



CSR Issues in the ICT Hardware Manufacturing Sector

SOMO ICT Sector Report

Irene Schipper & Esther de Haan



This report examines the ICT sector, a relatively young sector that often portrays itself with a clean image of highly skilled jobs and 'clean rooms' where professionals work in a controlled and dust-free environment. Who could imagine that, behind this radiant representation of young professionals building the industry of the future, we find poisonous production sites where workers assemble computers during 12-hour workdays, sometimes for months on end without a single day's rest?

Since its beginning in the early 1980s, the sector has experienced rapid growth characterised by strong competition in which the brand name companies are increasingly concentrating on their core competencies such as R&D, marketing, and branding to stay ahead. Production and, increasingly, design and supply chain management are contracted out, resulting in complicated production chains and responsibilities.

In this report SOMO focuses on an industry that has continuously shifted to countries that are perceived as cheaper, producing predominantly in export zones where labour rights and environmental issues have no priority. Research done for SOMO in China and the Philippines shows that computers are produced under endemic overtime, while a lack of unions and barriers to organising means that the workers cannot negotiate improvements. Workers are hired on short term contracts for years, blacklisted and subjected to discriminatory application processes.

The extensive use of toxic chemicals in the production of ICT devices creates huge problems during the entire lifecycle of ICT products. There are subsequent problems with occupational health and safety in the production facilities as well as environmental and community problems in the vicinity of the factories and around the waste disposal sites.

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Introduction

Research in the ICT sector

The ICT sector is young, complex, growing and dynamic. From the perspective of sustainable development there is less attention paid to this industry than there is to other manufacturing industries. Until recently, media and public attention on the issue of labour standards had focused primarily on the garment and footwear sectors. Research has revealed, however, that there are major problems in the production of hardware.

The first personal computer was introduced in the early eighties. Nowadays it's hard to imagine a workplace or household without at least one computer. The use of ICT is giving a lot of people new opportunities, access to knowledge or even markets, new ways to communicate and organize, improve solidarity and economic development.

But behind the thin façade of a clean and useful industry from the perspective of sustainable development, the reality is totally different. This sector study will give insight in trends, strategies, structures, regulation, problems and corporate responsibility initiatives at the international level.

Objectives

This report aims to raise awareness of the environmental, human and regulation problems in the ICT sector, and in particular in the production of hardware.

Secondly the studies carried out by SOMO aim to widen the campaign base in the ICT hardware sector in Europe and elsewhere, to provide information for campaigns and to lobby on improving conditions in the ICT supply chain.

In addition to this sector study, SOMO has taken on two case studies on ICT companies (Acer and Fujitsu Siemens Computers) and two major production countries (China and the Philippines). The aim of these studies is:

- To understand the role of manufacturers in the global supply chain, identify issues that need to be addressed and to develop strategies to address identified problems in the supply chain in general.
- To understand the organisation of the supply chains of Acer and Fujitsu Siemens Computers.

The results of the country and corporate research are presented in chapters one and three. A more detailed report on the corporate research is published in the company profiles of Acer and Fujitsu Siemens Computers. All the reports can be found on www.somo.nl.

Target groups

Our objectives for this report are to inform and analyse problems surrounding the ICT sector for:

- consumer organisations to raise awareness of the problems in the ICT sector.
- organisations, individuals and institutions which have buying power to improve the standards regarding labour and environmental issues in hardware production.
- individuals and organisations lobbying corporations in the ICT sector to introduce and improve their codes of conduct as well as monitoring and verification systems.
- governments and policy makers involved in regulating the ICT sector.
- NGOs and trade unions which are campaigning or are preparing a campaign on CSR issues in the ICT sector.
- individuals and institutions which want to improve supply chain responsibility, corporate transparency and sustainable products.
- individuals and organisations which want to avoid the widening gap between rich and poor in all countries and work on alternatives to the current globalised free market economy.

Structure of the report

Chapter 1 of the report defines the ICT hardware manufacturing and gives the characteristics of the sector and insight in the worldwide production and sales of computers.

Chapter 2 discusses the trends and strategies in the globalised production network of ICT hardware, identifying a system with a lack of (possibilities for) supply chain management in which many human and environmental problems arise.

Chapter 3 explores the supply chain, the various kinds of companies and the competition structure.

Chapter 4 focuses on the supply chain of Original Equipment Manufacturers (OEMs) and the multiple relations between the different kinds of companies discussed in chapter 3. The supply chain of two major brands on the Dutch market, Acer and Fujitsu Siemens Computers will be used as illustration.

