ABSTRACT

“Green IT” refers to the set of technologies, policies, and practices that meet the information technology needs of an organization while minimizing the impact on the natural environment. Many developed countries have already taken move towards this by following some principles, now it is the time for the developing countries to follow some rules of thumb to achieve partly the benefit of “Green Technology”. In India, the implement-ability of principle of “Green technology” is facing a dilemma due to many socio-economic matters. This new form of IT technology reduces ‘energy use and consumables’, including hardware, electricity, fuel and paper – among others. Because of these reductions, Green IT initiatives also produce cost savings in energy use, purchases, management and support, in addition to environmental benefits. Green IT is not only a booming economic sector but also an energy intensive one. It accounts for 2% of human Greenhouse Gas Emission worldwide as evidence in a study by ‘Global action Plan’ (UK based environmental organization). This figure can be reduced if the Green Segment or Green IT continues to grow. Sustainability is already a dominant trend in this sector. Women’s economic empowerment is a prerequisite for sustainable and pro-poor growth. According to ILO (International Labour Organization), in 2011-12 while 62% of women are employed in agricultural sector, only 20% in Industry and 17% in the service sector. Rural female employment to the service sector is at present very negligible but with ICT reach to rural areas it is possible that they would contribute to sustain the predicted growth in this segment. The present paper emphasises the importance and trends of Green IT in India, the women employment in IT sector as well as in Green IT, the Glass ceiling effect, and the networking & strategies adopted for women.

Keywords: Green IT, Glass ceiling effect, Sustainability, Women’s economic empowerment

INTRODUCTION

“I am no bird; and no net ensnares me: I am a free human being with an independent will.” -Charlotte Bronte, Jane Eyre [16]

In today’s World, it is difficult to ignore the ongoing concerns about climate change and the environment and whereas there are no easy solutions for businesses, the IT community can have a significant impact on the worldwide carbon footprint by adopting a ‘greener’ approach to computing [1]. Green IT is a collection of strategic and tactical initiatives that directly reduces the carbon footprint of an organisation’s computing operation... However, Green IT is not just focused on reducing the impact of the ICT industry. It is also focused on using the services of ICT to help reduce the organisation’s overall carbon footprint. The Green Computing, as defined in the Official Journal
of the French Republic on July 12, 2009, the ESTs of information and communication for short eco-ICT, are information technology and communication which design or use can reduce the negative effects of human activity on the environment [26]. About 60-70 percent energy is consumed by computers which are not in use but still turned on and that consumed energy is the main reason of CO₂ emission [5]. According to Jevons’s paradox technological progress that increases the efficiency with which a resource is used tends to increase (rather than decrease) the rate of consumption of that resource. This paradox is well supported by Moore’s law, 2005 which predicts exponential growth in the power density, and total power used for IT. On the contrary there is linear growth in power generation mechanisms [7]. The Grid Computing as a rising technology is a pivotal instrument that bridges the gap between being remote and industrialized. One of the prime movers in the technology that we have these days is the use of the grid computing. This technology allows for the distribution of the PC efficiency where there is an extraordinary computing device with resources comparable to a super computer that acts as a “server” for a group of computers that then act as workstations that systematically work as a group in order to achieve a common goal. This paper attempts to get into the theoretical underpinning having emerged from the overview of literatures on women working in this high-tech industry in India [11].

LITERATURE REVIEW

Basically, the whole green aspect came about quite a few years back when the news that the environment was not a renewable resource really hit home and people started realizing that they had to do their part to protect the environment. Many governments worldwide have initiated energy-management programs, such as Energy Star, an international standard for energy-efficient electronic equipment that was created by the “United States Environmental Protection Agency” in 1992 and has now been adopted by several other developing countries like India. This considers social responsibility, economic viability and the impact on the environment. The idea is to make the whole process surrounding computers friendlier to the environment, economy, and society. Once computers are sold businesses or people use them in a green way by reducing power usage and disposing of them properly or recycling them. The idea is to make computers from beginning to end a green product. If everyone takes into account green computing then our world of computers will have as little a negative impact on our physical world [6]. It has been observed by several researchers and they focused on using green IT viewed from the aspect of attitude, policy, practice, technology, governance (Molla, Cooper, Corbitt & Deng, 2008, Tenhunen, 2011, Mariani & Imam, 2012, Yuniarti, 2012) and ICT personnel (Wadwoba, Wanyembi, Omuterema & Omieno, 2013, Fors & Lennerfors, 2013, Tenhunen (2011)) [8] examined the adoption of Green IT by using attitude measurements, paperless office management, and virtualization. Several companies have introduced the concept and activities related to Green IT. A management consultant and an author W. Alan Randolph, in one hand, defines that “…empowerment is recognizing and releasing into the organization the power that people already have in reviews their wealth of useful knowledge, experience and internal motivation”, (Kreitner & Kinicki, 2003). On the other hand, Parkins and Zimerman (1995) says that, “…empowerment is the construct that links individual strengths and competencies, natural helping systems, and proactive behaviours’ to social policy and social change”[8]. Today, there are many such women who have been the backbone of the recognition that India has achieved in ICT business. A silent revolution is taking place with evolution of women empowerment in the knowledge era. They are getting the best access to Information and Communication Technology (ICT) education, employment opportunity & becoming owners of IT companies [27].

