

APPENDIX – I

GLOBAL AND INDIAN INITIATIVES

A. Global Initiatives and International Standards

The key global initiatives and international standards are as follows:

1. Restriction on Hazardous Substance (ROHS)

The RoHS, EU Directive 2002/95/EC, was adopted in February 2003 by the European Union. It took effect in the UK on 1 July 2006. This directive restricts the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment. RoHS applies to companies that manufacture or assemble electrical or electronic equipment within the EU, that import electrical or electronic equipment from outside Europe, or that (again, within Europe) re-badge electronic products as their own. Maximum concentration value (percentage by weight) for Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) is 0.1% and for Cadmium it is 0.01% (Butler, 2008: 5; Murugesan, 2008: 32; Webber & Wallace, 2009: 25; Aileen & Tan, 2010: 110; Neil, 2011: 40; Hanne, 2011: 425).

2. Waste Electrical and Electronic Equipment (WEEE) Directive

Legislation for the disposal of electronic equipment is covered within Europe by the Waste Electrical and Electronic Equipment (WEEE) Directive. It became active on 1 July 2007. This legislation compels manufacturers of equipment to take responsibility for their waste, either themselves or through a government-approved waste-handling firm. This is known as extended producer responsibility (EPR). A producer must provide information in the form of manuals on reuse and environmentally sound treatment for each new type of product they put on the market.

It applies on producers, retailers and distributors, local authorities, exporters and re-processors, and businesses and other non-household users of Electrical and Electronic Equipment (EEE) (Butler & Daly, 2008: 5; Pinto, 2008: 68; Murugesan, 2008; Info-tech, 2009: 6; Webber & Wallace, 2009: 26; Aileen & Tan, 2010: 11; Neil, 2011: 40; Hanne, 2011: 425)

3. Top Runner Program

Top Runner program is the law that addresses the sustainability of ICT products in Japan. The aim of this programme is to improve energy efficiency. It includes ICT product groups and focuses on energy performance. Manufacturers need to ensure that the energy efficiency of their products meets the standard (Calder, 2009).

4. Energy Using Products Directive (EuP)

The aim of this Directive-2005/32/EC is to reduce the environmental impact caused during the manufacture, use and disposal of a very wide range of products. This came into force on 11 August 2007 by European Union. It focuses on reducing environmental impacts resulting from product manufacture (processes and materials used), usage (energy/water consumption and emissions) and disposal (waste generation). The EuP Directive provides for setting of eco-design requirements which EuPs must meet before they can be placed on the market (Calder, 2009).

5. Electronic Product Environmental Assessment Tool (EPEAT)

Electronic Product Environmental Assessment Tool (EPEAT) was developed by the Green Electronics Council in Portland, Oregon and is originated in Dec 2007. It awards a gold, silver, or bronze certification, based on how well organizations meet benchmarked 51 criteria, some of which include ease of disassembly, chemical content, end-of-life design, etc. Products must meet at least 23 of the criteria for the bronze-level certification.

The environmental criteria underlying the EPEAT system address the full product lifecycle, from design and production to energy use and recycling. It has grown to

become the definitive global environmental rating system for electronics. EPEAT currently includes product ratings for PCs and Displays (including tablets), Imaging Equipment (which includes printers, copiers, scanners and multifunction devices) and Televisions (Butler & Daly, 2008: 7; Murugesan, 2008: 32; Webber & Wallace, 2009: 77; Aileen & Tan, 2010: 110; Neil, 2011:55).

6. Solving the E-Waste Program (StEP)

Solving the e-waste program (StEP) by United Nations is initiated in 2004. It is a program that tries to solve the e-waste problem by initiating and facilitating policies, legislations & design of e-waste management models (Pinto, 2008: 68).

7. Basel Convention and Basel Action Network

The Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and their Disposal, is an international treaty regulating the shipment and disposal of toxic substances. It is designed to protect human health and the environment from damage caused by the generation, management, transportation and disposal of toxic waste. Created by United Nation, it was ratified in 1989 and became effective in 1992. The Basel Convention has been signed by 170 countries and ratified by all but three (Afghanistan, Haiti, and the United State). Waste from electronics and computer is covered under the Basel Convention and is growing source of toxic waste.

The Basel Action Network (BAN), based in Seattle, Washington, is a not for-profit organization that that promotes the ideals of the Basel Convention through a network of global organizations. Its mission is to eliminate the transfer of toxic waste from industrialized countries to developing countries. It has created “e-Stewards Initiative”, which is designed to recognize responsible recyclers of e-waste (Pinto, 2008: 67-68; Webber & Wallace, 2009: 138-139).

8. Leadership in Energy and Environmental Design (LEED)

The LEED green building rating system was developed and is administered by the U.S. Green Building Council, a Washington D.C. - based, not-for-profit coalition of building

industry leaders. It promotes design and construction practices that reduces the negative impacts of buildings and improves the health of the people who occupy the buildings. While not specifically targeted towards data centers, many if of its ideals can apply to how data centers are designed and constructed. One of the areas where LEED focused is energy efficiency having weightage of 17 points. Other areas include sustainable site development, water efficiency material selection etc. (Butler & Daly, 2008: 8; Sivasubramaniam, 2009: 3; Webber & Wallace, 2009: 198).

9. ENERGY STAR

ENERGY STAR is an international standard which is used to measure energy-efficient ratings. Products bearing the 'ENERGY STAR' label are deemed to be more energy-efficient than those that don't meet the grade, according to the ENERGY STAR specifications. This programme was created in 1992 by the US EPA. Agreements to promote ENERGY STAR-qualified products have been made with the European Union, Australia, Canada, Japan, New Zealand and Taiwan. Devices carrying the ENERGY STAR logo, such as computer products and peripherals, kitchen appliances, buildings and other products, save 20–30% electricity on average. ENERGY STAR-qualified office and imaging products use 30–75% less electricity than 'standard' equipment. ENERGY STAR predicts that the energy savings resulting from using ENERGY STAR products will save nearly \$5 billion a year (Butler & Daly ,2008: 7; Murugesan, 2008: 32; Sivasubramaniam, 2009: 4; Webber & Wallace, 2009: 66; Aileen & Tan, 2010: 110; Sheikh, 2010: 23; Neil, 2011:62)

10. ISO14001

ISO 14001 is an international standard for effective environmental management. It is the best practice standard for the systematic management of an organization's environmental impacts and provides international specification for an environmental management system (EMS). It is broken down into five sections:

- General requirements
- Environmental policy

- Planning implementation and operation
- Checking and corrective action
- Management review

It is relevant to all organizations, in all sectors, and of all sizes. It is not product-specific and is vendor-agnostic. ISO14001 requires organizations to publish a policy statement that describes the organization's environmental values, and then to ensure that its actual performance is consistent with this statement. This requires an environmental risk assessment, operational control and the setting of specific, measurable, achievable, realistic and time bound (SMART) objectives to achieve its strategic environmental goals (Sivasubramaniam, 2009: 3; Unhelkar, 2011: 57).

