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Environmental aspects of information technology services

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Introduction

It is normally assumed that computers and the internet are good things for the environment because of all the efficiencies they bring to industry and individuals. But is there really a net environmental improvement?

The answer to this question may be quite important for the future because currently only about 47 of every 1000 people in the world get the advantages of internet use. As more people gain access, any environmental consequences will also grow.

The negative impacts

The major issue is the energy which these devices use every day during their use. For example estimates of energy use in the USA in IT equipment vary from 2% to 8% of the total USA electricity use. Similarly estimates for the energy use of the internet itself, as opposed to the computers connected to it, also vary from 1% to 8% of the total. Japanese estimates of CO_2 emissions due to IT equipment and infrastructure range also from 1% to 8% of the total Japanese CO_2 emissions.

Of particular concern is estimates by the US Environmental Protection Agency that 9% of the US electricity demand is from ICT products in the standby mode and that 90% of the energy used by equipment is used while in standby mode. European estimates are similar.

The environmental impacts are not limited to energy use. Table 1 gives a breakdown of some other impacts for ICT equipment.

Table 1 Effects of US$1 million of each product's manufacture, use and disposal on the environment. (1997 data).

Effect	Unit	Computer/Office Equipment	Computing and Data Processing Services
Electricity	TJ	1.58	0.50
Other energy	TJ	8.5	3.21
Ordinary pollutants	Tonnes	6.84	2.82

released			
CO_2 equivalent gases released	Tonnes	585	219
Hazardous waste generated	Tonnes	39	9.74
Toxic releases	Tonnes	0.94	0.20

The positive impacts

There have been many attempts to analyse the broader impact of ICT equipment in various places around the world. Usually these have been done for specific industries by comparing operations with and without internet services.

For example, bookshop services comparing conventional shops with order-by-internet services reveal that the internet version is up to 43% better with regard to emission of carbon dioxide. This improvement is mainly because the visit to the shop by the customer in a car is avoided, even though the book had to be posted or couriered to the customer. Further improvements were obtained because unsold books did not need to be delivered to the shop.

For software purchasing, ordering and delivery by the internet produced an 84% improvement because there was no need to put the software on a CD-ROM and post it to the customer.

Another example is applying to government agencies for such things as building permits or passports where there was a reduction in carbon dioxide emission of 92%. Again this improvement was due to less personal travel to pick up or deliver forms.

Interestingly, a study of alternative network systems found that wireless networks were better than wired networks by a factor of at least 2.

From these studies it seems that dematerialization is a good way to save on environmental costs. This means for example avoiding personal transport by using teleconferences or email. Considerable benefit can also be gained by more efficient transport and other such services by making use of ICT products for good management, or for energy management systems in buildings.

One detailed study of the Japanese economy suggests that by moving to a more IT-based economy, there would be overall reduction in the amount of CO_2 emitted of about 3%. Although more electricity would be used to power the IT equipment, there would be improvements in energy efficiency in industry and some structural changes which would more than offset that increase, as shown in table 2.

Table 2. Changes in CO_2 emissions as Japan moves to a more IT-based economy

Factor	Percentage of total CO_2 emissions
Increase in electricity to power IT	+1.5

Improvements in energy efficiency	-1.7
Structural changes in economy	-2.9
Total	-3.1

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