TRENDS & REASONS TO GO GREEN

Being Green means different things to different peoples. For some, it might mean buying technology that’s more energy efficient than what they have & reducing the amount of electricity a datacentres consumes. For others, it means buying hardware that is made of environmental friendly components. Yet others might look at the end of hardware life and suggest that Green IT means proper disposal. The global green mantra is 3 R’s that is “Reduce, Reuse, and Recycle [2].
Technologies Green Computing

VIA Technologies, a Taiwanese company that manufactures motherboard chipsets, CPUs, and other computer hardware, introduced its initiative for "green computing" in 2001. With this green vision, the company has been focusing on power efficiency throughout the design and manufacturing process of its products.

Carbon-free computing

One of the VIA Technologies’ ideas is to reduce the "carbon footprint" of users — the amount of greenhouse gases produced, measured in units of carbon dioxide (CO2). Greenhouse gases naturally blanket the Earth and are responsible for its more or less stable temperature. An increase in the concentration of the main greenhouse gases — carbon dioxide, methane, nitrous oxide, and fluorocarbons — is believed to be responsible for Earth's increasing temperature, which could lead to severe floods and droughts, rising sea levels, and other environmental effects, affecting both life and the world's economy.

Solar Computing

Amid the international race toward alternative-energy sources, VIA is setting its eyes on the sun, and the company's Solar Computing initiative is a significant part of its green-computing projects. For that purpose, VIA partnered with Motech Industries, one of the largest producers of solar cells worldwide.

Lead-Free and RoHS computing:

VIA’s lead-free manufacturing technologies do not require a lead bead, and the solder balls now consist of a tin, silver, and copper composite.

Energy-efficient computing:

A central goal of VIA's green-computing initiative is the development of energy-efficient platforms for low-power, small-form-factor (SFF) computing devices [6].

GREEN PRINCIPLES - ECO-FRIENDLY APPROACH

It was realized that the conventional computers take much energy and produce heat. The main aim of the manufacturer is to reduce the e-waste in the environment. In these computers, hazardous material such as PVC’s brominated flame-retardants and heavy metals such as Cadmium, Mercury and Lead are not used like commonly used computers [3].

The Green IT principles show the concepts of reducing the environmental impact. The figure 1 focused on different areas and activities. It presents the four green holistic principles. These principles are focused on different areas and activities as follows….

Green use – Reduce the energy consumption of data centres, computers and other information systems and use them in the environmental ways e.g. virtualization, turning off computer when not in use, etc.

Green design – Design energy efficient and environmentally sound components, computers, servers and equipment’s and concern more on the future of electronic parts e.g. eco-friendly design, LED monitor, etc.

Green manufacturing – Every process in manufacturing electronic components, computers and other associate subsystems should imply a low or no impact on the environment.

Green disposal –The company should plan refurbishment and reuse of old computers. Also, recycling process for unwanted computers or other electronics components should be prepared.
Figure 1: Domains of Green IT (Murugesan, 2008) [13]

Recently, computer industry realizes that going to be Green IT is the best direction to get success in both of environmental friendly and cost reducing. The companies try to engage those four green holistic with the entire IT lifecycle [9].

ENVIRONMENTAL BENEFITS AND COST REDUCTION BENEFITS

“Murugesan (2008) has identified the three drivers of Green IT as economical, regulatory and ethical. Bose and Luo (2011) also says “the three primary drivers of Green IT initiatives according to the literature are: (1) reducing costs due to budget cuts, (2) reducing consumption due to resource restrictions, and (3) complying with the local law.” Therefore it is evident that Green IT aims at cost reduction as well as environmental protection [13].

GREEN IT PERSONALITIES

Through conversations with IT and business decision-makers, four predominant Green IT Personalities emerge. The Green IT Personality Matrix plots Green Attitudes & Action on the vertical axis, and implemented Green IT initiatives on the horizontal. The four personalities are Green Advocates, Smart Spenders, Green Seekers and Green Observers [10]. The following fig. 2 depicts this.