B. Indian Initiatives and Standards

The key Indian initiatives and standards are as follows:

1. E-Parisaraa

E-Parisaraa Pvt. Ltd is India's first government authorized electronic waste recycler started in September 2005. It is engaged in handling, recycling and reusing of Waste Electrical and Electronic Equipment (WEEE) in eco-friendly way. The initiative aims at reducing the accumulation of used and discarded electronic and electrical equipment's, which most end up in landfills or partly recycled in a unhygienic conditions by backyard recyclers and then partly thrown into waste streams damaging the environment. The objective of E-Parisaraa is to create an opportunity to transfer waste into socially and industrially beneficial raw materials like valuable metals, plastics and glass using simple, cost efficient, home grown, environmental friendly technologies suitable to Indian Conditions (Victor & Kumar, 2010: 120).

2. E-Waste (Management) Rules, 2016

The Ministry of Environment, Forest and Climate Change has notified the E-Waste Management Rules, 2016 in supersession of the E-waste (Management & Handling) Rules, 2011. The rule posits restrictions on usage of hazardous substances as per global

best-practices and to prevent e-waste dumping in the country. It enables the recovery and/or reuse of useful material from Waste Electrical and Electronic Equipment (WEEE), thereby reducing the hazardous wastes destined for disposal and to ensure environmentally sound management of all types of WEEE. It implies Extended Producer Responsibility for channelization of e-waste to ensure environmentally sound management of such waste. The rule applies to every manufacturer, producer, consumer, bulk consumer, collection centres, dealers, e-retailer, refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, collection, storage and processing of e-waste. Ministry of Electronics and Information Technology provides technical support to the MoEF in this regard (<http://meity.gov.in/esdm/e-waste>).

3. Indian Green Building Council (IGBC)

The Indian Green Building Council (IGBC), part of the Confederation of Indian Industry (CII) was formed in the year 2001. The vision of the council is, "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025".

The council offers a wide array of services which include developing new green building rating programmes, certification services and green building training programmes. The council also organizes Green Building Congress, its annual flagship event on green buildings.

All the stakeholders of construction industry comprising of architects, developers, product manufacturers, corporate, Government, academia and nodal agencies participate in the council activities through local chapters. The council also closely works with several State Governments, Central Government, World Green Building Council, bilateral multi-lateral agencies in promoting green building concepts in the country.

(<https://igbc.in/igbc/redirectHtml.htm?redVal=showGreenNewBuildingsnosign>).

4. Green IT Projects

Ministry of Electronics and Information Technology has started the Green IT initiative by awarding a project for development of ICT Technologies for smart buildings with low carbon emissions to C-DAC Chennai and C-DAC Bangalore. A project to develop technologies for achieving power optimization in HPC systems has also been initiated at C-DAC Pune (<http://meity.gov.in/content/green-it>).

APPENDIX – II

NASSCOM REGISTERED IT ORGANIZATIONS IN PUNE

1. 1Mobility India Pvt Ltd
2. AccelTree Software Pvt Ltd
3. Ackcezione Technologies Pvt Ltd
4. Amdocs Development Centre India Pvt Ltd
5. Anibrain Digital Technologies Pvt Ltd
6. Aptara Technologies Pvt Ltd
7. Arya Risk Management Systems Pvt Ltd
8. Ascent Informatics (India) Pvt Ltd
9. Avaya India Pvt Ltd
10. Barclays Technology Centre India Pvt Ltd
11. BlazeClan Technologies Pvt Ltd
12. BMC Software India Pvt Ltd
13. CalSoft Pvt Ltd
14. Cradient IT Services Pvt Ltd
15. Cybage Software Pvt Ltd
16. Cyret Technologies India Pvt Ltd
17. Dimentrix Technologies Pvt Ltd
18. e-Zest Solutions Ltd
19. Emerson Innovation Center
20. Entercoms Solutions Pvt Ltd
21. Equinox Software & Services Pvt Ltd
22. Eternus Solutions Pvt Ltd
23. FLUXONIX Security Solutions Pvt Ltd
24. Fujitsu Consulting India Pvt Ltd
25. Futurism Technologies Pvt Ltd
26. Global Talent Track Pvt Ltd
27. Harbinger Knowledge Products Pvt Ltd

28. HSBC Software Development (India) Pvt Ltd
29. iauro Systems Pvt Ltd
30. Impact Infotech Pvt Ltd
31. Impact Systems Pvt Ltd
32. Information Systems Resource Centre Pvt Ltd
33. Inteliment Software Technologies (India) Pvt Ltd
34. Intouch Consumer Care Solutions Pvt Ltd
35. itCube Solutions Pvt Ltd
36. JDSU India Pvt Ltd
37. Jumping Goldfish Infotech
38. Kairee Systems Pvt Ltd
39. KPIT Technologies Ltd
40. kPoint Technologies Pvt Ltd
41. Legasis Services Pvt Ltd
42. Lifeline Systech Solutions Pvt Ltd
43. Maven Systems Pvt Ltd
44. Medsynaptic Pvt Ltd
45. Mindchips Consulting Pvt Ltd
46. Max Secure Software India Pvt Ltd
47. Neilsoft Ltd
48. Netscout Systems India Pvt Ltd
49. Niche Software Solutions Pvt Ltd
50. Nihilent Technologies Pvt Ltd
51. Nitman Software Pvt Ltd
52. Nitor Infotech Pvt Ltd
53. One Point IT Consulting Pvt Ltd
54. Oxygen Consulting Services Pvt Ltd
55. Panacea Infotech Pvt Ltd
56. Persistent Systems Ltd
57. Prescient Technologies Pvt Ltd
58. Principal Global Services Pvt Ltd