Chapter 5 discusses the CSR issues (labour, human rights, environment) and the way the ICT sector is dealing with these issues.

Chapter 6 describes both voluntary initiatives through codes of conduct of the sector itself and regulation by governments.

Chapter 7 gives a short summary of the research results and a list of recommendations to different stakeholders to undertake action for sustainable change in the ICT sector.

Process and methods

A variety of research methods were used for this report: desk research, field research and expert consultations.

The results of this report are based on information from literature, databases, interviews with workers, NGO analysis and input at roundtable conferences in:

- London (20 May 2004), organised by CAFOD.
- Mexico (15 and 16 April 2005), organised by SOMO and Cereal
- Amsterdam (28 April 2005), organised by SOMO in cooperation with the Dutch CSR Platform

Alongside these activities, (field) research was carried out by the Philippine Resources Centre and the Hong Kong organisation Labour Action China at the country level (Philippine and China), sector level and corporate level (Acer and Fujitsu Siemens Computers). The expertise of SOMO researchers and writing by Irene Schipper and Esther de Haan led to the analyses and results of this report. More detailed company profiles, related to this sector study, were written by Bart Slob.

Thanks go to CEREAL for the cooperation in organising the round table conference and interviews with workers in Mexico, Philippine Resource Centre and China Labour Action for the research during the research period and the Dutch Consumer organisation Consumentenbond for the Co-financing.

Research program

SOMO's research on the ICT sector is part of a four-year program of research of sectors of importance to civil society, poverty eradication and sustainable development, co-financed by the Ministry of Foreign Affairs in the Netherlands.

The objectives of this CSR Research programme are to increase knowledge among Northern and Southern civil society organisations about the effects of activities of corporations in developing countries. SOMO wants to increase cooperation between Northern and Southern civil society organisations and is aiming at influencing company policies and government policies and raising awareness.

The whole research programme includes the following sectors:

2003-2004: Garment sector and Financial sector

2004-2005: ICT hardware sector (computers) and Fresh fruit and vegetables.

2005-2006: Pharmaceutical sector and Food processing

2006-2007: Mobile telephones.

Information about SOMO

The report is published by the Centre for Research on Multinational Corporations (SOMO), an independent non-profit research institute that advises non-governmental organisations and trade unions in the Netherlands and worldwide. SOMO researches multinational corporations and their international context. By exposing unfair practices and systems SOMO wants to contribute to the struggle against exploitation, poverty and disparity, and provide means to achieve sustainable economic and social development, and a globalisation based on justice. The objectives of SOMO are:

- Changing through knowledge building: SOMO's research is directed at inducing change. The research and analysis and alternatives SOMO puts forth, provides a contribution to the policy advocacy of NGO's and policy development of international organisation, government and business.
- Strengthen civil society: SOMO brings fragmented available knowledge together, stimulates and coordinates cooperation between organisations. In addition SOMO trains local organisations in the South.
- Policy influence: SOMO organizes workshops, public meetings and lobby activities in order to influence government policies. SOMO wants the voice and development needs of the South to be brought to the front of Northern policy making that regulates corporations.

The research and activities of SOMO focus on: corporations, sectors and supply chains in an international context, Corporate Social Responsibility and International trade and investment.

Follow up

This report is the result of a year of research and activities, but it certainly is not the end of the process. SOMO sees this report as an invitation to participate in more structural activities towards structural change. SOMO wants this report to be a living document. Comments, new issues, (NGO) perspectives and recommendations will be added in updates to this report. Please send us your (research) experience in this sector or contribute to the list of demands (recommendations). Updates and discussion will be published on www.somo.nl. Comments can be sent to info@somo.nl. The next update of this report is expected in April 2006. SOMO will start a project on public procurements related to ICT in December 2005, and on mobile phones in 2006.

Irene Schipper
Esther de Haan
Amsterdam, September 2005

Glossary

BAN

The Basel Action Network, an international watchdog network of activists and groups around the globe monitoring the illegal trade in hazardous waste and technologies from developed countries to developing countries.

Barebone computer

A computer without a central processing unit (CPU), random-access memory (RAM), hard disk drive (HDD), and/or optional accessories such as W-LAN modules. ICT OEMs buy these barebone computers and have them (some do the final assembly themselves) filled to the desired specifications.

Barebone strategy

Combining competitive advantages of Asian and European production plants.

Board stuffing

A labour intensive process to manufacture printed circuit boards with the use of highly toxic chemicals.