Figure 2
EMERGING INDIVIDUALISATION & WOMEN EMPOWERMENT

This phenomenon of the labour market implies liberating women from patriarchal constraints. Walby Sylvia defines patriarchy as a system of social structures and practices, in which men dominate, oppress and exploit women’ (1991). She refers to the term “social structure” that predetermines every individual man in a dominant position and every woman in a subordinate one. Women are not only concentrated in the lower grades of work (vertical segregation), but in different areas of work (horizontal segregation). Exclusion strategy aimed at totally preventing women’s access to an area of employment, or to all paid employments and segregation aimed at separating women’s work from that of men by treating the former beneath the later in respect of remuneration and status [11].

Figure 3: Source: Authors adaptation of the model. Asmita Bhattacharyya, Dr.Bhola Nath Ghosh [11]

Hochschild and Machung (1989) observed that in the earlier economy, female labour force has two shifts viz. the 1st shift in office and the 2nd shift at home. But, actually, women more often juggle between three shifts i.e. Job, Childcare and Housework whereas the men juggle between jobs and childcare. Hochschild (1997) later propounded the idea of a “third shift” in conformity with the call for the New Economy. Longer working hours at the office in the first shift (at workplace) often encroach on the family time i.e. the second shift (at home) i.e. needs to be hurried and rationalised. Beck (1998) points out that woman with equal educational opportunities followed by increased awareness of their positions, build up expectation of more equality and partnership in professional as well as family life, is in contradiction to both of labour market and male behaviour. Deskilling of housework (technical automation and paid services) directs women to wards work outside the home.

SOCIAL CAPITAL AND THE CARE ECONOMY ARE CENTRAL TO THE GREEN ECONOMY

These two concepts are pre-conditions for the sustainable management of resources and also key for understanding the central roles that women play:

1. In social interactions in their communities through networking, building solidarity and consciousness among each other.

2. The work performed, usually in the domestic sphere that keeps the labour force fed and clothed.

The care economy is as complex as the market economy, and access to care services (the care regime) provided by the state or market is a crucial component of gender equality. If the care economy sputters, it will have serious consequences for both society and its productivity as it is losing its most important resource and value generator – people [14].

NEED OF ICT FOR WOMEN

It is a commonly held view that women are less engaged with ICTs than men. ICT need not be restricted to the upper strata of the society but have to freely flow to all parts of the female population. The scopes of areas in which ICT can put a greater switch in the hands of women in the new
globalized environment are as diverse as the socio-economic scenario. Within women's group itself, globalisation has generated the haves and the have not’s i.e. those who are in a valuable position and those relegated further into disadvantaged position under the new economic policy. Within women's group itself, the needs fluctuate accordingly.

Figure 4

DATA SOURCE AND INTERPRETATION

This paper is mainly based on secondary data from different international and national journals, survey reports, different national organisation reports, published books, web sites etc. The data describe the status, employment opportunities of women in IT sector and position of in corporate body. The recommendations and suggestions made by Government and different IT sectors.

Access to employment opportunities

Both demand and supply factors affect women's labour force participation. This is majorly affected by women’s status in society. On the demand side, economic, social and cultural factors, employers' attitude and discriminatory policies all affect female work participation. The supply of female labour depends on various factors as socio-economic status of family, life cycle commitment of marriage and fertility and education levels. In 2011-2012, women comprised 14.7% of all urban workers, a small increase from 13.4% in 1972-73 (www.catalyst.org) as fewer women are enrolled in higher education; their access to IT employment is limited. Education is the key to getting entry in a knowledge based sector. Various studies have shown that the people working in IT sector are mainly from urban background, especially for women. Thus, it is seen that majority of the respondents entering the IT industry belong to the upper caste and urban areas that had access to higher education related to newer technologies. The average is around 28 years. The respondents have a high socioeconomic status, only women from well-off families have access to IT. Similar results have been reported by Rothboeck (2001), Ramesh (2008), and Hussain (2008). Good communication skills are a necessity for entry in the IT sector (Fuller and Narasimhan, 2006). Persons from rural background and lower caste groups have an immediate disadvantage as English speaking skills are required and access to them is limited. The results are same when analyzed on a macro level data by NSS as shown in Table 1. The NSS data
shows that majority of people, more than 90% working in IT sector belong to urban areas & percentage is higher in case of women [25].