59. Prorigo Software Pvt Ltd
60. PTC Software (India) Pvt Ltd
61. Saama Technologies (India) Pvt Ltd
62. Sankalp Computer & Systems Pvt Ltd
63. Sapience Analytics Pvt Ltd
64. Sears IT & Management Services (India) Pvt Ltd
65. SEED Infotech Ltd
66. Silicus Technologies India Pvt Ltd
67. Smartcloud Infotech Pvt Ltd
68. Softcell Technologies Ltd
69. Spectraforce Technologies (India) Pvt Ltd
70. SQS India Infosystems Pvt Ltd
71. Suma Soft Pvt Ltd
72. SunGard IT Availability (India) Pvt Ltd
73. Symantec Software India Pvt Ltd
74. Synechron Technologies Pvt Ltd
75. Syngy India Pvt Ltd
76. SysTools Software Pvt Ltd
77. Talentica Software (India) Pvt Ltd
78. TalentServ Consulting Pvt Ltd
79. Tata Communications Transformation Services Ltd
80. Tata Technologies Ltd
81. Tech Mahindra Ltd
82. Techsignia Solutions Pvt Ltd
83. TIBCO Software India Pvt Ltd
84. Tieto Software Technologies Pvt Ltd
85. TomTom India Pvt Ltd
86. Volkswagen India Pvt Ltd
87. Vritti Solutions Ltd
88. Webonise Lab Pvt Ltd
89. WhiteHedge Technologies Pvt Ltd

90. Xpanxion International Pvt Ltd

91. zCon Solutions Pvt Ltd

92. Zensar Technologies Ltd

APPENDIX – III

DEFINITION OF SMALL, MEDIUM SIZED AND LARGE IT ORGANIZATIONS

A. Definitions as per different Countries

The concept of small, medium and large organization varies from one country to another depending on the indicators used.

The various definitions worldwide are:

1. Europe

- A small enterprise is defined as an enterprise which employs less than 50 persons and which has either an annual turnover not exceeding 10 million Euro or an annual balance sheet total not exceeding 10 million Euro.
- A medium sized enterprise is defined as an enterprise which employs less than 250 persons and which has either an annual turnover not exceeding 50 million Euro or an annual balance sheet total not exceeding 43 million Euro.

For both small and medium sized enterprises, not more than 25% of the capital or voting rights is owned by an enterprise which is not itself an SME.

- A large enterprise is defined as an enterprise which either employs more than 250 persons or which has either an annual turnover exceeding 50 million Euro or an annual balance sheet total exceeding 43 million Euro.

(<http://cms.nottinghamshire.gov.uk/organisational-sized-definitions.pdf>)

2. U.S.

There is no universally accepted definition of an SME, in the U.S. government. This situation reflects the relative nature of the “small” and “medium” size classifications, which can apply differently to firms in the manufacturing, agricultural, and service sectors. As per guidelines of U.S. government institutions, including those of the U.S.

Department of Commerce (Commerce), the U.S. Small Business Administration (SBA), and the U.S. Department of Agriculture (USDA), the definitions are as follows:

	Manufacturing and non-exporting services firms (a)	Exporting services firms (b)	
		MOST	High value (c)
Number of employees	< 500	< 500	< 500
Revenue	Not applicable	≤ \$7 million	≤ \$25 million
Defining institution	SBA Advocacy(d)	SBA/SBA Advocacy (e)	USDA
Data source	U.S. Census	ORBIS (f)	ORBIS

- (a) Includes exporting and nonexporting manufacturing firms and nonexporting services firms.
- (b) Selected on the basis of size and export potential, and includes wholesale trade services; professional, scientific, and technical services; and finance and insurance services.
- (c) A computer service was the only sector in this category.
- (d) SBA (the U.S. Small Business Administration) Advocacy from Census data
- (e) Revenue parameters established by SBA; employee number established by SBA Advocacy for research purposes
- (f) Commercial database
(<http://www.usitc.gov/publications/332/pub4125.pdf>)

3. Kenya

The term MSME stands for "micro, small and medium enterprises". Micro Enterprises = up to 10 employees Small = 10 to 50 Medium = 150 to 1000
(http://en.wikipedia.org/wiki/Small_and_medium_enterprises)

4. Australia

An SME has 200 or fewer employees. Micro Business: 1-4 employees. Small Business: 5-19. Medium Business: 20-199. Large Business: 200+.

(http://en.wikipedia.org/wiki/Small_and_medium_enterprises)

5. Israel

A business is considered small if it has not more than 50 employees. A medium business holds between 51 and 250 workers.

(http://en.wikipedia.org/wiki/Small_and_medium_enterprises)

6. Canada

A small business as one with fewer than 100 employees (if the business is a goods-producing one) or fewer than 50 employees (if the business is service-based), and a medium-sized business as one with fewer than 500 employees

(http://en.wikipedia.org/wiki/Small_and_medium_enterprises)

7. India (As per MSMED Act 2006)

The Government of India has enacted the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006 in terms of which the definition of micro, small and medium enterprises is as under:

(a) Enterprises engaged in the manufacture or production, processing or preservation of goods as specified below:

(i) A micro enterprise is an enterprise where investment in plant and machinery **does not exceed Rs. 25 lakh;**

(ii) A small enterprise is an enterprise where the investment in plant and machinery is **more than Rs. 25 lakh but does not exceed Rs. 5 crore;** and

(iii) A medium enterprise is an enterprise where the investment in plant and machinery is **more than Rs.5 crore but does not exceed Rs.10 crore.**

(b) Enterprises engaged in providing or rendering of services and whose investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED Act, 2006 are specified below.

(i) A **micro enterprise** is an enterprise where the investment in equipment **does not exceed Rs. 10 lakh;**

(ii) A **small enterprise** is an enterprise where the investment in equipment is **more than Rs.10 lakh but does not exceed Rs. 2 crore;** and

(iii) A **medium enterprise** is an enterprise where the investment in equipment is **more than Rs. 2 crore but does not exceed Rs. 5 crore.**

(<http://www.rbi.org.in/commonman/English/scripts/FAQs.aspx?Id=966>)

Table 1 below summarizes the criteria for worldwide definitions Small, Medium Sized and Large organizations.

Table 1: Criteria for worldwide definitions for small, medium sized and large organizations

Country	Criteria
Europe	Employee Count and Annual Turnover
U.S.	Employee Count and Revenue
Kenya	Employee Count
Australia	Employee Count
Israel	Employee Count
Canada	Employee Count
India	Investment in Equipment

B. Definition as per Gartner (Research Firm)

Gartner defines SMBs by the number of employees and annual revenue they have. The attribute used most often is number of employees; small businesses are usually defined as organizations with fewer than 100 employees; midsize enterprises are those organizations with 100 to 999 employees.

The second most popular attribute used to define the SMB market is annual revenue: small business is usually defined as organizations with less than \$50 million in annual revenue; midsize enterprise is defined as organizations that make more than \$50 million, but less than \$1 billion in annual revenue.

(<http://www.gartner.com/it-glossary/smbs-small-and-midsize-businesses/>)

C. Definition as per the governing authorities and IT organizations in Pune

Table 2 below shows representatives who were contacted for defining small, medium sized and large IT organization in Pune.

