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"E-Commerce and the Environment"

Summary Document

By

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Case Studies Absent

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Abstract

This summary report examines the involvement of environmental issues into the new business of e-commerce, in particular business-to-consumer commerce. Research focuses on what e-commerce leaders and environmental managers think about the environmental implications of using such a platform, whether or not companies integrate existing environmental strategies into their e-commerce business, and the long term benefits of doing so. This is set in the context of the current legislative changes and policy developments focused on both e-commerce and environmental protection.

Qualitative research was obtained from media coverage, published research available from the Internet and company interviews. The dearth of literature and research in this area is indicative of the inability of e-commerce commentators and business leaders to understand the environmental implications of their activities. The 'language', policies and tools do not exist. This is despite the fact that evaluation of literature and seven company case studies (The Body Shop, ThinkNatural, NatWest bank, Smile, Thomson Travel Group, WHSmith and Ethical-Junction), revealed that the environment should factor into e-commerce development.

The widespread adoption of e-commerce is changing the way companies view the environment. The affects will be: shifts in energy and paper use, transport and land use patterns; changes to our approach towards product life cycle analysis; and the potential for markets for carbon trading, green products and raw materials to expand. More uncertain are the affects of e-commerce activities on environmental accountability, reputation and awareness.

Findings reveal that, although e-commerce and environment managers have good environmental intentions, and in some cases perform related activities in other parts of their business, the issues do not influence e-commerce business strategy. This is despite evidence to suggest that companies may benefit financially from such initiatives.

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Appendix 2   Company assessment & audit: Framework for interview – containing key questions posed to e-commerce and environment managers.

Appendices can be obtained from the author by email at: elizabethhurstec@yahoo.co.uk

1 INTRODUCTION

Former South African President Nelson Mandela in his recent address to the UK's annual Labour Party Conference in September warned that in the age of the Internet "concern for the common good was in danger of being lost" (Guardian, 2000).

1.1 OPENING THE DEBATE

Society is intoxicated by Internet technology and yet there is a failure to recognise that it may have unanticipated and unintended consequences for the environment. The affects of digital technology have been impacting on our world at an exponential rate. One only need notice the flow of e-commerce ventures and the short lifetime of technological developments. The ideas are almost out of date as they go to print. This paper deals with one important aspect of a movement which, in itself, has changed our lives more in two years, one could argue, than the Bible managed to do in two thousand.

Any attempt to describe the implications of these new business dealings may prove controversial. The undertaking itself is a case of 'research on the run' - as the proponents of e-commerce and the Internet have scarcely had time to consider a fraction of the implications of the activities in which they are engaged. Little reliable data exists, and many individuals interviewed for the study have not developed a sophisticated language to allow them to articulate their policies of practices in a way which permits ease of comparison. Indeed, such language and tools are hard to find.

Nevertheless, research at this time is not premature, since we can only fall further behind if analysis is not attempted. In order to restrict the questions to a manageable number, research will focus on the environmental implications of e-commerce, in particular in the area between business and consumer.

1.2 THE STATE OF PLAY

Global penetration of the Internet and rapid influx of electronic retailers into every market, moves business leaders and individuals even further away from the realities of the tangible, environmental affects of business. But with technological revolution comes opportunity. The early adoption of a sustainable e-commerce business culture and a new approach to environmental information using the Internet may transform our ability to solve complex environmental problems that have eluded us in the past.

The quantity and breadth of information available on the subject of the Internet and electronic commerce is enough to make any researcher or e-business faint. Yet this does not translate to a correspondingly rich analysis of its affects on the environment. The Internet and other digital technologies which facilitate e-commerce touch upon everything within the realms of the physical and 'virtual': from financial market infrastructure to digital communication. Where, however does environmentally sustainable business and the planet earth fall within the ongoing stream of e-commerce debate? This area is something of a black hole. Our desire for e-commerce-related news stories, statistics, gadgets and comment is implacable but limited in scope.

The movement towards e-commerce is akin to jet-skiing towards an iceberg. The sparkling ice visible above the water represents the obvious and beneficial affects of e-commerce: speed, connectivity, globalisation of markets, shortened supply chains and business transparency. What

currently lies out of view is the expanse of iceberg below. Jagged edges protrude from the side and large holes eat away at the base, both features hidden below the surface of the water. These identify the less obvious affects of e-commerce, affects which will have both positive and negative implications on our environment. Buried even deeper within the core of the ice are subtle changes to company culture, the question of accountability, and the approach of e-business leaders to issues facing the planet.

Figure 1 E-commerce iceberg

The top, visible part of the iceberg represents the obvious benefits of e-commerce. The base and edges of the iceberg represent the direct environmental affects of e-commerce - the submerged, less visible part of the e-commerce phenomenon. The core of ice is analogous to the culture and attitudes of company leaders linked with the business of e-commerce, in this case their approach to the environment.
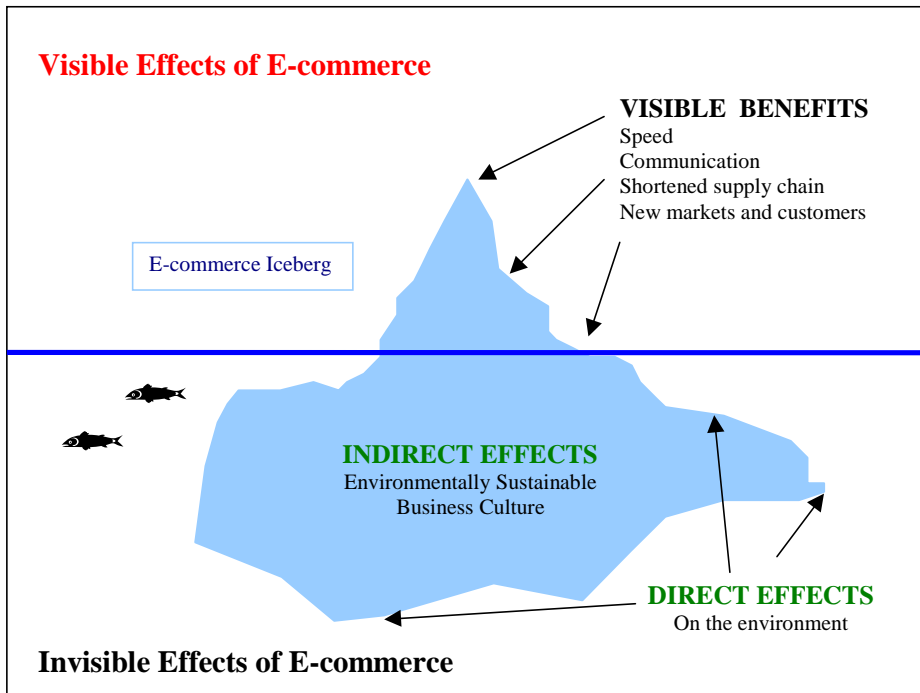
The topics for discussion in this area of information technology (IT) and the environment span a wide range of issues. Determining which are relevant is difficult given the absence of data. So far, research and discussion has developed around studies of electricity demand, paper use, discarded electronic equipment, shortened supply chain, traffic created by expanding fleets of white delivery vans and changes to the infrastructure requirements of business. The age of digital ordering and delivery has turned physical operations into virtual ones. But these issues ignore the intangible, externalities of e-commerce in particular the attitudes of e-commerce business leaders to environmental issues.

These complex issues face everyone: business, consumer, society.

Issues that the project focuses on include:
- **The subjects of the debate**: the direct and indirect environmental impacts of e-commerce and the environmental issues facing new e-commerce businesses
- **The business leaders**: the attitudes of e-commerce business leaders and environment managers towards new challenges and opportunities offered by the Internet and other digital technologies
- **The future**: where will the debate go next, is the Internet an ally of environmental sustainability?

1.3 RESEARCH OBJECTIVES

1.3.1 Aims

1. To understand the driving forces behind the adoption of e-commerce.
2. To identify the direct and indirect environmental impacts of e-commerce.
3. To assess environmental awareness and cultural attitudes by evaluating business policy, performance and behaviour of e-commerce business leaders and environment managers.
4. To investigate the extent to which companies, both new and old, are integrating environmental issues into their e-commerce business operations.
5. To discuss the impacts on the environment, society and company performance as reflected by the findings and list recommendations for future integration of the two issues.

2 METHODOLOGY

2.1 LITERATURE RESEARCH

Desk top based research and information gathering was ongoing for the duration of the project, approximately 5 months (May – September 2000). Information was taken from a wide variety of sources:

- **Newspaper articles** – information rich sources included the Financial Times and E-commerce supplement "Dot.com", from the Observer. Over 300 articles were collected.
- **E-commerce magazines** – Internet development magazines such as 'Wired'
- **Internet** – world wide search of government, NGO, industry and company sites.
- **Other Literature** – Published books, articles and reports

Areas researched: dot.com start up news, profiles of e-commerce leaders, brand and reputation, government initiatives, legal issues with a potential to affect all companies including dot.coms, e-commerce marketing and strategy.

Research also directed itself towards issues of environment which might overlap with e-commerce and business in general, those of sustainable management initiatives, corporate social responsibility, environmental reporting, changes to environmental law and policy making (e.g. change to pension laws, company law review, packaging regulations).

2.2 CASE STUDY RESEARCH

2.2.1 Company Selection

Ascribing criteria to case study choice and sector area was difficult given the dynamic nature of the e-commerce sector and shifting project aims. The initial selection process was established by FFTF who provided a list of 18 corporate partners. Sectors (and companies) of interest were chosen from this list and matched to companies in the same sector who base their operations largely around e-commerce technologies.

The partial collaboration between FFTF and Imperial College allowed the author some access to organisations participating in the Digital Futures Project. Of the five corporate partners approached, two agreed to involvement – WHSmith and NatWest bank.

Case study research was offered to each company in turn as an opportunity to review their e-commerce strategy and link it to their environmental performance. In the case of smaller e-commerce businesses with no strategy documents in place, research was designed to flesh out issues which would later affect the organisation.

2.2.2 Case Study Data Sources

The development of a core case study interview structure was necessary to link the aims of the research to the findings as summarised below:
A number of indicators were chosen to test these aims and then incorporated into the core interview questions:

➢ **Publication of environmental data** & performance on company Web site

- ➢ Analysis of **company performance** in a wide range of areas including environmental management systems, environmental policy and engagement, cross checked with the incorporation of these into the e-commerce business
- ➢ **Opinions** of e-commerce and/or environment leaders towards the specific environmental impacts of their general business operations. Where possible, the company Chief Executive Officer was interviewed.
- ➢ Opinions of e-commerce and/or environment leaders towards the environmental impacts of their e-commerce business

	Interview Type		Company research method				Departments Represented
	Meeting ☺☺	Phone ☎	Internet 💻	Literature 📖	Email ✉	Survey ⬚	One person representing each sector interviewed
Body Shop		2	✓	✓			E-commerce development
ThinkNatural	2		✓	✓✓		✓ Staff	Senior management (CEO) Finance Department
NatWest	2	1	✓	✓✓	✓		E-commerce development Environment Corporate communications
Smile	1		✓	✓			Senior Management (CEO)
Thomsons Travel	1		✓	✓	✓		Sustainable tourism
WHSmith	1		✓	✓			Environment (group risk)
Ethical Junction		1	✓	✓	✓		Senior Management (company founder)
Others (not used in final research)	5	10	✓	✓	✓		Mixed e.g. NTL, ICI, PublicSector
TOTAL	**12**	**14**				**30**	

Figure 2 Shows the data collection methods or instruments used for each case study.