CEM companies

Contract Electronics Manufacturing companies; Another name for Electronic Manufacturing Service companies.

Contract Manufacturers (CM)

Companies offering full scale manufacturing and supply chain management from engineering to logistics. Two important types of Contract Manufacturers are the EMS companies and the ODM companies.

CPU board

The main circuit board for a computer

CSR

Corporate Social Responsibility.

EICC

Electronic Industry Code of Conduct. Code of Conduct adopted in October 2004 by Hewlett-Packard, Dell, IBM and five Contract Manufacturers (Solectron, Sanmina-SCI, Jabil, Celestica and Flextronics). Cisco Systems, Microsoft and Intel signed up to the code in November 2004.

EMS companies

Electronics Manufacturing Service companies; Contract Manufactures producing the brand name products designed by the OEMs.

EPZ

Export Processing Zones. Industrial zones that are set up with special incentives to attract foreign investors, where imported materials are processed before re-exporting.

'Fabless' companies

Companies with minimal or no manufacturing capacities of their own.

Global Footprint

Resource management tool that measures how much land and water area a human population requires to produce the resources it consumes and to absorb its wastes, taking into account prevailing technology.

ILO

International Labour Organisation.

NGO

non-governmental organization

OBM companies

Own-Brand Manufacturer companies; OEM companies selling their designed products under their own name.

ODM

Original Design Manufacturers; Contract Manufactures designing and producing complete products for the OEMs. These products carry the brand names of the OEMs but the intellectual property belongs to the ODMs.

OEM

Original Equipment Manufacturers; companies that design and build products bearing their name (the brand companies known by the public).

Outsourcing

Contracting out some or all of a company's operation.

REACH

The REACH legislation (Registration, Evaluation, and Authorisation of Chemicals) requires companies to test the safety of more than 30,000 chemicals already on the market.

RoHS

The RoHS Directive requires the removal of six hazardous substances from all electronic products shipped into the EU, and will come into effect on July 1, 2006. It places a ban on four heavy metals (lead, cadmium, mercury and hexavalent chromium) and the Brominated Flame Retardants (PFR) PBB and PBDE.

SVTC

Silicon Valley Toxics Coalition, a coalition that engages in research, advocacy, and organising around the environmental and human health problems caused by the rapid growth of the high-tech electronics industry.

WEEE

The EU Directive on Waste Electrical and Electronic Equipment is designed to shift the responsibility for recycling onto producers. The EU member States must adopt appropriate measures in order to minimise the unsorted municipal waste element from electronic waste and achieve a high level of separate collection of electronic waste.

Chapter 1

Defining the ICT hardware manufacturing sector

1.1 Position of ICT hardware in the electronics sector

The ICT hardware manufacturing sector is part of the electronics sector which is currently the largest and fastest growing manufacturing industry in the world. In the past two decades, the share of electronics doubled to reach almost one quarter of world trade in manufactured products. The main reason for this surge is the rapid growth of the ICT sector, which has a substantial and still increasing participation of developing countries in international production networks¹.

ICT is the acronym for Information and Communications Technology and can be defined as the totality of the electronic means to collect, store, process and present information to the end-users in support of their activities, and consists of computer systems, data communication systems, knowledge systems, office systems and consumer electronics.² Rather than simply IT, ICT shows the importance of communications integrated with computers.

The end markets in the electronics sector

Original Equipment Manufacturers (OEMs) are companies that design and build products bearing their name (the brand companies known by the public). In the electronics sector they manufacture a wide range of electronics, among them equipment for the **computing industry**, such as PCs, servers, storage systems, and notebooks. Major OEMs in this end-market are IBM, Hewlett Packard (HP), Dell, Sony, Acer, Fujitsu Siemens Computers, and Toshiba, etc.

Other end markets for electronics are:

- **Communications:** wireless transmission systems, optical networking and wireline transmission systems and enterprise networking systems. OEMs in this end-market are Alcatel, Ericsson and Nortel.

¹ Development and Globalisation: Facts and Figures, a statistical reference book (UNCTAD, 2004). The online version is available at <<http://globstat.unctad.org>>.

² Definition from the report: "Asia and the Pacific into the twenty-first century: information technology, globalisation, economic security and development" (United Nations Economic And Social Commission for Asia And The Pacific, E/ESCAP/1120, 19 February 1999) <http://www.unescap.org/55/e1120e.htm#_1_2>.