Table 2: Definition as per the governing authorities and IT organizations in Pune

Sr. No	Name	Designation	Organization	Definition of small, medium sized and large IT organization	Criteria
1.	Mr. Darryl Zuzarte	Associate	NASSCOM	Small - Less than USD 100 million Medium - USD 100 million - 1billion Large - More than USD 1billion	Revenue
2.	-	-	MCCIA	No such defined categorization	-
3.	Ms. Saheli	-	SEAP	No such defined categorization	-

Sr. No	Name	Designation	Organization	Definition of small, medium sized and large IT organization	Criteria
4.	Mr. Sudip Apte	CEO and Research Director	Offshore Insights (Research Firm)	Small – Up to 100 Medium - 101 to 1000 Large - More than 1000	Employee count
5.	Mr. Karan Lakhina	Sr. Sales Consultant	Fundoodata.com	No such definition	-
6.	Mr. Sandeep Kulkarni	Director	Cognizant	Small - Less than 1000 Medium - 1000 to 2000 Large - More than 2000	Employee count
7.	Mr. Devendra Deshmukh	Founder & CEO	e-Zest	Small - Less than 200 Medium - 200 to 5000 Large - More than 5000	Employee count
8.	Mr. Amol Pande	Director and Founder	e-Zest	No such Definition. IT sector is the most unorganized section in terms standardization	-
9.	Mr. Narendra Barate	CEO	Seed InfoTech	No single definition available. Small - Less than 500 Medium - 500 to 5000 Large - More than 5000	Employee count

Sr. No	Name	Designation	Organization	Definition of small, medium sized and large IT organization	Criteria
10.	Mr. Shripad Joshi	Consultant	Persistent	Small – Up to 100 Medium - 101 to 1000 Large - More than 1000	Employee count
11.	Mr. Milind Kulkarni	Chief People Officer	e-Zest	No single definition available. Difficult to categorize	-
12.	Pankaj Girgaonkar	Associate Principal Engineer-IT	Qlogic	For product based the definition can be based on revenue and for service based, it can be based head count. Difficult to define the range.	-
13.	Mr. Sudhir Patil	Co-Founder & Director	Qualitia Software	Small – Less than 100 Medium - 100 to 500 Large – More than 500	Employee Count
14.	Mr. Prasanna Rege	Chief Operating Officer	SP Software Technologies	Small – Up to 100 Medium - 101 to 1000 Large - More than 1000	Employee Count

Sr. No	Name	Designation	Organization	Definition of small, medium sized and large IT organization	Criteria
15.	Mr. Feroz Tamboli	Program Manager, Global Project Mgmt	Symantac	Small – Less than 1000 Medium - 1000 to 5000 Large - More than 5000	Employee Count
16.	Mr. Neville Postwalla	People Function-Director	Mind Tree	Small –Less than 250 million dollar, Medium -250 million dollar to1 billion dollar, Large -More than 1 billion dollar	Revenue
17.	Mrs. Nidhi Shrikhande	Sr. Hr Manager	Synerzip	Small – Up to 100 Medium - 101 to 1000 Large - More than 1000	Employee Count
18.	Dr. Mukund Kale	Software Engineering Manger	Siemens	Small – Up to 100 Medium - 101 to 1000 Large - More than 1000	Employee Count
19.	Mr. Parag Parulekar	Founder	Dimensions Software	Small – Up to 100 Medium - 101 to 1000 Large - More than 1000	Employee Count

The below chart summarizes the criteria for defining small, medium sized and large IT organizations as per the governing authorities and IT organizations in Pune.

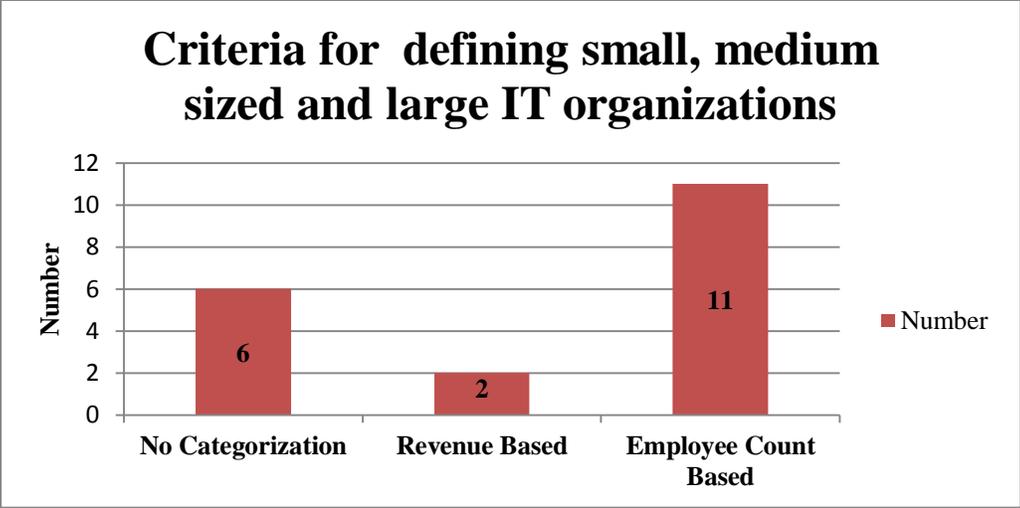


Figure 1: Criteria considered as a base for defining small, medium sized and large IT organizations

The below chart summarizes range for employee count considered as a base for defining small, medium sized and large IT organization.

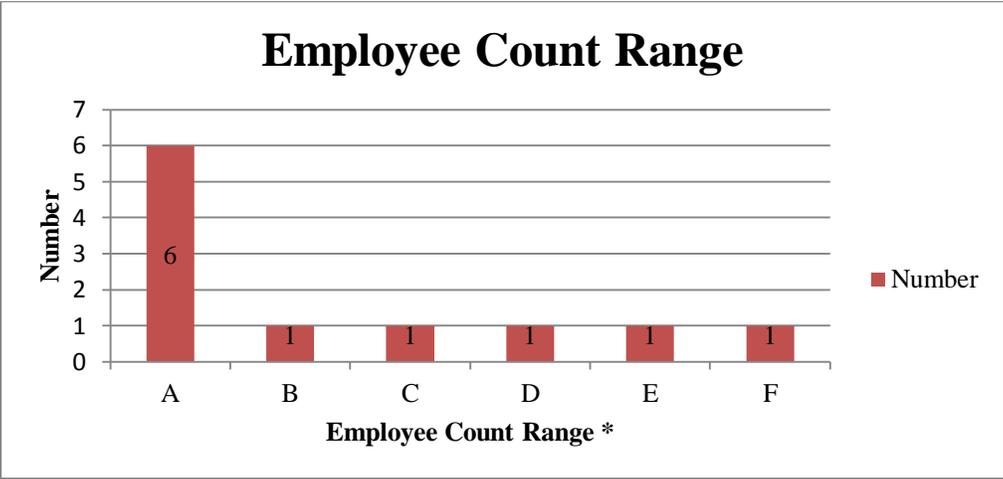


Figure 2: Range for employee count considered as a base for defining small, medium sized and large IT organization