A full copy of the methodology can be obtained from the author at: Elizabethhurstec@yahoo.co.uk

3 L I T E R A T U R E   R E V I E W

3.1 INTRODUCTION

One of the most profound changes afforded by the digital world is global, pervasive, communication – colloquially known as the 'death of distance' (Cairncross, 1998). Digital technologies such as the Internet facilitate efficient, speedy dialogue between individuals, business groups and society. These 'virtual' connections have the affect of altering the way business in particular is conducted. The Internet gives us the freedom to transact without needing to drive to the store or exchanging product for cash.

A rich source of literature and debate is available on the topic of e-commerce, the main themes of which are summarised below. This is balanced by a striking absence of data on the more peripheral issues such as the impacts of e-commerce on the environment and society.

Data described below was gathered by various research groups and used by Department of Trade and Industry or DTI in a recent retail e-commerce report (Foresight, 2000) and the Cabinet Office (e-Envoy, 2000)[1].

- 1 billion users are estimated to have access to the Internet by 2004 (E-Envoy, 2000)
- The UK e-commerce market is predicted to grow to at least £2.5 billion by 2003, with forecasts as high as £7 billion or more (Foresight, 2000).
- By 2002, on-line retail sales in the US alone may reach $40 to $80 billion (US Dept. Commerce, 1999).
- Over the first three months of 2000, approximately 6.5 million households had access to the Internet, 25% of the UK population (E-Envoy, 2000).
- 35% of the UK online population shop using the Internet (E-Envoy, 2000).
- 40% of all established businesses had access to the Internet in December 1999, Internet penetration highest amongst larger businesses (E-Envoy, 2000)

3.2 E-COMMERCE & THE 'NEW ECONOMY'

3.2.1 Defining E-Commerce

Electronic commerce (e-commerce) encompasses a wide range of technologies and connections between groups, offering a long set of definitions for consideration. See the Glossary at the beginning of this document for a summary.

E-commerce has become a cliché in it's own right. Newspapers, magazines, billboards, books, just about any media engine, rush to use the prefix 'e' or electronic. Defining 'e'-commerce is therefore no easy task. The UK government appears to avoid constraining definitions and use of 'e'-terminology wherever possible. The following broad definition offered by the UK Department of Trade and Industry (DTI) for electronic commerce (or e-commerce) is as follows:

> *"Electronic commerce is the exchange of information across electronic networks at any stage in the supply chain, whether within an organisation, between business and consumers or between the public and private sectors, whether paid or unpaid" (Cabinet Office, 1999).*

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[1] For more details and statistics, refer to the UK government site "Mapping E-commerce" at http://www.e-envoy.gov.uk/2000/strategy/estatmap/estatmap.htm .

The UK governments definition is broad enough to encompass just about any movement of digital data, whether it be via personal computer, phone or digital television, facilitating information, money or product exchange. Government MP Kim Howells, Trade and Industry Parliamentary under-secretary of state for competition and consumer affairs, terms the Internet an "anarchic beast", something not capable of being "tied down with jargon" (Howells, 2000 personal communication).

Key e-commerce connections are defined in most business documentation according to the groups they impact or involve:

- **Business-to-business** or 'B2B' e-commerce is a business-only transaction or information exchange between two or more organisations, between a product manufacturer and the product distributor for instance[2].
- **Business-to-consumer** or 'B2C' gains more media exposure than B2B, and is thus better understood by the general public. Amazon.com is a high profile example of the retail function B2C companies offer consumers. Incorporated into this definition are the full set of interactions companies offer via their sales or promotional (home) Web site e.g. Provision of information to the consumer via the Internet.

Other definitions pertinent to this report include:
- **Portal**, an Internet site which acts as a 'hub' directing user 'traffic' to other Internet sites or by providing further (contact) information
- **Dematerialization**, a term used to describe the disappearance of many physical, tangible aspects of business which have been replaced by a digital equivalent (e.g. Paper)
- **E-tailing**, a shortened version of 'electronic retailing' or commerce[3].
- These ideas are all encompassed by the concept of the **digital age**, a colloquial term used to describe our current experiences of Internet, WAP, digital television and fibre optic technology.

E-commerce connections include:
- Internal company access (within an organisation) via the **intranet**
- Extended company access reaching across businesses, suppliers and customers via B2B networks or **extranets**
- Public access via the **Internet** the **dominant core network for e-business**

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[2] For more information on B2B, refer Phillips & Mecker, 2000 @ www.pwcglobal.com
[3] A list of further e-commerce terms are defined in the glossary at the beginning of this document.

3.2.2 Developments in E-commerce and UK Government stance

The UK Government seeks to be the world leader in E-commerce (DTI, 1998). Three key documents summarising the UK Government stance on E-commerce exist:

3.2.2.1 UK Government – E-Commerce

1.	1998	<u>Government White paper</u> *"Our Competitive Future: Building the Knowledge Driven Economy"* Sets initial targets : By 2005 everyone will be connected to the internet. 100% of Government services online – transacting and procuring as far as possible (DTI, 1998)
2.	1999	<u>E-Envoy Report</u> (Cabinet Office, 1999)* *"E-commerce @ its best"* Describes how targets will be achieved. * E-Envoy: Cabinet Office department whose role is to bring together all government policies on e-commerce
3.	2000	<u>E-Envoy Report</u> (Cabinet Office, 2000) *"UK Online Report"*[4]

The European Commission's stance on the social aspects of e-commerce are detailed in the following document:

1.	1999	<u>European Commission</u> *"E-Europe : An information society for all"*[5] Prioritises a socially inclusive approach to the digital age Launched in Lisbon, March 2000 (ISPO, 2000)

3.2.3 A New Paradigm for Business?

The Internet has provided a new platform for global markets and potentially, will shift the business strategy of many organisations. The changes afforded by digital technologies are thought so significant, that the phrase 'new' or 'digital economy' is now heavily in use (Tapscott, 1995). Does this new economy reflect a new paradigm of business?

Constant comparisons are drawn with the industrial revolution by analysts of the 'new economy' such as Mannel Castells, author of the *Information Age*, professor at the University of California, Berkley and Alvin Toffler, leading commerce commentator who predicts a 'third revolution' (Castells, 2000; Toffler, 1981). Interestingly, Murphy 1998 likens the new 'networked' business world to an ecosystem, each business unit sharing increased dependence on the other. Management systems are no longer so closed, linear, segmented and non-interactive. So how is e-commerce making business different? This is not just a phenomenon of technology. The

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[4] www.e-envoy.gov.uk
[5] www.ispo.cec.be/basics/I_europe.html

Internet is changing the way we think about business in general (Murphy, 1998). It is affecting valuation, investment, product supply chains, business linkages, regulation and accountability.

3.2.3.1 New Valuation Models and Investment

- Dot.com stocks are difficult to value (Knight, 2000). The finance world is faced with a new challenge – that of valuing e-commerce ventures with no tangible assets and limited capital. This challenge also faces private investors seeking investment opportunities.
- Traditional indicators used for stock picking such as earnings per share and net asset value are often useless in the absence of profits (Knight, 2000).
- The media, e-commerce analysts and even stock advice magazines such as *Moneywise* recommend looking for additional information such as management experience, brand strength, activities of the competitor and most pertinent to this study – the company report, long term vision and targets set by business leaders (Knight, 2000). Using the Internet as an information source is highly recommended.

3.2.3.2 Supply Chain and E-Procurement

- E-commerce has revolutionised the traditional business supply chain - the disappearance of the middle man in business dealings (the supplier warehouse for example) and changes to the ownership of the supply chain. Using digital technologies such as e-commerce and the Internet, the entire supply chain can be managed (but not necessarily owned) by one company – from manufacturing to marketing.
- Example: U.S. company National Semiconductor (Asia operations), a global producer of computer chips, switched over the management of their production and supply chain to Fedex using their global information systems. By establishing a transport and digital information exchange network, the company reduced their supply chain cycle down to 2 days from 60 (Jones,1998).
- SME's are able to compete in a global market place while cutting out unnecessary product movement and employment costs.
- The growing importance of auction sites like e-Bay which have about 4 million items on sale at any one time, are good examples of the disappearance of the 'middle man' in the supply chain.

3.2.3.3 Communities

- Evolution of business networks: groups are linking together and competing as e-business communities, something not previously possible without the Internet platform. Boundaries created by geography are dissolving.
- Professor Michael Porter, one of the most popular economists in the U.S. believes that a company will find it harder to be competitive in a global economy unless it is in a cluster of companies. Benefits include high and stable demand, shared suppliers and constant access to skilled workers allowing each member company the advantage of economies of scale without sacrificing its flexibility.
- The Internet is raising the profile of environmental and community groups by offering global access to information, interactive platforms for voting or email campaigning and now portals dedicated to specific communities or business operations. Portals such as *Ethical-Junction.org* and *PublicSector.org* are good examples of community or business 'clusters'.

3.2.3.4 Consumer paradise

- Consumers are facing a dilemma of choice. Leading authors on the subject of the 'digital' or 'new' economy, Davis & Meyer (1998) and Tapscott, (1995) support the notion of unparalleled consumer demand for wider product availability and service. The Internet offers the consumer an unparalleled information source and vast product range to choose from, something not possible before the advent of this technology.

- Another important element of consumer satisfaction with companies in the B2C sector is the speed of product delivery. Consumers have come to expect faster turn around times with the advent of online ordering.

3.2.3.5   Regulation and Accountability

- The absence of regulatory control over e-commerce transactions, particularly in areas of retailing and finance, loom large over government, industry and the public. The dangers to e-commerce come from premature regulation, creation of a patchwork set of rules and uncertain legal and regulatory frameworks.

3.2.4 Dot.com ethics & corporate culture

The following phrases are used for 'new economy' business leaders: luminary, visionary, young, energetic, motivated, anti-establishment, anti-bureaucratic. Concurrent media reports maintain that despite this they fail to understand the concept of strategic thinking – hence the failure of recent dot.com ventures such as Clickmango.com and Boo.com (Telegraph, 2000c; Metro, 2000; Financial Times, 2000k). If e-commerce leaders are indeed radical thinkers, where are the weak links?

The attitudes of E-commerce leaders towards the environment and their stake holders is of great relevance to society, given the new accent on business operations often viewed as weightless (i.e. conducted in the virtual world). Does this new generation of business leader have a different approach to environmental responsibility?

E-commerce leaders are popular sources of inspiration for all businesses, or so it would seem. Recently released publications 'Heroes.com' by Louise Proddow, Marketing Director of Sun Microsystems UK, and 'The Internet Entrepreneurs: business rules are good, break them' by Christopher Price of the Financial Times evaluate in detail, the profile of these business leaders.

