality we call "G -readiness".

Molla, Cooper and Pittayachawan [2009] developed and instrument to empirically measure the g-readiness of the organizations based on the Green IT framework developed by Molla et al [2008]. The study involved the a sample size of 2153 CIOs or their equivalent from 3 countries viz Australia, New Zealand and US with an average organization size of more than 100 people. An online survey was sent to the above out of which only 143 usable responses were received [95 Australian; 14 New Zealand, and 34 U.S.]. The response rate is comparable to response rates of other studies targeting senior executives [Bhatt and Grover, 2005; Fink and Neuman, 2007]. A variety of techniques can be used to evaluate the measurement properties of a construct. The most common ones, which are assessed in this current study, are unidimensionality, convergent validity, discriminant validity, factorial validity, nomological validity, and predictive validity [Straub et al., 2004]. To assess unidimensionality and convergent validity, we first explored and identified the substrata of each construct with exploratory factor analysis (EFA). Confirmatory factor analysis (CFA) is used to conduct all validity tests. A 35-item scale was developed and tested for validity which can be used to ascertain the g-readiness of an organization.

Mariani and Imam [2012] did a preliminary study of g-readiness in Indonesian organizations using the instrument developed by Molla et al [2009]. The paper aimed to measure Green IT readiness among twenty organizations in Indonesia as an early indicator to understand the implementation of Green IT initiatives in Indonesia. The findings were then compared with results derived from similar studies of 143 organizations from Australia, New Zealand and the USA. The questionnaire was uploaded to a website, from October to December 2011, to allow participants to access the survey easily. The first selected sample was based on the same data that the previous research on Green IT Awareness but

narrowed to financial institutions. However following the low response rate, the survey has been sent a second time to the whole database which meant various sectors responded. With not much feedback, the author has tried to extend the research to wider database by asking help from the organizer of the Indonesian Green IT conference 2011 as well as to the research department of their institution. Unfortunately the sample has shown a very poor interest in supporting this research and after sending the questionnaire to more than 1000 persons, only 20 replied. Among the 20 surveyed institutions, 65 percent of the respondents were Senior Managers ranging from Chief Executive Officer, Chief Information Officer or IT Department Head. Others (35%) held various positions such as IT Consultant, IT manager and IT support. The industry backgrounds varied from Financial (30%), IT (30%), Telecommunication (25%) and the remaining 15 percent consisted of two government institutions, a media corporation, an education institution and an automobile dealer. The result showed a poor g-readiness of the 20 companies which were surveyed.

Maija Tenhunen [2011] worked on the conceptualizing and measuring g-readiness in Finnish companies with a special focus on e-Invoicing as an application area. The survey used to test the G -Readiness framework and determine the actual level of Green IT Readiness was carried out in summer 2010 as an anonymous web based survey. The data was analyzed using PASW Statistics 18, formerly known as SPSS, and SmartPLS 2.0 M3. The questionnaire was created as an online questionnaire using Webropol and the respondents were sent an email with a short note introducing the study. Reminders were also sent to the people who did not respond the first time. A total of 514 questionnaires were sent which yielded 45 usable responses. The author used a narrower approach with modifications to the original instrument with respect to Finland. The research found that g-readiness of Finnish organization was mediocre. In comparison to the original, more holistic model, the Finnish model gave more optimistic scores. The model was also used to test does eco-sustainability explain adoption of e-invoicing. It was found out that no such connection can be made and thus the hypotheses predicting this connection had to be declined.

There has not been significant research on this topic in Indian context and I am not able to find any specific publication or research work with respect to Indian organizations' g-readiness. One of the IT companies, Fujitsu, has worked on the sustainability of organizations adopting Green IT in terms of the global benchmark comparing results from four countries namely the USA, UK, Australia and India. This study measured the green IT awareness in the said countries and in varied industrial sectors. The model used in this study has been developed by Connection Research and RMIT University, Australia. The data for this study was gathered through an online survey of organizations in most industry sectors

across four countries, which asked respondents at CIO and IT Manager level over 80 questions about their Green IT policies, behaviour and technologies in each area. A total of 638 responses across four countries were received and included in this research. The findings of the research were – (1) globally, overall Green IT maturity was found to be low, (2) UK is the leading country in terms of Green IT awareness, (3) IT/Communications/Media was found to be the best performing sector across the four countries and (4) operational Green IT performed the best in all the six variables – lifecycle, end user (operational), enterprise, enablement, metrics and Green IT index, studied.

METHODOLOGY

RESEARCH DESIGN

Research work follows a set pattern of steps. For carrying out any research, 'Research Design' has to be prepared. Choice of research design is more likely selecting a cheese cake recipe- some are better than others but there is no one which is universally accepted as the "Best".

The goal of this research is to find out the facts, analyze the information gathered and to give conclusion based on the analysis. Thus, this research work can be referred to as 'Descriptive Research ' which will test the green IT readiness of top IT organizations in India. There have been a lot of discussions about green IT and organizations getting ready for the same all across the world but how far that objective has been met are still a question.

After extensive research of literature, research objectives have been drafted. Molla et al [2009] developed an instrument which can test the g-readiness of the organizations empirically. The culturally modified questionnaire originally developed by Molla et al [2009] will be uploaded on google docs and then e-mailed to the respective CIOs/IT managers. The data will be processed with the help of SPSS software. A systematic pilot study will be conducted to make the questionnaire better and comprehensive. Reliability and the validity of the questionnaire will be tested using Cron Box Alpha test. Regression, Correlation, Exploratory Factor Analysis and Confirmatory Factor Analysis techniques will be used to do the useful and meaningful analysis using appropriate statistical softwares like E-Views, SPSS, AMOS and Excel. Also, Likert Scale will be used. Content analysis will be used to make the study mode comprehensive and authentic. Also, both Primary and Secondary data will be used in the study.

SAMPLE DESIGN

The data will be collected from the top 100 IT companies of India listed on www.moneycontrol.com report based on their performances (Reference:http://www.moneycontrol.com/stocks/top-companies-in-india/net-sales-bse.html Top companies in India by net sales - BSE in the month of August 2013). The culturally modified questionnaire originally developed by Molla et al [2009] will be uploaded on google docs and then e-mailed to the respective CIOs/IT managers of the selected 100 companies.

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