- **Multimedia:** digital satellite set-top boxes, personal video recorders, digital gateways and internet protocol entertainment devices. OEMs in this end-market are Echostar, Nokia and Philips Electronics.
- **Industrial and Semi-conductor Systems:** semi-conductor capital equipment, computer controllers, and test and inspection equipment. OEMs in this end-market are Applied Materials, Electronics for Imaging and LSI.
- **Defence and Aerospace:** avionics systems, weapons guidance systems, cockpit communications systems and space systems. OEMs in this end-market are The Boeing Company, General Electric, and Lockheed Martin Corporation.
- **Medical:** blood glucose meters, computer tomography scanners, respiration monitors, and anaesthesia workstations. OEMs in this end-market are GE Medical Systems, Philips Medical Systems and Roche.
- **Automotive:** entertainment devices, navigation systems, and wireless communication systems. OEMs in this end-market are Saab, Volvo etc³.

1.2 Industry classification codes of the ICT hardware sector

According to the United Nations Standard International Trade Classification (SITC) revision 2, electronics (SITC 75-77) include office machines and automatic data processing equipment (computers), telecommunications and sound recording and reproducing apparatus and equipment, and electrical machinery, apparatus and appliances such as semiconductors. The computing industry specifically, (PCs, servers, storage systems, and notebooks) falls under SITC code 752.

Electronics: SITC 75 –77⁴

751 Office machines.

752 Automatic data processing machines and units thereof.

759 Parts of and accessories suitable for 751, 752.

761 Television receivers.

762 Radio-broadcast receivers.

763 Gramophones, dictating and sound recorders.

764 Telecommunications equipment, and parts.

771 Electric power machinery, and parts thereof.

772 Electrical apparatus such as switches, relays, fuses and plugs.

773 Equipment for distributing electricity.

774 Electric and radiological apparatus, for medical purposes.

775 Household type, electrical and non-electrical equipment.

776 Thermionic, cold and photo-cathode valves, tubes, and parts.

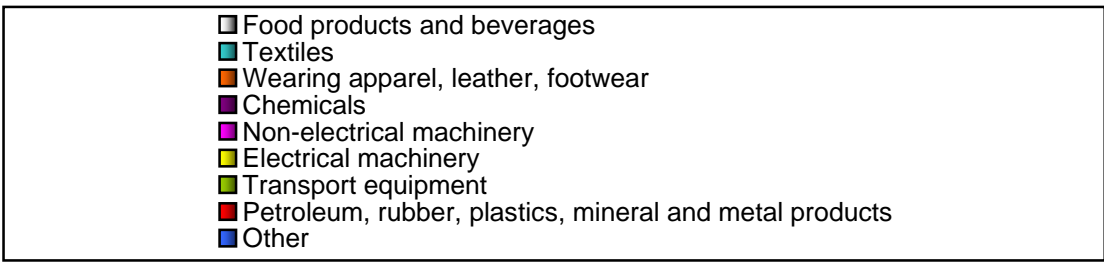
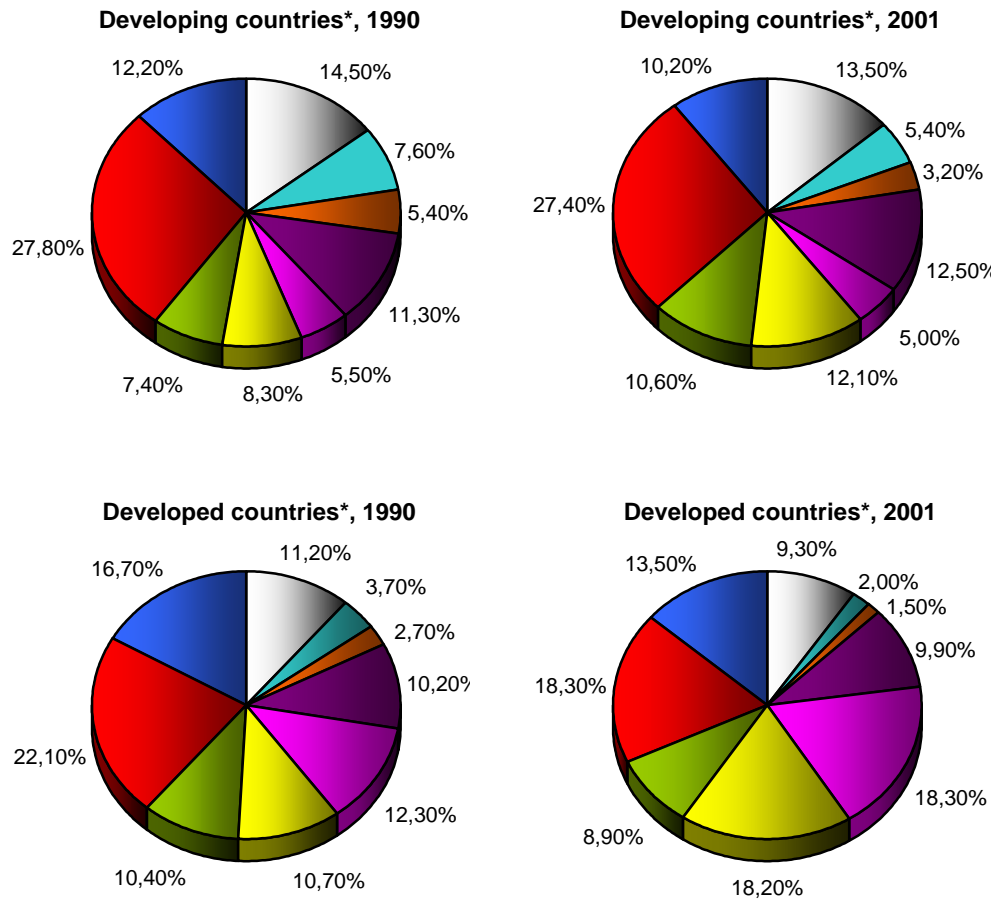
778 Electrical machinery and apparatus, n.e.s.