The above figure consists of employee count range* as defined below:

- A-** Small : Up to 100, Medium : 101-1000, Large: More than 1000
- B-** Small : Less than 100, Medium : 100-500, Large: More than 500
- C-** Small : Less than 200, Medium : 200-5000, Large: More than 5000
- D-** Small : Less than 500, Medium : 500-5000, Large: More than 5000
- E-** Small : Less than 1000, Medium : 1000-2000, Large: More than 2000
- F-** Small : Less than 1000, Medium : 1000-5000, Large: More than 5000

Thus looking at the various definitions, the most well accepted definition is based on employee count and is defined as “Small IT organizations have employee count up to 100, medium sized IT organizations have employee count between 101 and 1000 and large IT organizations have employee count above 1000”.

APPENDIX – IV

QUESTIONNAIRE

Management Level Questionnaire

Organization's Profile

** Requires an answer*

1. Name of the organization :
2. Which of the following best describes your type of IT organization? *
 - Product Based IT organization
 - IT Training organization
 - Service Based IT organization
 - Any other (please specify)
3. Which of the following best describes your position in your organization? *
 - Senior Management
 - Middle Management
 - IT Infrastructure
 - Any other (please specify)
4. Approximate number of employees in your organization *
 - Up to 100
 - 101 to 1000
 - Above 1000
5. Approximate number of PCs/laptops in your organization *
 - Up to 100
 - 101 to 1000
 - Above 1000

Green IT Business Areas

6. On a five-point scale, what is the level of concern for the following areas in Green IT for your organization? *
(1-Not concerned, 2-Somewhat, 3-Fairly, 4-Very, 5-Extremely concerned)

Sr. No	Areas in Green IT	1	2	3	4	5
1	Effect of IT on greenhouse gas emission					
2	Regulations on greenhouse gas emissions					
3	Environmental friendly IT purchasing					
4	IT energy consumption (Use of IT in an energy efficient manner)					

Sr. No	Areas in Green IT	1	2	3	4	5
5	Cost of powering IT infrastructure					
6	E-waste management (Discarding IT in an environmentally friendly way)					
7	Data center optimization					
8	Contribution of IT to reduce carbon footprint					
9	Suppliers' environmental footprint					
10	Clients' environmental footprint					
11	Overall environmental footprint					

Green IT Policy

7. Does your organization have Green IT component as a part of its overall IT policy? *

Yes

No

8. If yes, which of the following areas are included in your organization's Green IT policy? *

- Environmental friendly IT purchasing/ sourcing
- IT equipment usage reduction and energy efficiency
- IT use to reduce environmental impact
- Data center optimization
- E-waste management
- Not applicable
- Any other (please specify)

9. Which of the following parameters do you consider while purchasing/sourcing IT equipment in your organization? *

- Energy efficiency
- E-waste reduction
- Compliance to applicable Green IT laws
- Vendor evaluation (for their green track record)
- Recyclable IT hardware
- Any other (please specify)

10. Which of the following areas are focused for IT equipment usage reduction and energy efficiency in your organization? *

- Use of IT in an energy efficient manner
- Rightsizing IT equipment
- Printer optimization
- Any other (please specify)

11. In order to reduce impact of IT on the environment, which of the following technologies / software do you adopt in your organization? *

- Energy efficiency technologies (e.g. Virtualization)
- Travel reduction technologies (e.g. Videoconferencing)
- IT software to monitor business's carbon footprint
- Any other (please specify)

12. For E-waste management, which of the following areas are focused in your organization? *

- Environmental friendly IT disposal
- IT reuse (Donation/Refurbishment)
- Any other (please specify)

Green IT Practices

13. On a five-point scale, what is the awareness level of the following *Green IT practices regarding environmental friendly IT purchasing/ sourcing* in your organization? *

(1-Not aware at all, 2-Somewhat aware, 3-Fairly aware, 4-Much aware, 5-Extremely aware)

Sr. No	Green IT Practices	1	2	3	4	5
1	Preferring IT suppliers that offer take-back options					
2	Preferring IT suppliers that have green track record					
3	Giving weightage to environmental considerations in IT procurement (considering ENERGY STAR, ROHS, EPEAT, WEEE etc. or looking for Eco-labeling)					
4	Preferring laptop over PC					
5	Preferring LCD monitor over CRT monitor					
6	Preferring recycled printer cartridge					
7	Preferring ink jet printer over laser printer					
8	Preferring multifunction devices (scanning, copying, printing) over printers					
9	Preferring LED (Light emitting diode) over CCFL(cold cathode fluorescent lamp) LCD monitors					

14. On a five-point scale, what is the awareness level of the following *Green IT practices regarding IT equipment usage reduction and energy efficiency* in your organization? *

(1-Not aware at all, 2-Somewhat aware, 3-Fairly aware, 4-Much aware, 5-Extremely aware)

Sr. No	Green IT Practices	1	2	3	4	5
1	Enforcing PC power management (e.g. switching off the monitor and PC when not in use, using Sleep mode/Hibernate mode etc.)					
2	Enforcing double side printing					
3	Enforcing draft printing					
4	Sharing printer (network enabled printer)					
5	Printing only what you need					
6	Reducing font size for printing					
7	Using print preview before printing					
8	Secure printing (printer prints only when the user is physically located at the printer and inputs a user code)					
9	Preferring document sharing services(e.g. Google Doc) over printing multiple copies					
10	Enforcing data de-duplication (storing one copy of single data)					
11	Enforcing telecommunication strategies					
12	Enforcing removal of screen savers					
13	Enforcing removal of software bloats (computer programs that have meaningless and unnecessary features that are surplus to requirements for most users or software that offer little or no benefits to its user)					

15. On a five-point scale, what is the awareness level of the following *Green IT practices regarding use of IT for reducing environmental impact* in your organization? *

(1-Not aware at all, 2-Somewhat aware, 3-Fairly aware, 4-Much aware, 5-Extremely aware)

Sr. No	Green IT Practices	1	2	3	4	5
1	Remote conferencing					
2	Remote support/ Online services					
3	Server consolidation & virtualization					
4	Storage consolidation & virtualization					
5	Desktop virtualization					
6	Power down systems					
7	Thin clients					
8	Cloud computing					