3.3   E-COMMERCE & THE ENVIRONMENT

3.3.1 Research and Previous Work

At the time of writing this report, major contributions to the global debate had been made by the following research groups:

1. **Digital Futures Project**[6] – is a year long project launched by the UK Department of Trade and Industry. The research group led by *Forum for the Future* will investigate the wider social and environmental affects of E-commerce. The project is a collaborative effort between fourteen corporate partners, five government departments and eight research organisations. Preliminary research findings will be available at the end of the research period, in March 2001.
2. **The Centre for Information Strategy and Policy**[7] (CISP) sponsors iMP: *The Magazine on Information Impacts*. Articles and comments on IT-environment issues are posted on iMP's Web page one of the leading authors is Nevin Cohen, Ph.D., a consultant in information technology and environmental planning and protection[8]. His report entitled "Greening the Internet: Ten Ways E-Commerce Could Affect the Environment and What We Can Do" was one of the first articles of it's type available on the Web (Cohen, 1999). CISP is a strategy group affiliated with Science Applications International Co-operation (SAIC), a high-technology research and engineering company based in San Diego, California. Cohen also

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6 http://www.digitalfutures.org.uk
7 http://www.cisp.org
8 http://www.cisp.org/imp/october_99/10_99contents.htm

publishes a variety of articles and news items on the following new Website: www.green-ecommerce.com, a very good source for up to date links and data world-wide (update: Feb.2000).

Other documents known to broadly address the issues include:

- **Hendersons Investment** "Internet Position Paper", written by the socially responsible investment unit (Henderson Investors, 2000).
- **Joseph Romm**'s work on the Internet economy and global warming (Romm, 1999), and ERM's conference on Reputation and the Internet (ERM, 2000) offer issue specific studies in this area. See Energy section for more details.
- **Imperial College -** complimentary research undertaken by Walton on the "Environmental Implications of Business-to-Business E-commerce Systems" which specifically address supply chain and procurement issues (Walton, 2000).

Ed: Since the university publication of this report, there has been significant developments in the levels of research and company involvement on the issue. This must be taken into account when reviewing the data within this document.

3.3.2 Future Work - Company Developments

Future developments in this area are no longer limited to academic and company research. Ecsponent.org, Greenonline.com and Ge-commerce.com fulfil a number of services by offering environmental data, trading information and business contacts. Only one of these has purely environment / e-commerce business strategy dedicated to addressing the complete environmental implications of e-commerce in the business world. Ecsponent[9] is still in the early stages of business development, set up in the UK in 1999 by Peter Spark. The company was established to enable environmentally responsible electronic commerce with an IT design focus. It will act to connect purchasers and suppliers of environmentally audited products and services, facilitate environmentally valid cost benefit and life cycle analyses, undertake auditing and also provide online advice. The main focus of the company is in providing software, verification and data services throughout supply chains. Soon to be launched, it is one of the only organisations directly tackling the issue as a discreet, recognisable concept.

Greenleaf, one of Europe's leading green publishing houses is currently putting together a book entitled "The Ecology of the New Economy". Release date of this publication is unknown.

3.3.3 Direct Environmental Impacts of E-commerce

The obvious benefits of e-commerce such as increased connectivity, information exchange, market expansion, dematerialization and the development of online communities are so apparent to business, that there is great enthusiasm for developing e-commerce capability. These new opportunities correspond in the previously used iceberg analogy in Chapter 1, to the ice floating above the water. And by extension, the environmental affects of e-commerce remain obscured.

The direct and indirect environmental effects of e-commerce are discussed below.

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[9] http://www.ecsponent.org

3.3.3.1 Environmental Impact 1: Energy Use and the Green House Effect

E-commerce is changing the world's appetite for energy[10] (U.S. House of Representatives, 2000; ACCC, 2000). The use of Call centres, centralised computing facilities, homes stocked with more electronic equipment and the trend towards outsourcing energy needs will shift our use of electricity. Research so far suggests that the impact of e-commerce could go either way, a question recently addressed in a hearing of the United States House of Representatives entitled "Kyoto and the Internet – the implications of the digital economy" (US House of Representatives, 2000).

- **Energy Savings:** Centralisation of warehouse facilities and communication networks especially, lead many to believe that the adoption of e-commerce will lead to significant energy savings and corresponding reduction in green house gases
- U.S. energy use and net green house gas production could drop by about 0.25% by 2003 due to e-materialisation of paper (Romm[11], 2000).
- By 2010, this could reach 1.5%, if dematerialization of paper and changes to construction patterns were both taken into account (Romm, 2000).

There is evidence to the contrary that argues that energy use will in fact escalate:
- **Energy Use Escalates:** The surge in demand for Internet use is changing businesses' approach to energy supply. Companies wanting to improve the reliability of their sites are now outsourcing energy and technology needs to telecommunications companies. Increasing numbers of telecommunications companies, Internet service providers and mobile phone companies are looking for purpose built facilities for their equipment. The Docklands and City areas are leading centres in Europe for what are variously known as "Internet hotels", "telehouses" or "co-location facilities" (Financial Times, 2000m). The large warehouses full of computer equipment result in energy issues being passed onto the supplier, out of sight and mind of the company utilising the services.
- Power cuts have already hit Silicon Valley, California in areas struggling to cope with demand exacerbated by Internet hotels. This may lead the UK government to address future expansion of power plant facilities (Financial Times, 2000f; Evening Standard, 2000).

A summary of some of these arguments can be found on the Association of Canadian Communities Website, where Romm and the World Wide Fund for nature discuss these issues in more detail (ACCC, 2000).

3.3.3.2 Environmental Impact 2: Waste Electronic Equipment

Electronic hardware disposal is one of the fastest growing waste streams in the European Union and one of the most significant environmental issues facing society according to the European Commission (Europa, 2000). The environmental implications are ominous

- This waste stream grows at a rate of three times the level of average municipal waste (Europa, 2000)
- Electronic waste constitutes 4% of the municipal waste today and is increasing by 16-28% every five years (Europa, 2000)
- 15 million PC's are thrown away each year in the US (Guardian Newspaper, 21/11/00)
- More than 90% of electronic waste ends up in disposal or shredding facilities without any pre-treatment and recycling, (Europa, 2000).

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[10] For an in-depth summary of the arguments reported at the United States House of Representatives, go to www.felsef.org/mar00.htm#SRI-C

[11] Joseph Romm, executive director of the Centre for Energy and Climate Solutions in the US, leads the field of research in this area (Romm, 1999, 2000)

- Electronic equipment is the source of many toxic substances including the heavy metals especially lead, mercury, cadmium, chromium, and bromine, used in manufacture and treatment[12]. Inefficient incineration of plastics in this waste stream generate highly toxic organic compounds in the form of dioxins and furans.

The new **European Directive on waste electric and electronic equipment COM (2000)347** imposes a number of tight restrictions on the industry, manufacturers in particular (EUROPA, 2000). The proposed new Directive:

- Calls for increased levels of recycling, more efficient equipment design, substitution of harmful components and reductions in landfill disposal and incineration
- It puts full financial responsibility on manufacturers to collect and recycle at least 60% by weight of waste equipment. Waste recovery measures must be implemented no later than 2006.
- The directive will cover all electrical and electronic equipment used by consumers along with a wide range of professionally used electrical and electronic equipment such as fridge's, washing machines, toasters, hairdryers, toys, TV-and video sets.

3.3.3.3   Environmental Impact 3: Paper Demand

The connotations of technology and de-materialisation are significant when matched against issues such as world-wide paper consumption.

- Paper manufacturing is one of the most energy and resource intensive industries.
- The Internet is displacing a wide range of printed materials: magazines and newspapers; books and journals; dictionaries and encyclopaedias. Online information requires no paper, ink, storage facilities, retail network or delivery vehicles.
- The digitisation of standard business transactions is also changing office paper use, highlighting what some believe will become the 'paperless office'. For example, Sun Microsystems now save 1.8 million sheets of paper per year in the switch to on-line expense forms (Tucher, 2000, Pers. Comm.).
- Digital photography bypasses the significant environmental affects caused by film processing chemicals (Cohen, 1999).
- Intranet broadcasting, duplex printers, and print-on-demand technology (POD) also contribute positively by facilitating cheaper, more efficient methods of publication and distribution. Print-on-demand technology will allow publishers to distribute an electronic version of a book to a nearby printing house once the right market has been defined. Long inflexible print runs may be a thing of the past, reducing the risk of unsold books and unnecessary storage and delivery (Financial Times, 2000d).
- Furthermore, paper traffic through conventional mail networks could be expected to decline significantly, resulting in changes to transport requirements (see section below).

So, as companies such as Xerox create thin films of paper which hold digital ink we appear to move further away from the worlds burdensome paper demands. However what may seem intuitive, may not necessarily be the case. Some examples of this:

- **Boost in catalogue sales** by association. The new trend in online shopping has led to 'multi-channel' retailing business models, where companies aim to capture customers using a combination of shops, catalogues and the Internet. Paper catalogues are far from disappearing! The Internet offers companies such as Brookstone another platform to feed business into their catalogue sales of electronic gadgets. Catalogue sales increased 72 % to $50.2 million between 1998 and 1999 (Financial Times, 2000g). If catalogue sales continue

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[12] Brominated flame retardants and heavy metals are to be substituted from January 1, 2008

to increase, it's hard to envisage customers and companies significantly reducing catalogue publication.

- **Paper-based duplication** of digital information such as company email and Internet shopping lists. How many of us print up email correspondence for a meeting or a long list of product information from retail Web sites? B&Q, the D-I-Y chain renown for it's environmentally aware business practices, now list all their products on the home Web site. Useful information, however, because the company lacks an online ordering system, it has become necessary for customers to print up a shopping list before venturing into the store or alternatively, they can pick up a catalogue at the door.

3.3.3.4 Environmental Impact 4: Transport Patterns and Pollution

Transport patterns are already changing as a result of e-commerce activity. The home-delivery side of B2C e-commerce has led to increases in 'white van' deliveries, adjustments to Post Office services and a shift in public shopping Telegraph, 2000d; Foresight, 2000). The full extent to which e-commerce influences delivery patterns and travel is uncertain.

- Online retailing and customer demand has already caused the Post Office to expand services considerably. Parcel Force (delivery division of the PO) is set to expand fleet size and change delivery strategy in line with new delivery pressures (Telegraph, 2000d).
- Teleconferencing is potentially reducing business travel while globalisation and the low cost of air travel may well be increasing traffic, energy use and pollution. The average transatlantic business flight uses between 80,000 – 100,000 pounds of fossil fuel, an impact easily avoided through use of teleconferencing (Financial Times, 2000j).

Companies such as the American National Transport Exchange (NTE), the UK dot.com start-up Dropzone1 and The Post Office, may prove useful in reducing environmental impacts caused by traffic congestion[13].

- **NTE** monitors large scale transport arrangements and product movement using e-commerce systems, allowing it to track the movement of a truck fleet and it's cargo very closely. This should cut down traffic congestion and fuel use if networking efficiency is gained. For instance, if the company is able to notify the truck driver of a last minute pick up point, the return trip is not made empty.
- Fledgling e-businesses such as the UK's **Dropzone1** will cut down the number of failed deliveries and unnecessary customer visits to post office depots with their unique product delivery network. They operate by providing e-commerce retailers with a network of more convenient drop-off points for the customer, namely Texaco and BP service stations. Small packages ordered over the Internet are sent from warehouse to drop off point by the retailer, where they are stored until pickup. Customers benefit from email delivery notification and extended delivery hours. The delivery and tracking system will be all be conducted electronically.
- **Post Office's** plans for extension of its delivery network, and potential environmentally detrimental affects this may have, could well be offset by increased use of it's efficient delivery network. If e-retailers come to use the Post Office more frequently in preference to their own 'white vans', this may optimise delivery. Some 94% of Britons live within a mile of a post office (Guardian, 2000a; Telegraph, 2000d).