Table 1: Rural/Urban & Male/female Workers in IT Industrial Categories (%)

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<td></td>
<td>Male</td>
<td>Female</td>
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<tr>
<td>Rural</td>
<td>7.9</td>
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<td>Urban</td>
<td>92.1</td>
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<th></th>
<th>Male</th>
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<th>Total</th>
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<tr>
<td>Rural</td>
<td>8.1</td>
<td>3.4</td>
<td>7.3</td>
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<tr>
<td>Urban</td>
<td>91.9</td>
<td>96.6</td>
<td>92.74</td>
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Source: NSSO 51st, 61st round (Figures are male – female share to total)

The above table shows the female participation rate in rural areas in IT sector has increased from 0.2% (1999-00) to 3.4% in (2004-05). This indicates that economic opportunities and scope of female workers in rural IT sector has increased after Globalisation

Knowledge Networking and Empowerment

1. “Networking Rural Women and Knowledge”, UNESCO project in Nabanna, India explores innovative uses of databases, intranet portals and web-based partnerships in the local language for the benefit of poor women. The project puts emphasis on building a framework for information sharing, content creation, off-line information dissemination and web-based partnership with organizations located outside the region [19]

2. Project Shakti launched by Hindustan Unilever promotes internet penetration among rural women. The Internet awareness is increased by Project Shiksha of Microsoft and Internet Bus of Google [16].

3. Self Employed Women’s Association (SEWA) is an organization dedicated to creating employment opportunities for poor self-employed women workers. They believe that poor women’s growth, development and employment happens when they have work and income security and food security [25].

4. NASSCOM: National Association of Software and Service Companies provide mentoring and empowering women managers across junior, middle and senior level from the IT Industry all the way through various activities concern to training, workshop and all others. India Shop, an e-commerce website in Tamilnadu, has been designed to sell rural women’s cooperatives and NGO’s. Swayam Krishi Sangam (SKS) is using ICT’s such as smart cards and hand held devices to improve microfinance projects to empower poor women [16].

5. Green ICT-related skills and employment: Green ICT-related skills and employment have rarely been discussed on “green jobs”. This is partly because the full potential of ICTs for improving environmental performance across the economy has not yet been fully recognised (see OECD, 2010). A working definition for “green ICT related jobs”, which includes both, “green jobs” related to ICTs and jobs that are related to green ICTs
The above figure describes the relationship between these three job categories together with ICT related employment [14]. The expansion and spread of the technology based and aided employment in this sector is believed to have brought in skill dichotomies both within the sector and the economy as a whole. With the advent of the high-tech jobs in this sector, especially in the first phase of outsourcing revolution, there has been a ‘polarisation’ in the labour market, with sharp differences between highly skilled and well-paid workers and those who work with lower wages and insecure condition. This ‘skill-dualism’ is increasingly visible even within the sector itself, with the spread and growth of domestic outsourcing activities. A sharp ‘gender divide’ is also discernible, when it comes to distribution of employment gains of the new generation jobs in the information economy. The ‘women friendly’ and ‘gender neutral’ images of employment in this sector, Ramesh (2010) explains that given the low level requirements of skill, the workers are found given inferior salary packages. Thus, it is reasonable to believe that despite the expectations generated by the sector in terms of provision of ‘empowering’ and ‘modern’ jobs to women workers, in reality they continue to operate within the narrow paradigms, which are (re)constituted by gendered constructs (Raju, 2013)[16].

Table 2: Women Employment in Green IT Industry in India

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Source: World Economic Forum & the Internet Centre for Society

This table 2 shows the status of women in green IT industries that they have already broken the glass ceiling effect in the IT sector. Thus a new trend is emerging in Green IT companies for professional women.
Figure 6

CONCLUSION

Businesses around the world have discovered that going green isn’t just good for the planet; it’s good for their bottom lines. It is an emerging issue that how mid-size companies are realizing significant cost savings when they adopt Green IT initiatives. Many governments are pressing business for action on the environment, through both regulatory regimes and international treaties, and this trend will surely continue. Consumers and business partners will demand even greater environmental accountability. Employees, too, will start to ask for measures that reduce environmental impact. Different study report demonstrates that IT departments across the globe are committed to minimizing their environmental footprint, despite the challenges presented by the current economic climate. In the present day, improving the server room to accommodate the infrastructure needs of modern virtualization and consolidation techniques will address pressing business needs – as well as provide energy-saving opportunities [18]. Far-reaching changes towards gender equality and women’s empowerment in the ICT arena are needed at every level – local, national and international. Engendering ICTs is not merely about greater use of ICTs by women. It is about transforming the ICT system to Green ICT. This involves Governments building ICT policies with strong gender perspectives and engaging with civil society and gender and ICT experts on these areas. Clear gender strategies being deployed through design, in the implementation and evaluation of Green ICT projects and programme.

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