16. On a five-point scale, what is the awareness level of the following *Green IT practices regarding E-waste management* in your organization? *

(1-Not aware at all, 2-Somewhat aware, 3-Fairly aware, 4-Much aware, 5-Extremely aware)

Sr. No	Green IT Practices	1	2	3	4	5
1	Disposing IT in an environmentally friendly way					
2	Donating IT equipment					
3	Refurbishment of IT equipment (upgrade and use IT)					

17. On a five-point scale, what is the awareness level of the following *data center specific Green IT practices* in your organization?
(1-Not aware at all, 2-Somewhat aware, 3-Fairly aware, 4-Much aware, 5-Extremely aware)

Sr. No	Green IT Practices	1	2	3	4	5
1	Blade server					
2	Airflow management					
3	Hot aisle/ Cool aisle data center layout					
4	Airside/ Waterside economizer					
5	Install more energy efficient lights					
6	Localized cooling					
7	Free cooling					
8	Upgrade to more energy efficient transformers and UPS					

18. On a five-point scale, how will you rate maturity (in terms of adoption) of the following *Green IT practices regarding environmental friendly IT purchasing/ sourcing* in your organization? *
(1-Not practiced at all, 2-Practiced rarely, 3-Practiced sometimes, 4-Practiced fairly regularly, 5-Ensured to be practiced at all the times)

Sr. No	Green IT Practices	1	2	3	4	5
1	Preferring IT suppliers that offer take-back options					
2	Preferring IT suppliers that have green track record					
3	Giving weightage to environmental considerations in IT procurement (considering ENERGY STAR, ROHS, EPEAT, WEEE etc. or looking for Eco-labeling)					
4	Preferring laptop over PC					
5	Preferring LCD monitor over CRT monitor					
6	Preferring recycled printer cartridge					
7	Preferring ink jet printer over laser printer					
8	Preferring multifunction devices (scanning, copying, printing) over printers					
9	Preferring LED (Light emitting diode) over CCFL(cold cathode fluorescent lamp) LCD monitors					

19. On a five-point scale how will you rate maturity (in terms of adoption) of the following *Green IT practices regarding IT equipment usage reduction and*

energy efficiency in your organization? * **(1-Not practiced at all, 2-Practiced rarely, 3-Practiced sometimes, 4-Practiced fairly regularly, 5-Ensured to be practiced at all the times)**

Sr. No	Green IT Practices	1	2	3	4	5
1	Enforcing PC power management (e.g. switching off the monitor and PC when not in use, using Sleep mode/Hibernate mode etc.)					
2	Enforcing double side printing					
3	Enforcing draft printing					
4	Sharing printer (network enabled printer)					
5	Printing only what you need					
6	Reducing font size for printing					
7	Using print preview before printing					
8	Secure printing (printer prints only when the user is physically located at the printer and inputs a user code)					
9	Preferring document sharing services(e.g. Google Doc) over printing multiple copies					
10	Enforcing data de-duplication (storing one copy of single data)					
11	Enforcing telecommunication strategies					
12	Enforcing removal of screen savers					
13	Enforcing removal of software bloats (computer programs that have meaningless and unnecessary features that are surplus to requirements for most users or software that offer little or no benefits to its user)					

20. On a five-point scale how will you rate maturity (in terms of adoption) of the following *Green IT practices regarding use of IT for reducing environmental impact* in your organization? * **(1-Not practiced at all, 2-Practiced rarely, 3-Practiced sometimes, 4-Practiced fairly regularly, 5-Ensured to be practiced at all the times)**

Sr. No	Green IT Practices	1	2	3	4	5
1	Remote conferencing					
2	Remote support/ Online services					
3	Server consolidation & virtualization					
4	Storage consolidation & virtualization					
5	Desktop virtualization					
6	Power down systems					
7	Thin clients					
8	Cloud computing					

21. On a five-point scale how will you rate maturity (in terms of adoption) of the following *Green IT practices regarding E-waste management* in your organization? * **(1-Not practiced at all, 2-Practiced rarely, 3-Practiced sometimes, 4-Practiced fairly regularly, 5-Ensured to be practiced at all the times)**

Sr. No	Green IT Practices	1	2	3	4	5
1	Disposing IT in an environmentally friendly way					
2	Donating IT equipment					
3	Refurbishment of IT equipment (upgrade and use IT)					

22. On a five-point scale how will you rate maturity (in terms of adoption) of the following *data center specific Green IT practices* in your organization?
(1-Not practiced at all, 2-Practiced rarely, 3-Practiced sometimes, 4-Practiced fairly regularly, 5-Ensured to be practiced at all the times)

Sr. No	Green IT Practices	1	2	3	4	5
1	Blade server					
2	Airflow management					
3	Hot aisle/ Cool aisle data center layout					
4	Airside/ Waterside economizer					
5	Install more energy efficient lights					
6	Localized cooling					
7	Free cooling					
8	Upgrade to more energy efficient transformers and UPS					

Green IT Drivers

23. Please rate the factors that were the main drivers for pursuing Green IT in your organization. *
(1-Not relevant, 2-Relevant to a little extent, 3-Somewhat relevant, 4-Fairly relevant, 5-Extremely relevant)

Green IT Drivers	1	2	3	4	5
Reducing cost of IT					
Corporate strategy					
Environmental consideration					
Social acceptance					
Maturity of Green IT industry					
Governmental regulations					
Governmental incentives					
Clients' pressure					
Employees' pressure					
Green IT uptake by more organizations					
Industry association					
Competitors' action					
IT vendors' pressure					
Any other (Please specify)					

Green IT Governance

24. What percentage of your organization’s budget is allocated explicitly for Green IT initiatives? *

- None
- 6-15%
- More than 25%
- 1-5%
- 16-25%
- Don’t Know

25. Is your organization associated with any group dedicated to Green IT?* (e.g. Green Grid)

Yes No

If yes, please mention the name of the group. _____

26. On a five-point scale, please rate the following statements regarding Green IT implementation in your organization. *
(1-Not at all, 2-To a little extent, 3-To some extent, 4-To much extent, 5-To a great extent)

Statements	1	2	3	4	5
Encourage employees to attend seminars/workshops on Green IT					
Encourage employees to suggest, identify and spread Green IT practices by forming a Green IT Forum or Club					
Share environmental information regarding your product and services through the organization’s website					
Roles and responsibilities for Green IT initiatives are clearly defined					
Set a target for reducing IT carbon foot print in coming 3 to 5 years					
Engage the service of Green IT expert for gaining Green IT knowledge					
Analyzing IT energy bill separately from the overall corporate bill					
Auditing the power efficiency of existing IT systems and technologies					