For the increasing participation of developing countries in electronics manufacturing, see the following graphs provided by UNCTAD.

³ Overview of end-markets derived from annual report Sanmina-SCI (2004).

⁴ Development and Globalisation: Facts and Figures, a statistical reference book (UNCTAD, 2004). The online version is available at <<http://globstat.unctad.org>>.

Distribution of manufacturing value added, at 1990 prices, in developing and developed countries, by ISIC division (in %)



* china is excluded, but China, Hong Kong SAR and Taiwan Province of China are not

This report will focus on Corporate Social Responsibility (CSR) issues relating to hardware products in the computing end-market, which are exemplary for CSR issues in the electronics sector as a whole.

1.3 Low-cost production countries of ICT hardware

The place and date of birth of the ICT sector are California, USA in the 1970s. One of the characteristics of the sector is its rapid growth in a relatively short period of time. Much of the growth in production in the ICT sector has taken place in newly industrialising countries, particularly in Asia. Countries such as Singapore, Taiwan, Malaysia and Thailand initially emerged as low-wage manufacturing hubs for production, followed by China (massively), the Philippines, Indonesia, and more recently India. Asia has clearly emerged as the central region for ICT manufacturing. In 2003, electronic and electrical products accounted for 60% of total exports from the Philippines and for two-thirds of exports from Singapore; they are also the highest export value for Malaysia.⁵ But low-cost production facilities have also been established in Latin America (Mexico to supply the US and Canadian markets), and Eastern Europe (Hungary, Czech Republic, Poland, Romania and Estonia); the latter locations focus on Europe as the end market.

Many of the above-mentioned countries have experienced substantial industrial upgrading, often resulting in massive production complexes for intricate equipment and components.⁶ Production in these countries started with the lower-end components, but due to the recent trend of vertical integration (see chapter 2) there is a shift to include the higher ends of the value chain at these locations. However, a significant part of skilled labour is still situated in the strategic plants in developed countries.⁷

By contrast, the ICT industry has generally been perceived as a clean and high-skilled working environment, yet the majority of the manufacturing is labour intensive, low-skilled and 'dirty' work, with a majority of female workers. A good example of dirty work is the "board stuffing", a labour intensive process to manufacture printed circuit boards with the use of highly toxic chemicals. This low-skilled work is carried out in the above-mentioned low-cost countries.

→ **The largest production country: Taiwan.**

Nowadays, Taiwan is the world's premier electronics factory; it produces more than two-thirds of the world's LCD monitors, nearly three out of four notebook PCs, and four-fifths of PDAs (Personal Data Assistant, i.e. handheld computers)⁸. Industry analysts expected

⁵ The ICT sector: The management of Social issues and environmental issues in supply and disposal chains, Survey undertaken by ISIS Assets Management plc (January 2004)
<<http://www.computertakeback.com/docUploads/ISIS%5FICT%5FJAN%5F2004%2Epdf?CFID=9154074&CFTOKEN=15076694>>.

⁶ Labour Standards and Union organising in the IT-industry in East and South-East Asia, a trade union and labour research workshop, 30 May-# June 2005, outline and agenda.