3.3.3.5 Environmental Impact 5: Land Use Patterns and Infrastructure

Changes to infrastructure and company size brought about by e-commerce retailing may influence our impact on the environment, particularly on a companies eco-efficiency (see energy

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[13] http://www.dropzone1.co.uk

section above). With many shop fronts restricted to the size of a PC screen, an office in every capital city supported by hundreds of employees is not always necessary. To illustrate:

- The airline company Easyjet would need a call centre four times the current size if most of their customers, currently 70%, didn't book on-line (Financial Times, 2000h).
- The need for commercial floor space may drop by up to 5 percent in the U.S. alone according to some studies (ROMM, J. 1999).
- The redundancy of office and high street floor space could lead to significant energy savings and thus, reductions in green house gas production.
- E-commerce trends have also led to changes in the distribution and size of an organisation. Companies such as Tesco Direct, the worlds biggest online grocery business, will have to dramatically increase the number of "picking centre" warehouse sites in the event that business "takes off" (Leahy, 2000).

How will this expanding requirement for building space affect our view of land development, brownfield sites and protected areas?

The growing use of large warehouses along with the trend towards construction of telecommunication centres has the affect of centralising both people and product, at least on a local scale. The implications for transport patterns and energy use are unclear. Will people work more often from home, reducing their reliance on public transport and the car? Is heating one single home and powering the electrical equipment of one home office worker more energy efficient than allocating them shared office space? Will 'hot desking', the trend of allocating workers temporary office space using electronic booking allow companies to monitor electricity and heating needs more efficiently?

3.3.3.6 Environmental Impact 6: Carbon Trading

There is great potential for E-commerce to lift the concept of carbon trading out of the realms of obscurity and turn it into a profitable, successful global operation[14].

In light of the governments commitment to reducing carbon dioxide emissions by 20% by 2008-2012, in answer to the demands of the Kyoto Protocol signed in 1997. A decision has been made by the UK Government to introduce a tax on industrial energy use to incentivise energy efficiency and there are also plans to introduce a UK-wide emissions trading scheme next year (Financial Times, 2000c). This will allow companies to reduce their CO_2 emissions by changing business practice or by buying the surplus permits of another. Carbon trading is one way the environmental burden can be more equitably distributed within industry by the reallocation of emissions targets.

- Greenergy International Ltd, global specialists in clean energies maintain that by harnessing the power of the Internet, companies will more easily manage carbon production using a hub for their entire accounting, management, banking and energy purchasing activities (Financial Times, 2000c). An international market for trading carbon emission permits may develop more readily if the Internet can offer a central point of trade and larger source of information than currently available. James Bayley, ex-nuclear physicist and IT director of *SwanBayley Purchasing* Internet procurement company believes that carbon trading over the Internet will

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[14] Polluting as well as non-polluting industries are only just beginning to tackle the concept of measuring their environmental impacts using carbon units. By translating the amount of energy used (gas, electricity etc) into an equivalent value for the carbon dioxide emitted (produced to make the energy in the first place), companies can approximate their contribution to the greenhouse affect using this carbon value, or unit and move to set future targets for reduction.

be one of the "largest areas of growth in the area of E-commerce" (Bayley, 2000, personal communication).

3.3.3.7   Environmental Impact 7:   Demands for Raw Materials and Products

The affects of Internet trading on buying habits and consumption levels could be detrimental to the environment. Many questions arise. For instance, will companies trade with less thought for environmental controls and expectations that might otherwise be demanded?

- One of the recent global developments in the B_2B sector is the establishment of the Mining and Metals Procurement Market Place[15]. This venture is one of the worlds most ambitious B_2B projects, set up using $100 million seed capital. It will open all companies in the industry - mining, minerals, metal producers and suppliers – to a global minerals marketplace where all companies will have access to procurement sources of raw materials and services. The environmental implications of this new market environment are yet to be explored by the mining industry!

- Demand for products such as motor vehicles may also shift. Studies by the Deutsche Banc (Alex Brown report) and Roland Berger consultancy in North America indicate that vehicle prices will drop considerably with the introduction of e-commerce. Shortened supply chain and increased efficiency will entail benefits being passed onto the consumer in the form of significant price reductions (Financial Times, 2000a). As price is often the only limiting factor in consumption, it would be detrimental to the environment if more cars found their way onto the roads.

3.3.3.8   Environmental Impact 8:   Demand for Green Products

The Internet is likely to contribute to the development of niche markets, organic food being a good example. If the behaviour of shoppers in supermarkets is anything to go on, the consumer paradise offered by the 'new economy' could serve poorly defined markets in the environment or 'ethical' sector very well (see section 4).

- Recent studies by the Future Foundation consumer group indicate that the average supermarket shopper is so overwhelmed by product choice, that they employ less obvious buying strategies such as buying organic products known to be more environmentally friendly (Guardian, 2000c). A typical supermarket now holds up to 40,000 separate products where only two decades ago, the number was 5,000 (Guardian, 2000c). The Leeds branch of Sainsbury's holds 101 lines of water alone! These figures should be compared with the average 450 *organic* product lines offered by big supermarkets (Observer, 2000b). Here enters the issue of the success of the niche market of green products. Will the Internet make it more successful? Is there not a close association between the choice offered by supermarkets and the choice offered by the Internet?

- Despite strong evidence for a growing consumer demand for 'environmentally friendly' products, the market for such products is poorly defined, a factor which has in the past limited proactive behaviour and risk-taking in business. Companies often do not perceive enough demand to sustain extra cost

So how does the spoilt consumer and the trend towards ethical buying patterns relate to e-commerce and the environment? Simple. The implications of *how* we sell over the Internet are potentially larger than the *direct* environmental impacts of the product itself. E-procurement may make it easier for specialist markets such as ethically sourced products to succeed, using the strength of community selling and consumer education. If competition becomes strong enough, and shortened supply chain selling acts to cut traditional retail costs, the staggering (sales) premiums added to such products may fall away, with the knock-on-affect of increased demand.

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[15] www.mmprocurement.com

At the same time, portals such as *Ethical-Junction* and *PublicSector.org* focus buying groups, attracting consumers who are indeed confused by the vast array of product choice before them. Another new online market place offers companies the opportunity to post their adoption of ISO14001 environmental management system on their Web site, bringing in more business using this green criterion (UNEP, 2000)[16]. The Internet will hopefully provide market focus and product information for the environmentally aware consumer.

3.3.3.9 Environmental Impact 9: Life Cycle Analyses

Electronic procurement spurred on by enormous buying chains and competitive pricing, will change the nature of the supply chain and the boundaries of business responsibility (Jones, 1998; Tapscott, 1995). The analysis technique known as life cycle analysis[17] looks at the whole business process, from 'cradle to grave' – product development to disposal.

- If the e-procurement system changes product movement and ordering, this may have implication for subsequent recycling, re-use and the overall responsibilities of business during product handling. The boundaries of business are important here. Who will take responsibility for recycling once the product is dealt out of the hands of the manufacturer into the hands of mass buying markets on the web?
- Innovations in electronic coding and product tracking may facilitate better life cycle analysis. With detailed product information and connected information networks, the ability of buyers, sellers and manufacturers to tap into this information (environmental implications of disposal for example) may increase.
- The net environmental affects of these changes in supply chain are unclear.

3.3.4 Indirect Environmental Impacts of E-commerce

Measuring the subtle affects of e-commerce on shifts in business culture and awareness is no easy task. Identifying changes to environmental accountability, awareness and reputation is a cloudy issue, these aspects of business being rarely tangible or even apparent. These economic externalities faced by business are hidden within the core of our e-commerce 'iceberg' – unrecognisable from above and below the water and yet central to the e-commerce and environment debate. What lies at the core of each e-commerce business strategy? Drive for profit or a desire to manage the full range of risks posed by their businesses: financial, social and environmental.

3.3.4.1 Environmental Impact 10: Environmental Accountability

Will use of the Internet affect a companies accountability?

- E-commerce is not confined by physical geography (location and constraining country specific regulation) so how is something as simple as sales tax applied?
- Will changes to product movement and documentation allow companies to become more easily subversive?
- Policing the Internet is no easy task which may further complicate the application of environmental legislation. Not only this, if the Internet is harder to regulate, how do we write appropriate rules for dot.com's?
- A good example of changing environmental accountability comes from out-sourcing, say energy use. Where does the boundary of a companies environmental responsibility (and business operations) lie?

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[16] The portal is www.14000registry.com.

[17] For more information on life cycle analyses, refer to Spold, 1993.

Julian Morris, director of the Environment and Technology Programme at the Institute of Economic Affairs points out some of the logistical difficulties of tracking e-goods and business behaviour (Telegraph, 2000b). Identifying the location of a purchaser is not always possible. Technology does not support this, which means the system relies on a purchaser revealing their true whereabouts. As on-line cash payment systems become more widely accepted and the need for address details become even more unnecessary, the incentive for businesses to with-hold this information may increase especially those intent on avoiding payment of sales tax (VAT).

Pervasive communication, free unrestricted markets, strong competition and price transparency may encourage companies to bypass their environmental responsibilities. Companies such as Environmental Resource Management (ERM) consultancy would disagree. ERM believe the Web is a driver for transparency, a tool which will encourage greater corporate transparency (ERM, 2000).

3.3.4.2   Environmental Impact 11: Environmental Awareness

Put yourself in the position of an Internet entrepreneur confronted with the challenge of identifying the impacts of their business on the environment. It's a difficult task. Operating within a virtual business framework, where most transactions are digital and the office space is limited to a single room in a building, the whole concept may seem laughable. Which is probably why dot.com leaders could be forgiven for not learning, knowing or caring. Understanding or looking out for the environmental impacts of a 'weightless' business is an enormous challenge.

- Such attitudes are perpetuated by bigger business who seem to absolve themselves of the role to teach new dot.com companies about their wider responsibilities. For instance, Anderson Consulting, one of the largest e-commerce consultants in the UK do not seem aware of the environmental issues surrounding their own business let alone other organisations they seek to help. In an e-business questionnaire posted on their home Web site back in 2000, respondents were given a list of 21 issues that might be of importance to them, including knowledge management, innovation and 'human capital' (Anderson Consulting, 2000). Environment, sustainability or ethical investment are not mentioned. Their on-line advice to companies seeking to embrace e-business and/or survive it is "Understand all the dimensions of the challenge" (Anderson Consulting, 2000).
- Information comes more cheaply with the advent of the Internet. The current flow of environmental data is unprecedented and will now hopefully facilitate greater understanding of the issues as well as links to appropriate government and stakeholder groups ready with advice.

3.3.4.3   Environmental Affect 12: Environmental Reputation

Environmental reputation may prove to be one way in which new e-commerce companies differentiate themselves from their competitors. Founders of socially aware companies – *Youreable.com* and *Schools-for-shools.com* recently won large prizes in the E-millionaire TV competition hosted by Channel 4, entered by over 7000 applicants, proving that companies with a conscience hold strong appeal. Venture capitalists and e-commerce specialist Anderson Consulting actively donated marketing, technical expertise and capital to these companies which they believed would "make a difference as well as being profitable" (Financial Times, 2000b).

The connected world now places companies in a more precarious position when it comes to consumer power and campaigning. Shell received more than 38 million hits on their Web site in

the month after the re-launch of their environment and social section (ERM, 2000). The Corporate Watch site claim 1 million hits a month with 430 clear links to campaign group sites[18].