27. Do you have a green advocate coordinating all green activities? *

- Yes, focused on all green initiatives as a whole (including IT)
- Yes, focused exclusively on IT initiatives
- Yes, but they do not focus on all IT initiatives
- No, but we are considering one
- No, not at all

28. The "champion" of Green IT within your organization is *

- C- Suits – CEO, CTO, CIO
- IT department
- Marketing department

- Owner, chairman, Partners
- Finance department
- Any other (please specify)

29. Do you need to consider Green IT compliance required from your IT customers?

Yes No

If yes, what kind of compliance you need to observe? _____

30. Does your organization enforce Green IT compliance on your suppliers?

Yes No

If yes, what are these compliance? _____

31. Does your organization have a Green IT advisory team? *

Yes No

If yes, then who are the members of Green IT advisory team in your organization?
(e.g. CEO, CTO)

32. In order to assess IT's environmental impact, does your organization use any metrics? *

Yes No

If yes, then please specify the metrics. _____

33. Do you have Green auditing practice in your organization? *

Yes No

If yes, then how frequently is the Green IT auditing done? _____

34. Does your organization get any tangible benefits from government agencies?

Yes No

35. Do you have a Green IT feedback mechanism to review the Green IT Policy? *

Yes No

Green IT Benefits

36. On a five-point scale, rate the following Green IT benefits that you have experienced in your organization. *

(1-Not at all, 2-To a little extent, 3-To some extent, 4-To much extent, 5-To a great extent)

Green IT Benefits	1	2	3	4	5
Saved money					
Energy efficiency					
Increased staff morale					
Met regulatory requirements					
More competitive					
Stronger brand image					
Increased customers					
Greater customer satisfaction					
Healthy relations with vendors					
Attractiveness for investors and business partners					
Easier maintenance of IT systems					
Positive impact on the environment					
Reduced office space					

Green IT Barriers

37. On a five-point scale, rate the barriers that stop your organization from implementing Green IT. * (1-Not at all, 2-To a little extent, 3-To some extent, 4-To much extent, 5-To a great extent)

Green IT Barriers	1	2	3	4	5
The cost of Green IT solutions					
Inadequate funding					
Lack of government incentives					
Lack of support / resistance from management					
Inadequate skills and training on Green IT					
Absence of enforceable government regulations					
Lack of support from employees					
Uncertainty about business benefit of environmentally sound IT					
Any other, please specify					

38. How have you overcome those barriers in your organization?

Miscellaneous

39. What is your opinion about the following statements regarding Green IT? (1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5- Strongly Agree)

Sr. No	Statement	1	2	3	4	5
1.	Implementing Green IT is a costly affair					
2.	Green IT can be adopted using simple easy to use solutions					
3.	Important but not practiced much due to lack of law enforcement					

Sr. No	Statement	1	2	3	4	5
4.	Important but not practiced much due to lack of awareness					
5.	Would definitely implement some form of Green IT practice culture					

40. What is your current Green IT maturity level in your opinion on a scale of 1 to 10? What is your road map to achieve the highest possible maturity in 3 to 5 years of time? *

Employee Level Questionnaire

* Requires an answer

1. Name (optional):
2. Name of the Organization:*
3. Which of the following best describes your type of the IT Organization? *
 - Product Based IT organization
 - Service Based IT organization
 - IT Training organization
 - Any other (please specify)
4. Which of the following best describes your designation in your Organization? *
 - Software Developer
 - Senior Software Developer
 - Software Quality Engineer
 - Team Lead
 - Project Lead
 - Software Architect
 - Software Trainer
 - Any other (please specify)
5. Approximate number of employees in your organization: *
 - Up to 100
 - 101 to 1000
 - Above 1000
6. On a five point scale, please rate, how often do you practice the below mentioned Green IT practices? Please tick **NA-Not applicable** if the practice is not applicable at your level or you are not involved in it. * **(1-Not practiced at all, 2-Practiced rarely,3-Practiced sometimes, 4-Practiced fairly regularly, 5-Ensured to be practiced at all the times)**

Sr. No	Green IT Practices	1	2	3	4	5	NA
Environmental friendly IT purchasing/ sourcing							
1	Preferring IT suppliers that offer take-back options						
2	Preferring IT suppliers that have green track record						
3	Giving weightage to environmental considerations in IT procurement (considering ENERGY STAR, ROHS, EPEAT, WEEE etc. or looking for Eco-labeling)						
4	Preferring laptop over PC						
5	Preferring LCD monitor over CRT monitor						
6	Preferring recycled printer cartridge						
7	Preferring ink jet printer over laser printer						
8	Preferring multifunction devices (scanning, copying, printing) over printers						

Sr. No	Green IT Practices	1	2	3	4	5	NA
9	Preferring LED over CCFL(cold cathode fluorescent lamp) LCD monitors						
IT equipment usage reduction and energy efficiency							
1	PC power management (e.g. switching off the monitor and PC when not in use, using Sleep mode/Hibernate mode, remote power management software etc.)						
2	Double side printing						
3	Draft printing						
4	Sharing printer (network enabled printer)						
5	Printing only what you need						
6	Reducing font size for printing						
7	Using print preview before printing						
8	Secure printing (printer prints only when the user is physically located at the printer and inputs a user code)						
9	Preferring document sharing services(e.g. Google Doc) over printing multiple copies						
10	Data de-duplication(storing one copy of single data)						
11	Telecommunication strategies						
12	Removal of screen savers						
13	Removal of software bloats (computer programs that have meaningless and unnecessary features that are surplus to requirements for most users or software that offer little or no benefits to its user)						
IT use to reduce environmental impact							
1	Remote conferencing						
2	Remote support/ online services						
3	Server consolidation & virtualization						
4	Storage consolidation& virtualization						
5	Desktop virtualization						
6	Power down systems						
7	Thin clients						
8	Cloud computing						
E-waste management							
1	Disposing IT in an environmentally friendly way						
2	Donating IT equipments						
3	Refurbishment of IT equipments (upgrade and use IT)						

7. On a five-point scale, please rate the following statements regarding Green IT implementation. Please tick **DK-Don't Know** if you do not know the answer. *
(1-Not at all, 2-To a little extent, 3-To some extent, 4-To much extent, 5-To a great extent)

Sr. No	Statements	1	2	3	4	5	DK
1	IT equipment contribute to greenhouse gas emission						
2	IT can be used to reduce a business's total carbon footprint						
3	IT professionals play an important role in reducing business's carbon foot print						
4	My organization provides guidelines for observing Green IT practices						
5	My organization encourages employees to attend seminars/workshops on Green IT						
6	My organization has a formal feedback mechanism available through which I can communicate my thoughts / suggestions/feedback about Green IT initiative						
7	My organization encourages employees to suggest, identify and spread Green IT practices by forming a Green IT Forum or Club						
8	My organization shares environmental information of its products and services through its website						
9	My organization has implemented Green IT through Green IT Policy						
10	In my organization, roles and responsibilities for Green IT initiatives are clearly defined						
11	I get involved in Green IT initiatives taken by my organization						

8. For each of the following statements, please choose one of the three options. *
(Yes/ No/ Don't Know)

	Statements	Yes	No	DK
1	Budget is allocated for Green IT initiatives in my organization			
2	My organization has a green advocate coordinating all Green activities			
3	My organization has set a target for reducing IT carbon foot print in coming 3 to 5 years			
4	My organization has an Green IT advisory team for its implementation			

9. Do you think Green IT initiatives are important and essential initiative for an IT organization?

10. On a scale of 1 to 10, please rate you organization for its Green IT initiatives. *

11. Any additional input which you would like to give for Green IT implementation.

APPENDIX -V

GLOSSARY

1. **Audit**

Inspection and analysis to check whether a standard or set of guidelines is being followed, that records are accurate or that efficiency and effectiveness targets are being met. (Neil, 2011: 115)

2. **Airside/ Waterside economizer**

An air-side economizer regulates the use of outside air for cooling a room or a building. A water-side economizer utilizes evaporative cooling (usually provided by cooling towers) to indirectly produce chilled water to cool a datacenter when outdoor conditions are cool (often at night). (Velte, 2008: 67-68)

3. **Airflow management in data center**

Having a clear path for the cool air to travel under the raised floor and to get to the loaded areas. Above the raised floor, allowing a path for hot air to return back to CRAC units. (Ebbers et al., 2010: 14)

4. **Blade server**

A blade server is a compact, self-contained server that consists of core processing components that fit into an enclosure with other blade servers. The modular design of the blade server helps to optimize server performance and reduce energy costs.

(<https://www.techopedia.com/definition/2283/blade-server>)

5. **Carbon footprint**

Measurement of all the greenhouse gases produced by individuals and/or groups. It relates to the amount of greenhouse gases produced daily and yearly through burning fossil fuels for electricity, heating and transportation, etc. A carbon footprint is measured in units of tonnes (or kg) of carbon dioxide equivalent. (Calder Alan, 2009)

6. Cloud computing

An internet based development and use of computer where different services such as servers, storage and applications are delivered to an organization's computers and devices through the Internet. Cloud providers offer services that can be grouped into three categories viz., Software as a Service (SaaS), Platform as a Service (Paas) and Infrastructure as a Service (IaaS). (Neil, 2011: 119)

7. Compliance

Ensuring that a standard or set of guidelines is followed, or that proper, consistent accounting or other practices are employed. (Neil, 2011: 119)

8. DCiE (Data center Infrastructure Efficiency)

Reciprocal of PUE and can be used to report how much power is being used just by IT equipment. $DCiE = 1 / PUE \times 100\%$. (Webber & Wallace, 2009: 182)

9. Desktop virtualization

Desktop virtualization is a virtualization technology that separates an individual's PC applications from his or her desktop. Virtualized desktops are generally hosted on a remote central server, rather than the hard drive of the personal computer.

(<https://www.techopedia.com/definition/601/desktop-virtualization>)

10. E-waste

The discarded and end-of-life electronics products ranging from computers, equipment used in ICT, home appliances, audio and video products and all of their peripherals. (Chatterjee S, 2011:1)

11. Free cooling

In many climates, data center managers can help reduce the cooling costs by taking advantage of outside environmental conditions to cool IT equipment.

(<http://searchdatacenter.techtarget.com/podcast/Using-free-cooling-in-the-data-center>)

12. Fossil fuels

Fossil fuels are hydrocarbons, primarily coal, fuel oil or natural gas, formed from the remains of dead plants and animals.

(https://www.sciencedaily.com/terms/fossil_fuel.htm)

13. Greenhouse gases

Any gaseous compound in the atmosphere that is capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere. By increasing the heat in the atmosphere, greenhouse gases are responsible for the greenhouse effect, which ultimately leads to global warming. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

(https://en.wikipedia.org/wiki/Greenhouse_gas)

14. Hot aisle/ Cool aisle data center layout

Equipment racks for servers and other heat generating devices are arranged in parallel rows sitting on top of a raised floor system, where every aisle between rows of racks has exclusive hot air outlets or exclusive cool air intakes. (Webber & Wallace, 2009: 191)

15. Localized cooling

On-demand cooling systems are becoming more and more prevalent. These units are brought in to provide temporary cooling when central air is down. (Velte, 2008: 69)

16. PUE (Power Usage Efficiency)

Identifies the ratio of total power to IT equipment. The numerator is comprised of the total power feed going into the data center cooling, power distribution, IT equipment, lights, etc. $PUE = \text{Total data center power} / \text{IT equipment power}$. (Webber & Wallace, 2009: 181)

17. RACI matrix

A responsibility assignment matrix system that brings structure and clarity to assigning the roles that people play with in team. RACI is acronym for responsible, accountable, consulted and informed. (Neil, 2011: 19)

18. Server consolidation

Server consolidation refers to the use of a physical server to accommodate one or more server applications or user instances. Server consolidation makes it possible to share a server's compute resources among multiple applications and services simultaneously. It is mainly used to reduce the number of servers required in an organization. Server consolidation works on the principles of server virtualization, where one or more virtual servers reside on a physical server.

(<https://www.techopedia.com/definition/16016/server-consolidation>)

19. Server virtualization

It is a virtualization technique that involves partitioning a physical server into a number of small, virtual servers with the help of virtualization software. Server virtualization attempts to increase resource utilization by partitioning physical servers into several multiple virtual servers, each running its own operating system and applications..

(<https://www.techopedia.com/definition/688/server-virtualization>)

20. Storage consolidation

Storage consolidation is the process of centralizing, sharing and optimizing data storage resources among multiple users and applications. It is a broad concept that enables the design and construction of storage infrastructure for efficient management and maximum use, with the lowest storage hardware and management costs.

(<https://www.techopedia.com/definition/13736/storage-consolidation>)

21. Storage virtualization

It is the process of grouping the physical storage from multiple network storage devices so that it looks like a single storage device.

(<https://www.techopedia.com/definition/4798/storage-virtualization>)

22. Thin clients

A client computer which depends primarily on the central server for processing activities, and which mainly focuses on conveying input and output between the user and the remote server. (Neil, 2011: 133)