The Internet platform allows a company to advertise their environmental activities and political stance on issues without the need for significant investment.
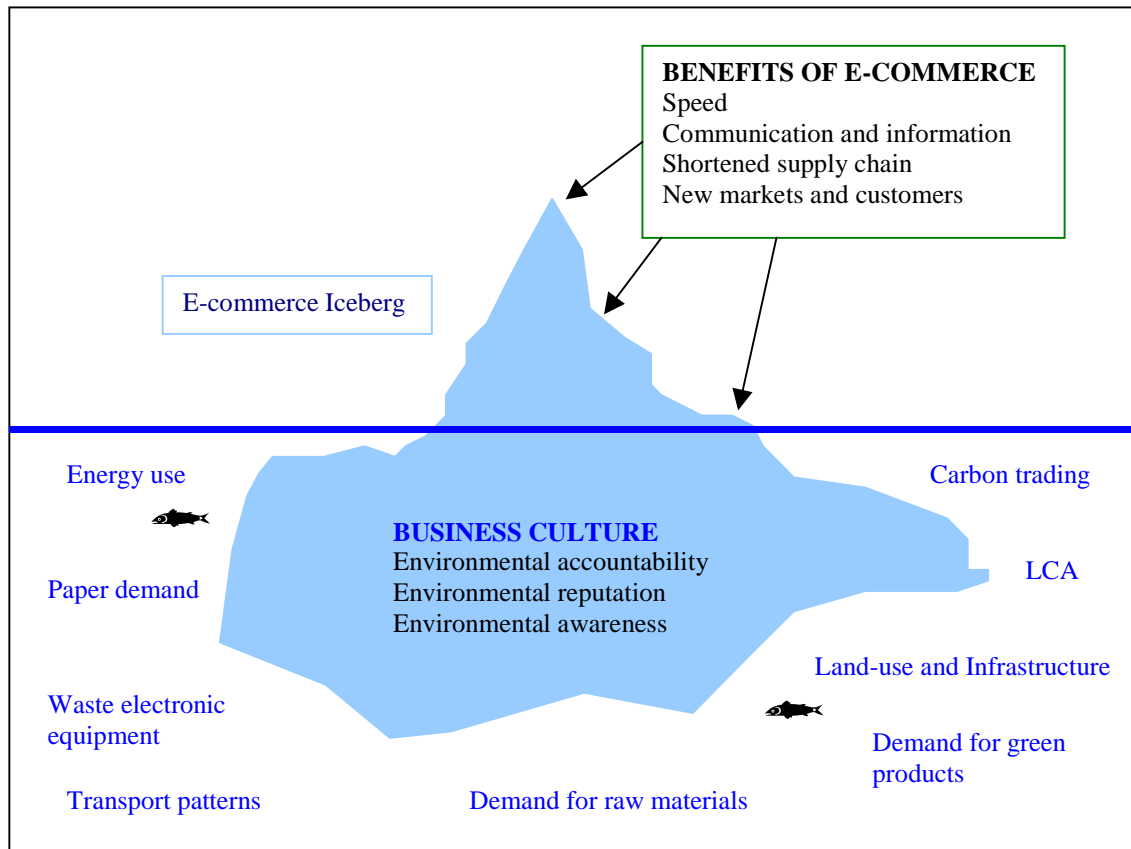
Figure 3 List of the direct and indirect environmental affects of e-commerce

	Environmental Effect	Implications	Relevant Legislation & Policy
Direct Effects	Energy	Energy 'hotels', reduction in floor space needed, paper and energy use change, green house gas production shifts.	Kyoto protocol – 20% redn. Required by 2008-2012
	Waste electronic equipment	Growing at 3 times the level of municipal waste. 90% of waste ends up in disposal or shredding facilities. Computer parts contain heavy metals (e.g. lead, mercury). Incomplete incineration of PVC liberates highly toxic dioxins & furans.	Europe. Directive COM 2000/347 on waste electronic equip. EC directive on PVC phase-out imminent.
	Paper demand	The 'paperless office'? Increasing catalogue publication, printing emails for meetings, Print-on-demand technology.	
	Transport patterns	Pollution and energy use through teleconferencing, changes in product delivery especially 'white van' movements	
	Land use plans & infrastructure	Reduced floor space and changing energy requirements.	
	Carbon trading	Establish international trading hub using Internet.	Kyoto Protocol
	Demand for products	World wide markets, mass e-procurement may shift consumption patterns and increase environmental burden	
	Demand for green products	Establish international markets using the Internet. Growth of niche market and consumer interest increasing.	
	Life cycle analyses	With mass e-procurement, the recycling and disposal responsibilities may change. Improved product tracking using digital technology	
Indirect Effects	Environmental accountability	Virtual business activities, absence of legislation.	UK Company Law Review, EC white paper on environ. liability
	Environmental awareness	Awareness of 'weightless' business impacts non-existent. Education through use of internet.	
	Environmental reputation	Good way to differentiate company. Investment groups seeking more info on a company's environ. stance and performance. IT sector has the worst reputation for environ. & social reporting. Public campaigning power increasing. Shareholders have more leverage to change company behaviour through transparent reporting procedures (Pension Laws). Don't underestimate the power of the consumer.	NPI Social Index, US Domini Social Index track performance. Pension Fund Laws – require trustees to state the extent to which environmental considerations are taken into account in their investment policy. In force July 2000.

[18] www.corpwatch.org

Figure 4 E-commerce Iceberg (with environmental impacts)

The top of the iceberg sits clearly out of the water, corresponding to the apparent financial opportunities offered by e-commerce. The part we fail to recognise is the submerged base and core - the direct impacts which e-commerce has on the environment, and the indirect and more uncertain impacts on environmental accountability, awareness and reputation.

BENEFITS OF E-COMMERCE
Speed
Communication and information
Shortened supply chain
New markets and customers

E-commerce Iceberg

Energy use

Carbon trading

BUSINESS CULTURE
Environmental accountability
Environmental reputation
Environmental awareness

LCA

Paper demand

Land-use and Infrastructure

Waste electronic equipment

Demand for green products

Transport patterns

Demand for raw materials

3.4 ENVIRONMENTAL ISSUES FACING ALL BUSINESS

The general trajectory of environmental performance and debate is indicated by a number of legislative changes and developments in government policy, as indicated below. This is not a definitive catalogue of issues. It does however highlight some of the more pressing areas facing not only established businesses but also new dot.com companies, of which many are not aware.

3.4.1 Environmental Legislation
Companies that harm the health of the environment could become liable for larger damages under new legislation planned. Companies are also facing stronger pressures to assess and report their impacts.

Environmental Liability	**White Paper - European Commission[19]** Outline proposals which would force companies to pay for damage caused regardless of whether the incident was their fault or not (Europa 2000b; Ethical Performance, 2000)
Company Reporting	**Company Law Review - UK Government** Public and very large companies should be legally required to publish an operating and financial review which would include information on their relationship with stakeholders and impact on the community and environment (Ethical Performance, 2000)

3.4.2 Environmental Policy and Reporting

3.4.2.1 Reporting
The UK's leading index of corporate environmental engagement by Business in the Community (BITC) along with research by the Warwick Business School consistently show that a large proportion of companies fail to disclose any form of environmental information, despite in some cases, having an environmental policy or actually carrying out activities that support environmental protection (BITC, 1999, Warwick Business School, 2000).

The new Global Reporting Initiative (www.gri.org) presents companies with an international framework in which to write viable reports and targets. The Institute of Chartered Accountants also recently published a revised corporate governance guidelines for UK directors which establish new responsibilities for risk management in the areas of health and safety, environment and company reputation (ICAEW, 1999)[20].

Lack of disclosure of environmental impacts and social issues of great relevance to this research. Not surprisingly, the IT sector has the worst reputation for environmental and social reporting, despite the positive reports produced by others in the industry such as IMB and Oracle (see their Web site for details). IBM has already achieved an estimated 20 percent reduction in global CO_2 emissions through energy conservation efforts from 1990 through 1997 (ACCC, 2000). How will other companies in the e-commerce sector view their responsibilities towards reporting?

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[19] http://europa.eu.int/comm/environment/liability/index.htm
[20] Also check www.icaew.co.uk/internalcontrol

3.5 ECONOMIC INCENTIVES

Investing in environmental and socially responsible business strategies makes financial sense. Simple investments save money and impact: reducing energy use and recycling paper waste are clear examples. Unfortunately, profitability and environmental sustainability lie uncomfortably alongside one another in the minds of many business leaders. This is particularly the case for small to medium sized businesses who believe they lack the infrastructure and expertise to handle such issues (Tilley, 1999). Recent reports suggest that this need not be the case (Dow Jones, 2000; Tilley, 1999; Feldman & Soyika, 1996).

- Companies which 'green' their corporate practises not only reduce stock volatility but actually make their shareholders up to 5% richer according to a report by the then ICF Kaiser, one of the US's largest engineering consulting groups (Feldman & Soyika, 1996).

Research is backed up by the economic potential of recent legislative changes to investment laws. The incentive for all businesses to consider the environmental and social impacts of their activities is now stronger given the potential of increasing shareholding. Recent changes to the **Pension Fund laws** requires trustees to state the:

> *"extent to which social, environmental and ethical considerations are taken into account* [in their investment policy]*"* (Pensions, 1999).

This legislative amendment came into force in July 2000. Shareholders now have more leverage to change company behaviour through these transparent reporting procedures.

- The market for 'ethical' stocks is not to be underestimated, nor the power of the consumer.
- Three of the top five ethical and ecological individual pension funds have outperformed the FTSE All Share Index over five years to the same date (Ethical Performance, 2000).
- More than £1.31 trillion of mutual fund and pension money in the US has been redirected into companies that are deemed to be socially responsible (Guardian, 2000b).
- Approximately £2.8 billion is currently invested in over 44 ethical funds in the UK (Moneywise, 2000).
- Four out of ten consumers refused to buy products of companies they thought 'unethical' in 1999 according to a Price Waterhouse Coopers survey of 22,000 people in 21 countries! (PWC, 2000).

The newly developed UK NPI Social Index and US equivalent Domini Social Index track the environmental and social performance of organisations. 'Ethical' stocks come from companies with specific policies towards human rights, environmental protection, child labour for instance and often have a proven track record in putting such policies into practice through business initiatives and targets.

New valuation indicators (company reporting, visionary targets) and the recent adjustments to pension laws both offer unique financial opportunities, leaving organisations more scope for creativity in their investment strategies. Those revolving around environmentally responsible business behaviour may prove very attractive. The Internet will give prospective and existing shareholders immediate access to a vast source of data and company information. The building interest in Internet share trading should alert many companies to the potential of promoting their stocks on their own company Web site using environmental and social themes.

4 CASE STUDIES

Case study details are not available for public release. For more information, I advise you contact the company direct.

Case studies include:
- The Body Shop
- ThinkNatural
- NatWest (Royal Bank of Scotland)
- Smile (The Co-Operative Bank)
- Thomsons Travel
- WHSmith
- Ethical-Junction

5 DISCUSSION & CONCLUSIONS

5.1 INTRODUCTION

The speed at which we adopt electronic modes of business is affecting the way in which we view the environment. Evidence from a review of literature and analysis of the attitudes of business leaders highlights the importance of such a debate, one which currently lacks momentum. The language, tools and policies required to address the environmental implications of electronic business currently do not exist.

This chapter discusses:
- **The subjects of debate:** the direct and indirect environmental affects of e-commerce. Environmental risks and changes to legislation and policy.
- **The business leaders:** their approach to the environmental implications of their e-commerce business
- **The integration:** of existing environmental policies and attitudes into e-commerce business operations. The tools, language and policies.
- **The opportunities:** for maximising company performance and bringing the environmental debate forward

Discussion is based upon an examination of research and literature as well as an analysis of seven case studies: The Body Shop, ThinkNatural, Natwest & Royal Bank of Scotland, Smile (The Co-operative Bank), WHSmith, Thomsons Travel, Ethical-Junction.

5.2 THE SUBJECTS OF THE DEBATE

5.2.1 Driving forces behind e-commerce

The reality of e-commerce is that it is changing the way we do business. Speed, efficiency, market widening and greater communication are the main business drivers behind the adoption of e-commerce, as reflected by literature and case study histories. E-commerce and digital technologies are increasing the speed of standard business operations, opening new global markets, driving competition up and regulatory control sideways. Significant alterations to the product supply chain are occurring on all levels: from product manufacture, through to ordering and dispatch. Huge budgets and rapid rollout describes the development of e-commerce capabilities for all case studies examined. In most cases, companies developed this side of the business in less than two years. Company leaders and analysts alike speak of the digital age in terms of 'revolution' and 'opportunity'.

Whilst this side of the business develops, companies struggle to keep pace within a competitive e-tailing environment. Next to profit - establishing brand name, marketing strategy and supplier relationships appear to dominate the priorities of management. Marketing is particularly important, not just because competition is fierce but because the Internet user profile is ill-defined (interest, demand, demographics, infiltration). Thus, despite the promise of 1 billion users of the Internet by 2004, organisations are not *necessarily* able to tap the full potential of the Internet. The affects of uncertain consumer demand, have strong implications for the ongoing success of e-commerce operations. The fledgling nature of e-commerce business has therefore introduced market widening on one level and business uncertainty on another.

Valuing e-commerce ventures, in particular dot.com start ups with no capital or profit, is problematic. The new focus for private and big investors is increasingly leaning toward company

reports, long term vision of business leaders and finally, company targets, preferably available in digital form on the Internet.

5.2.2 Environmental issues

The environmental affects of e-commerce are very real, as are the legislative changes which threaten the inactivity of the IT sector in particular (e.g. Electronic waste directive, reporting policies).

Analysis of literature from the media, the Internet and other published sources focussing on e-commerce revealed a startling absence of environmental related issues. Elements of the debate are trickling into the public domain but only through publication on the Internet, on specialist sites and through individual research initiatives. The United States and UK lead the debate.

Widespread adoption of e-commerce and Internet capabilities will affect our ecological footprint on the environment. The question that remains unanswered is how much.

The proposed direct affects of this new business platform are as follows (according to interpretation and summary of literature):

1. **Changes to energy use** – resource use and greenhouse gas emissions affected
2. **Growing waste electronic equipment** – heavy metals, dioxins and furans, landfill
3. **Changes to paper use and demand** – forests, chemical use, recycling
4. **Transport patterns and pollution** – teleconferencing, white vans, mobile offices
5. **Land use and infrastructure** – physical location requirements change
6. **Carbon Trading** – successful international market using the Internet
7. **Demand for raw products** – consumer culture grows with global market place
8. **Demand for green products** – education and market consolidation encourages rise
9. **Life cycle analysis** – product development process through to disposal

The indirect affects:

10. **Environmental accountability** – of business leaders and e-commerce organisations
11. **Environmental awareness** – of environmental issues, legislation, education
12. **Environmental reputation** – improved or endangered through use of the Internet?

Not enough information exists to refute or prove the widespread implications for each. Bearing in mind the barriers standing in the way of organisations learning about these issues (lack of research and media exposure), it came as some surprise therefore that e-commerce and environment leaders were able to identify *all but two* of these between them. The issues that went unmentioned were carbon trading and energy use. The opinions of industry add additional weight to the broad assumptions and ideas extrapolated from literature.

Best represented by the case study group were the perceived changes to transport and distribution.

- **The Royal Bank of Scotland (Natwest)** held the most prominent argument. The banks environmental manager estimated that through the use of teleconferencing, both environmental and financial gains were achieved. Annual savings of £60,000 had been made by this switch in company behaviour, further incentivising the process of cancelling unnecessary travel arrangements. Given that the average transatlantic business flight burns 80,000 – 100,000 pounds of fossil fuel, this is no small achievement (Financial Times, 2000j).

- **The Body Shop** added a new idea to this argument by incorporating the concept of secondary packaging into the notion of changing transport patterns. Their e-commerce leader anticipated higher return rates for goods ordered over the Internet (in the absence of the touch and feel experience offered by retail stores). This may add to transport and packaging requirements.

In review, the most obvious impacts of e-commerce would appear to be energy use and waste electrical equipment which both received limited attention from the representatives of each company. The reasons for this are unclear.

In the case of the more intangible, immeasurable aspects of e-commerce such as environmental reputation, awareness and accountability, business leaders were more sanguine, if responsive at all. The question of environmental accountability and liability received the strongest response from **The Body Shop, NatWest, WHSmith** and **Ethical Junction**. Most companies discussed the Internet as playing an important role in increasing environmental transparency and accountability. Through the widespread provision of environmental information, ignorance was no longer considered to be an excuse. **WHSmith** was the only one to place a question mark against the future need for environmental performance and quality assurance data in a market overtaken by electronic procurement.

Reputation management surfaced as an issue for some companies when the subject of Internet reporting was brought up. If anything, the publication of environmental data and performance was thought more likely to damage reputation through media exposure and public misrepresentation. The intangible affects of e-commerce on environmental accountability, awareness and reputation is poorly understood. An area difficult to discuss further without over-stretching the results of the research.

It is also worth noting that participation in the Digital Futures project, as was the case for WHSmith and NatWest, did not guarantee a clearer, more comprehensive understanding of the issues. All in all, each company responded differently to the issues discussed, none offering an opinion on the net environmental affects or outcome.

This absence of thought provoking environmental debate in e-commerce circles contrasts with the general trajectory of environmental policy making and legislative changes. A large number of changes in this area affect ALL business, including those who undertake e-commerce operations, exclusively or inclusively. The environmental risks which companies face are very real, as are the financial implications of ignoring them.

5.3 THE BUSINESS LEADERS

The language of business leaders in both the environmental and e-commerce departments of each company is highly consistent.

If rhetoric is anything to go by, all companies canvassed have a culture of "business morality", high "ethics" and "environmental change". All supported the research, most acknowledged the environmental affects of e-commerce while discussing *some* of the generic environmental issues with confidence. Company reports, press release information and comments from staff all maintain that *environmental protection is integral to the way they do business*.

The language used and opinions ventured on more specific environmental *differed*. These included:

- The need for environmental reporting

- The consumer demand (or interest) in environmental information – impacts, performance, targets
- The specific environmental issues facing the company (environmental awareness)
- The responsibility of each company towards the environment and its stakeholders (consumer, supplier performance, NGO engagement)

Few organisations recognised the *full* implications of their own business (as discussed under "issues facing the company"), let alone the impacts potentially flowing from their e-commerce activities.

The approach to environmental reporting using the Internet is mixed. This is linked with the strongly held opinion that there is insufficient customer interest in these matters, to the extent that the issues are too "personal" to be canvassed. This often flies in the face of company reports which encourage stakeholder dialogue.

The perceived responsibilities of each company representative towards the environment and their stakeholders varies. Company attitudes span the spectrum from an actively campaigning stance through to a "respond to, rather than influence" approach (interview quote). In the latter case, this attitude is consistent with reactive business behaviour which may prevent the company from *anticipating* problems and stakeholder requirements.

Testing the water with business leaders is no easy task. Individual reactions and interview prompts vary, yielding a range of responses. Just as it is not possible to differentiate the ideas of e-commerce business drivers from those of the environmental management department. Not enough information is available to draw any conclusions on the representative nature of this group.

5.4 INTEGRATING CONCEPTS INTO BUSINESS

Environmental strategies only work effectively if they are built into, rather than bolted on the end of a companies business system. Case study research shows that:
- Companies readily accepted the changes offered by e-commerce, however the integration of environmental issues into this area of business has not been so seamless, despite all good intentions. The language of business leaders is apparent, even visionary, when one records their drive for change and widespread acceptance that e-commerce will affect this side of the business. Vision does not translate to action in this case.
- This is often despite the fact that environmental business strategies already exist other parts of the business e.g. lending strategy, product labelling, financial reporting, benchmarking.
- Companies do not appear to have the policies or tools, let alone know how on how to fully integrate their environmental policies into sustainable e-business behaviour.

The clearest example of this is the lack of communication between e-commerce leaders and the environmental department. The departments hardly ever overlap. This has far reaching implications for the success of the existing environmental strategy and may also explain why the whole debate is so poorly understood. Environment leaders in many cases are exempted from decisions made on e-commerce development and spending and visa versa – the allocation of finance and IT resources, discussion around the overlap of departments, the marketing and development strategies.

Of relevance to the debate was the strong impression leaders gave of customer apathy towards environmental issues. This in some cases was used to explain why company interest or reporting was not deemed necessary. But what do we really know about the online buyer? According to

statistics on the UK Government's e-commerce Website, not much (E-Envoy, 2000). Internet customer profile is important. If we don't know who the customer is, how can we assume that offering them environmental information has no economic benefit? Particularly if there is no gateway for communication via the company Website. None of these companies request issue specific feedback, if at all on their home Webpage and none connect directly to the environment manager via email facility. The absence of environmental reports and policy documents removes another prompt for public reaction.

Company size and infrastructure does not appear to play a role in the integration of these policies into business - the small dot.com start up seems no further behind than the large established company.

So what does this lack of integration mean? Potentially one of two things:

1. The problems highlighted above do not exist, or at least have limited impact on company performance and environmental health.
2. Companies lack the language (awareness, understanding), policies and tools which might enable them to integrate their environmental policies into this side of the business.

Answers to this question can not be provided on the basis of scant analyses presented in this report. However, the indicators and policy ideas which developed during this project may be of some use to the reader. These indicators were used to monitor the extent to which each company integrated both sides of the business. These indicators also act as a recommendation for companies seeking to investigate further.

5.4.1 Indicators: Policies & tools for better environmental management

5.4.1.1 Policies

□ *Integration of departments* - Encourage dialogue and shared decision making between e-commerce leaders (development and management) and the environment department. Large e-commerce budgets should be discussed alongside the environmental strategy of the company. Compare needs and areas where business overlap.
□ *Adopting an environmental strategy* – informally or formally (in the case of dot.com start ups with no history of development in this area). Work on the culture of the group.
□ *Linking e-commerce and environment strategies* – documented or otherwise, discussing the relationships and impacts of both areas from a financial, social and environmental point of view
□ *Engage in dialogue* with other business groups, NGO's, Government and particularly staff to share ideas and discuss relevance/importance. The community is usually a surprising source of business ideas, as is the Government with sources of advice. Intranets should also factor into this strategy.
□ *Contribution and campaigning* – for environmental issues

5.4.1.2   Tools

> □ *Environmental reporting* on the company Web site in the form of tips for the day, flashing banners and publication of company values all the way through to formal reporting on performance and targets. Will ideally use a multi-layered strategy, which targets a wide range of groups with varying levels of understanding. Companies can monopolise this communication pathway without the need for significant investment in environmental strategies and performance in early stages of company development.
> □ *Links* – using environment related hyper-link, web site surveys or site specific feedback requests via emails. Links to suppliers, related industries and stakeholders strengthens community links and the ability of the organisation to keep in touch.

5.5   EXPLOITING THE POTENTIAL OF THE NET

Research indicates that the organisations embracing e-commerce are unaware of the financial advantages they may bring to the company once associated with the debate at hand. But with 'revolution' comes opportunity. Potential exists for electronic business to benefit financially from the early adoption of environmentally sustainable business strategy and a proactive approach. The financial angle of this debate cannot, and will not be ignored. If integrating environmental issues into e-commerce operations was simply a case of personal ethics and company philanthropy, many businesses would not benefit financially, arguably, even survive. However, investing in environmental strategies makes good financial sense. By harnessing the Internet as a promotional platform and e-commerce as a customer magnet, organisations should benefit. The following list highlights the potential of the Internet and e-commerce, as defined by the individuals represented in this research and the literature which abounds on the subject:

5.5.1.1   Investment Opportunities
Recent changes to investment laws and the problems faced by the financial world in placing value on new e-commerce ventures, may prove advantageous to new e-commerce companies. If company valuation information is correct, personal and large investors in e-business are becoming more reliant on company reports available on their website along with the vision of their leader (strategy, planning, long term thinking). This is in the absence of classic profit indicators and availability of capital. The opportunities for organisations to add the environment into their business strategy would surely add to the portfolio of information sought by investors? Furthermore, changes to investment laws and the growth of the ethical fund sector offer new opportunities to the e-commerce sector, already stressed out in the attempt to differentiate their company from another.

Innovative, creative e-commerce ventures are fertile ground for the development of the sustainable business strategy. In many cases, the company culture is not yet fully established and business drivers are hungry for marketing strategies which will set them apart from their competitors.

5.5.1.2   Adding commercial value
By educating the consumer on the subject of the environment, there is more chance of building the demand for green products and eco-labels. This is more appropriate for companies such as the Body Shop, ThinkNatural and Ethical-Junction. If however other companies such as Thomson's were to brand eco-tours or Natwest decided to profit further from it's Environment related loans scheme, then such a strategy would make more financial sense.

5.5.1.3 Building staff morale

Company involvement in environmental, socially aware activities is likely to contribute positively to staff morale, company pride and work motivation. This is particularly relevant to the e-commerce – IT industry who suffer from high staff turnover.

The most important role for management is to navigate unpredictability. To be flexible but not get lost is very difficult. Strategic planning is necessary.

5.6 METHODOLOGICAL LIMITATIONS

The lack of qualitative evidence, methodological rigor and limitations in the data set (size) mean that this research is unable to answer many of the questions it originally set out to solve. Specifically, the questions that can not be answered or that are not addressed by this report include:

1. Whether or not e-commerce will have a net negative or net positive affect of environmental sustainability
2. The extent of consumer demand for environmental information
3. The business case for integrating environmental policies and performance into e-commerce operations (i.e. financial implications).

6 CONCLUSIONS

- The development of e-commerce business has not joined up with the environmental debate. Environmental strategies do not translate into the world of e-commerce
- Environmental issues lie at the bottom of the business agenda for companies engaged in e-commerce, unmatched by their activities in other areas of business
- Issues of corporate responsibility are well embedded into the culture of all companies represented by this research, however the rhetoric and vision in many case does not match performance in areas of e-commerce development
- Integrating environmental issues into e-commerce business may offer unique financial advantages to those involved

The future of this debate is unclear, but one thing is certain - inaction has never been a good strategy. Business and society will eventually be required to step aside from current thinking and investigate where the environmental costs and benefits lie.

7 RECOMMENDATIONS

7.1 FOR BUSINESS, GOVERNMENT AND SOCIETY

- Refer to section 5.4.1 for specific recommendations
- Making a difference to the environment does not have to be a grand statement – it can be a thought, connection or enquiring approach.
- Re-address your attitude to the environment: If you don't "see" the environmental and social impacts of your business, it might be because you don't "look".
- Lawyers, government and venture capitalists should encourage small dot.com start ups to manage the whole range of risks posed to the organisation: financial, social and environmental
- Companies should use the Internet to obtain environmental information while linking to their stakeholders – a further source of inspiration and business ideas

7.2 FOR FUTURE STUDY

- Establish a business case for incorporating environmental issues into e-business
- Chart and quantify the amount of money and time spent on environmental activities and marketing strategy in e-business
- Investigate the extent to which world government organisations are examining and supporting these issues

Ask yourself the following questions in an attempt to evaluate the environmental and sustainable business thinking into e-commerce-Internet strategy:

1. What is the profile of my customer?
2. What are the environmental impacts of my business and those of my suppliers?
3. Where can I find out more information?
4. Do they require environmental information? How do I know?

REFERENCES

ACCC, 2000. "Top Companies Join WWF, Center for Energy and Climate Solutions In Innovative Effort to Save Energy, Lower Greenhouse Gas Emissions " from the Website of the Association of Canadian Community Colleges, March 1, 2000 accessed on: http://www.accc.ca/EnergyEfficiency/news04-20-2.htm

ANDERSON CONSULTING, 2000. E-Commerce survey published n home web page, accessed July-August 2000. Available at www.ac.com.

BALLIN, P., 2000. Personal communication. Phone interviews with E-commerce director, The Body Shop International.

BECK, P., 2000. Personal communication, interview 12/7/00.

BELL, E., 2000. "Any model you like – still wont work" in The Observer, Business section 7/5/00, p. 3.

BELL, N., 2000b. Personal communication. Imperial College lecturer in environmental science and plant ecology., London.

BITC, 2000. Business in the Environment Index of Corporate Engagement, 1999. London.

THE BODY SHOP, 2000. Report and Accounts. Available on home website, accessed at www.thebodyshop.co.uk/aboutus/ra2000.pdf

BRUNEL UNIVERSITY, 2000. "Virtual Society" Conference, London. Information accessed at the London QEII conference and at Websites www.virtualsociety.org.uk http://www.brunel.ac.uk/research/virtsoc/

BULZACKI, C., 1999. Business News Report: WH Smith share price rises on news of another 'net' purchase (17 01 99), at: http://www.jump.co.uk/news/b-990117-whsmith.html, accessed 1st September, 2000.

CABINET OFFICE, 1999. "E-commerce at it's best" Performance and innovation unit report September 1999, UK Government. Available at: http://www.e-envoy.gov.uk/2000/strategy/piureport/12.htm

CABINET OFFICE, 2000. "UK online" Annual report – e-minister and e-envoy   available at : http://www.e-envoy.gov.uk/2000/progress/anrep1/010.htm

CAIRNCROSS, F., 1998. The death of distance: how the communications revolution will change our lives. Orion Business, London.

CAMBRIDGE, 2000. Corporate reputation in an open world. Survey designed by the Decision support group, Institute for manufacturing, University of Cambridge. 1999.

CASTELLS, M., 2000 "The New Economy" keynote speech given at the Virtual Society Conference 19th June, 2000, London.

CISP, 2000. "Is IT kind to the earth" a collection of images, articles and comments available at http://www.cisp.org/imp/october_99/10_99contents.htm

CITIZENS ONLINE, 2000. UK based Research group and NGO formed to specifically to address the 'digital divide' and the social and cultural impacts of the Internet. Launched May 2000 in London. Information accessed August 2000, available at: www.CitizensOnline.org.uk

COHEN, N., 1999. "Greening the Internet: Ten Ways E-Commerce Could Affect the Environment and What We Can Do", iMP magazine available online accessed 11th September 2000 on: http://www.cisp.org/imp/october_99/10_99cohen.htm

COMMITTEE OF INQUIRY, 1999. "A new vision for business: summary report", p. 5

CO-OPERATIVE BANK, 1999. Financial Statements. Annual report and accounts, UK.

CO-OPERATIVE BANK, 1999b The Partnership Report: measuring our progress in 1999. Annual social and environmental report, UK.

CRADDOCK, T.,2000. Personal communication, interview 25/7/000.

DAVIS, S., MEYER, C. 1998. BLUR, the speed of change in the connected economy. Capstone publishing, UK

DOWARD, J., 2000. "No mercy on dotcom death row" in The Observer, Business section, 2nd July 2000, London, pp.8.

DOW JONES, 2000. Financial performance information found at http://indexes.dowjones.com . The same information is available in the Bottom Line Magazine by UNEP (See UNEP, 2000 reference).

DTI, 1998. "Our Competitive Future: Building the Knowledge Driven Economy". UK Government white paper, December 1998.

DTI, 1997. "Seventh progress report to and response from the president of the board of trade and the secretary of state for the environment". Advisory committee on business and the environment, Department of Trade and Industry, March 1997.

DYSON, E. 1999. "The impact on society" Electronic commerce – A real business guide CBI Report, Caspian publishing, London pp. 43-47.

E-ENVOY, 2000. Mapping E-Commerce. Statistics on national Internet usage available on the UK Cabinet Office, office of the e-Envoy Website at: http://www.e-envoy.gov.uk/2000/strategy/estatmap/estatmap.htm .

ERM, 2000. "Corporate reputation and the Internet", report on the seminar held in March 2000, London accessed at www.erm.com   in   July   2000   or   at http://www.erm.com/ERM/showcase.nsf/(Page_Name_Web)/SI_CorporateReputationandtheInternet-anERMsurvey

ETHICAL PERFORMANCE, 2000. Independent newsletter, Volume 1, issue 11, April 2000, London.

EUROPA, 2000. "Commission tackles growing problem of electrical and electronic waste" Brussels, 13 June 2000, Accessed 13/6/2000 at: http://europa.eu.int/comm/environment/docum/00347_en.htm

EUROPA, 2000b. EC White paper on environmental liability. Information available at: http://europa.eu.int/comm/environment/liability/index.htm . (See Ethical Performance, 2000).

EVENING STANDARD, 2000. "Telco hotels" in the Evening Standard, 31st July 2000.

FELDMAN, S.J, SOYKA, P.A., 1996. "Does Improving A Firm's Environmental Management System And Environmental Performance Result In A Higher Stock Price?" report and economic conceptual model, ICF Kaiser International, accessed September 2000 at:
http://www.icfconsulting.com/icfconsulting/home.nsf/pages/resp_pays.htm

FORESIGHT, 2000. "Clicks and Mortar: the new store fronts" by the retail e-commerce task force. February 2000, Department of Trade and Industry, United Kingdom.

FRASER, M., 1999. *Global Electronic Commerce* (periodical)

FINANCIAL TIMES, 2000a. "B2B gain on cars has been overdone" in the Financial Times 24th May 2000, London.

FINANCIAL TIMES, 2000b. "E-millionaire" in the Financial Times newspaper 17th July 2000, London.

FINANCIAL TIMES, 2000c. "Environmentally and financially friendly" by Bilefsky, D., 2000. in the Financial Times, London 22nd June 2000.

FINANCIAL TIMES, 2000d. "Print costs fall in radical new business models" by P. Di Maio, in Review 15, IT in Publishing, The Financial Times June 7th 2000, London.

FINANCIAL TIMES, 2000e. "Lost in Cyberspace" by P. Jenkins in the Financial Times, 8-9th July 2000, London.

FINANCIAL TIMES, 2000f. "Internet hotels threaten to sap London's power" by M. Jones in the Financial Times, July 31st 2000, London.

FINANCIAL TIMES, 2000g. "Multichanneling" by J. Macinerney in the Financial Times, weekend July 15th-16th 2000, London.

FINANCIAL TIMES, 2000h. "Travel E- Easy" by J. Shillingford in Life on the Net section in The Financial Times, 14th September 2000, London.

FINANCIAL TIMES, 2000i. "Strength in number proves location does matter" by A Wendlandt in the Financial Times, 4th September, 2000, London.

FINACIAL TIMES, 2000j. "Catching the green express from Euston", 2nd January 2000 by Amon Cohen in Inside Track, Business Travel, The Financial Times, London

FINANCIAL TIMES, 2000k. "Boos next" by C. Daniel in the London Financial Times, 19th May 2000.

FINANCIAL TIMES, 2000 l. "Dot com business chiefs are earning 40% more" in the London Financial Times 30th May 2000, p. 4

FINANCIAL TIMES, 2000m. "Telehouses" by J. Lamb in The Financial Times 15th March 2000, London.

GUARDIAN, 2000. "Mandela thanks labour faithful" by N. Watt in the Guardian September 29th 2000, London pp.9

GUARDIAN, 2000a. "Stand and deliver" in the Guardian newspaper, 29th June, 2000, London (Editorial page)

GUARDIAN, 2000b. "US Investors pull $2 trillion out of sin stocks" by P. Inman in The Guardian, June 30th 2000, London.

GUARDIAN, 2000c. "Shoppers dislike being spoilt for choice" by G. Diggines in the Guardian, April 24th, 2000, London p.7.

HENDERSON INVESTORS, 2000. Socially Responsible (SRI) Internet Position paper (internal report not publicly available).

HENDERSON, C., 2000 "Might PVC be PC after all?" in the Financial Times, June 2nd 2000, Inside Track, London pp. 17

HOWELLS, K., 2000. Speech given at the Virtual Society Conference hosted at the QEII centre, London, 19th June 2000.

ICAEW, 1999. The guidance Internal Control: Guidance for Directors. Combined Code on Corporate Governance. The Institute of Chartered Accountants in England & Wales, available at http://www.icaew.co.uk/internalcontrol accessed in September 2000.

ISPO, 2000. Press release. European Commission launches "eEurope: An information society for us all" accessed at www.ispo.cec.be/basics/I_europe.html in July 2000.

JONES, D., 1998. "The new logistics – shaping the new economy", pp. 221-235 in Tapscott, D., Lowy, A., Ticoll, D. (Eds), 1998. Blueprint to the digital economy: creating wealth in the area of e-business. McGraw-Hill, New York.

KNIGHT, J., 2000. "Signs of growth" in Moneywise Magazine, August 2000, London, pp. 27-32.

KNIGHT, S., 2000. Personal communication. Joint director of Ethical-Junction. Phone interview conducted in August 2000.

KPMG Report 1998. "Electronic Commerce – Research Report 1998" KPMG Management Consulting.

MAI report 1999. "E-Commerce: the Internet grocery market" Market Assessment International strategic report. Market Assessment Publications, August 1999

METRO, 2000. Summary of Forrester Research in Metro 25th May 2000 (Newspaper of the London Underground).

MIDDLETON, J., 2000 'Victorian values for money?' in Green Futures Magazine. July/August 2000. pp. 43, Forum for the Future publication, U.K.

MONEYWISE, 2000. A Moneywise guide to ethical investments, pull out feature of Moneywise Magazine August 2000, London.

MORI, 1998. Corporate social responsibility – the business case. Presented to Impact on Society Seminar, Mori 1998.

MURPHY, W.J., 1998 "Making intranets obsolete: extending the enterprise to partners, suppliers and customers", pp. 260-282 in Tapscott, D., Lowy, A., Ticoll, D. (Eds.), 1998. Blueprint to the digital economy: creating wealth in the area of e-business. McGraw-Hill, New York.

NATWEST, 2000. Personal communication. Interview with NatWest e-commerce corporate development and corporate communications team members, July 2000.

NATWEST, 2000a. 'PC Banking: NatWest on-line launched', source of launch date and number of offices. Accessed 24th August 2000 on home Website: http://www.NatWest.co.uk/scripts/framesearch.jsp?url=/about/about/pressr/archive/archive13_275.htm, no longer available.

NATWEST, 2000b. "Small businesses split over need to innovate" 19th April 2000 on homepage site, accessed August 2000 on:
http://www.NatWest.com/scripts/framesearch.jsp?url=/about/about/pressr/archive/archive8_432.htm   and in September 2000 on:
http://www.NatWest.com/scripts/framenew.jsp?navsection=PRESSROOM.MENU&navitem=HOT

NATWEST, 2000c. "Get to grips with e-commerce and e-business", 00 online e-commerce report for SME's, June 20000 accessed in August 2000.
http://www.NatWest.co.uk/scripts/framenew.jsp?navsection=BUSINESS.GUIDE&navitem=ASSISTANCE or navigate through home Website: small business – product tips and guidance – small business tools and downloads (bottom of page) – e-commerce.

NATWEST, 2000d. "NatWest cuts through Web clutter" Press release May 2000, accessed September 2000 at:
http://www.NatWest.com/scripts/framenew.jsp?navsection=PRESSROOM.MENU&navitem=HOT

NATWEST, 1999. Report and Accounts.

NATWEST, 1999a. Annual review and summary financial statement, 1999.

NATWEST, 1998. "Environment sense does make business sense", Mid-Corporates, document release on NatWest home Web page accessed August 2000 on:
http://www.NatWest.com/scripts/framesearch.jsp?url=/about/about/pressr/archive/archive15_118.htm
(Note: this Web page is no longer assessable as of late September 2000).

NTIA, 1999a. "Falling through the net" report produced by the US Department of Commerce, National Telecommunications and Information Administration (NTIA) 1999, information accessed on www.ntia.doc/ntiahome/digitaldivide/summit/ in July 2000.

NTIA, 1999b. Digital Divide Summit and roundtable discussion hosted by the US Department of Commerce, National Telecommunications and Information Administration, December 9th 1999, Washington. Information access on www.digitaldivide.gov , July 2000.

NTL, 2000. "Our Philosophy" accessed at: http://www.ntl.com/aboutus/philosophy.asp

OBSERVER, 2000a.   Title and author unknown. Business section 7, 25th June 2000.

OBSERVER, 2000b. "Is this the new Roddick" by S. Ryle in the Observer 2nd July 2000, Business section p.3.

OBSERVER, 2000c. "Book giants teeter on the brink" by S. Ryle in The Observer newspaper, Focus section, 2nd July 2000, pp.21.

PACKAGING REGULATIONS, 1997. UK Department of the Environment, Transport and the Regions (DETR), Press Notices, Press Notice 1139, 25 November 1999, accessed on: http://www.detr.gov.uk/press/9911/1139.htm

PENSIONS Statutory Instrument #1849, 1999. The Occupation Pension Schemes (Investment, and assignment, forfeiture, bankruptcy etc.) Amendment Regulations.

PHILLIPS, C. & MECKER, M., 2000. "The B2B Internet report: collaborative commerce" Morgan Stanley Dean Witter, Equity Research, April 2000. Accessed at: www.msdw.com/mrchuck on September 8th, 2000.

PWC, 2000. Survey results from ethical consumption available on PricewaterhouseCoopers home Website at www.pwcglobal.com.

ROBINSON, H., 2000. Personal communication. Interview with sustainability manager of Thomson Travel Group.

ROMM, J. 2000. Testimony in "Kyoto and the Internet: the Energy Implications of the Digital Economy", special report # 1: February 2, 2000 hearing of the committee on government reform, subcommittee on national economic growth, natural resources and regulatory affairs, United States House of Representatives accessed at: http://www.felsef.org/mar00.htm#SR1-C

ROMM, J., 1999. "The Internet economy and global warming: a scenario of the impact of e-commerce on energy and the environment". Annandale: UG, the Centre for Energy and Climate Solutions, December 1999 available on: www.cool-companies.org.

SEARGEANT, J., 2000. Personal communication. Informal speech made at Henderson Investment IT-environment seminar, 20th July 2000, London.

SCHENKER, J., 2000. "Military Intelligence" in Time Magazine, July 3, 2000 pp.70-71

SPOLD, 1993. The LCA Sourcebook. Business in the Environment. London.

TAPSCOTT, D. 1995. The digital economy: promise and peril in the age of networked intelligence. McGraw-Hill, New York.

TELEGRAPH, 2000. Title and author unknown. August 3rd, 2000. Daily telegraph newspaper, Dot.com supplement.

TELEGRAPH, 2000b. "Personal view" by J. Morris in the Telegraph newspaper, 3rd August 2000, Dot.com supplement, p. E3

TELEGRAPH, 2000c. "E-Tailers feel Clickmango chill" by S. Goodley in Daily Telegraph, Dot.com supplement, 3rd August 2000, London.

TELEGRAPH, 2000d. Title and author unknown. Article found in the Daily Telegraph, 29th June 2000. Transport patterns and new flexible delivery options offered by the Post Office. More details available on www.parcelforce.co.uk

THINKNATURAL, 2000. Internal company report, released January 2000. Information not publicly available. Includes financial projections and press releases.

THINKNATURAL, 2000b. Sales catalogue, published April 2000.

THOMSON, I. 1997. "The infrastructure of electronic commerce: building the new digital market place" FT market briefing, London, Pearson Professional Ltd.

THOMSON TRAVEL GROUP, 1999. Report and Accounts available on home Website at: http://www.thomsontravelgroup.com/corporate/index.html Accessed July 2000.

THOMSON TRAVEL GROUP, 1998 sustainable tourism strategy available at: http://www.thomsontravelgroup.com/corporate/index.html. Accessed July 2000.

TILLEY, F., 2000. "The gap between the environmental attitudes and the environmental behaviour of small firms" in *Business Strategy and the Environment* 8, pp. 238-248.

TOFFLER, A., 1981. *The Third Wave*. Bantam Books.

TUCHER, J., 2000. Informal presentation made by head of public relations of Sun Microsystems to a group meeting co-ordinated by Hendersons Investors, 20th July 2000, London.

UNITED STATES. DEPARTMENT OF COMMERCE. (1999). The emerging Digital Economy II. Washington, DC: U.S. Department of Commerce.

UNITED STATES HOUSE OF REPRESENTATIVES, 2000. Testimony in "Kyoto and the Internet: the Energy Implications of the Digital Economy", special report # 1: February 2, 2000 hearing of the committee on government reform, subcommittee on national economic growth, natural resources and regulatory affairs, United States House of Representatives accessed at: http://www.felsef.org/mar00.htm#SR1-C

UNEP, 2000. "The Bottom Line" Spring Issue, 2000. Newsletter of the United Nations Environment Programme finance initiatives.

WALTON, 2000. Environmental implications of B2B E-commerce systems. MSc thesis, department of environmental technology, Imperial College, London.

WARWICK BUSINESS SCHOOL, 2000. Environmental performance of UK companies accessed at www.wbs.warwick.ac.uk.

WEE, 2000. European directive on Waste Electric and Electronic Equipment (WEE) COM 2000/347. Available at: http://europa.eu.int/comm/environment/docum/00347_en.htm

WHSMITH, 1999. Report and Accounts.

WILSDON, J., 2000. "Amidst the dot.com fever, a cool gaze at the future" in Green Futures Magazine, January/February 2000, Forum for the Future Publication, London.

WINGHAM, R. 1999. Net benefits-guaranteed electronic markets: the ultimate potential of on-line trade. Macmillan Business, London.

WYLIE, I. 2000 'Finance at your fingertips' in Moneywise, August 2000 pp.46-50, London.