⁷ Boy Lüthje, "The IT industry: labour flexibility, production networks and the global downturn", Asian labour Update, no.45 (October-December 2002).

⁸ TIME Asia Magazine, Vol. 166, No. 1 (issue dated July 4, 2005).

Taiwan to account for 84% of global notebook production in 2005, compared to 63% in 2003. However, about 65%⁹ of this production is manufactured in China, despite all these products carrying a sticker stating 'Made in Taiwan'. See for example the chart of the supply chain of the Acer Travelmate C110 in Chapter 4.

Taiwanese companies form the majority of the Original Design Manufacturing companies (ODM companies - contract manufactures not only producing but also designing the brand name products for the OEMs, see also chapter 2) producing for HP, Apple, Dell and all the rest of the brand names. These Taiwanese companies are unknown to the wider public. As mentioned, Taiwanese ODMs produce most of the computer parts outside of Taiwan, they have large factories in China, some with more than 10,000 workers¹⁰.

→ **The fastest growing production country: China**

Many western electronics manufacturing services companies (EMS – they are Contract Manufacturers producing the brand names products designed by the OEMs, see also chapter 2) have also moved their manufacturing to China to take advantage of low labour costs; the vast supply of migrant labour from rural provinces; and the potential of China as a huge consumer market. The labour costs in China are low, less than \$1.00 per hour. The large first-tier electronics manufacturing services (EMS) providers like Flextronics, Solectron and Jabil are very well represented in China, as are the Taiwanese ODM companies.

As OEMs and Contract Manufacturers relocated manufacturing to China, they also took with them many of their suppliers. The result is that many low-cost parts including resistors, capacitors, switches, relays, and low-end semiconductors are readily available in China. In fact, 85% of bare-printed circuit boards are now produced in China. Component prices in China are 20% less than in the U.S. and Europe. But semiconductor production is limited to such parts as diodes, analogue ICs, commodity logic and other discrete parts, which are lower-end semiconductors. Greg Shoemaker, vice president of procurement for Hewlett-Packard, says many of HP's products are built in China, but higher-end semiconductors needed for production have to be imported. According to Greg Schoemaker, "there aren't a lot of high-end semiconductor producers in China". One reason is that there is not a lot of cost benefit in manufacturing high-end chips in China because chip production is not labour intensive. Another reason is that Chinese chip suppliers don't have access to technology and equipment to produce high-end memory built on 90 nanometer (nm), as China has import limitations on technology because of the Wasserman agreement. The agreement bans countries from exporting to mainland China equipment that enables production of wafers larger than 200mm or feature sizes smaller than 0.25 micron.

⁹ Purchasing May 19, 2005 SECTION: Vol. 134, No. 9; Pg. 30; ISSN: 0033-4448. Buyers search for success in China: China has become an important source for many commodity components, but don't expect any high-end chips to be produced there any time soon.

¹⁰ Foxconn (brand name of Hon Hai), the biggest Taiwanese ODM company maintains a huge facility with about 80,000 workers in Shenzhen, probably the largest electronics plant in the world, offering a broad spectrum of manufacturing resources.

In 2005, China produced about 6% of the world's (lower-end) semiconductors and it produced about 18% of electronics equipment.¹¹

→ **The newcomer: India**

India is traditionally considered a leader in software outsourcing, but is now increasingly being seen as an attractive location for ICT hardware equipment production. Recent moves into India by some major OEMs, including Microsoft and Nokia, and by some large Contract Manufacturers (Jabil, Flextronics and Elcoteq) indicate that the nation is on its way to become a significant electronics-production region in the future.

Features of India are that the population is more than 1 billion and the nation is projected to have a Gross Domestic Product (GDP) growth rate of 6 percent in 2005. It has a large consuming market as in 2003 the country had more than 30 million handset subscribers (mobile phone subscriptions), PC sales of more than 2 million and colour TV shipments of more than 5 million. India has a highly educated workforce.¹²

¹¹ Purchasing May 19, 2005 SECTION: Vol. 134, No. 9; Pg. 30; ISSN: 0033-4448. Buyers search for success in China: China has become an important source for many commodity components, but don't expect any high-end chips to be produced there any time soon.

¹² Website of EMSnow, Adam Pick, "India, next stop for EMS - Contract manufacturers establish operations in the nation", 13 January, 2005 <<http://www.emsnow.com/npps/story.cfm?ID=9011>>

Table: Major exporters for Automatic data processing equipment (SITC 752), ranked by average 2001-2002 values

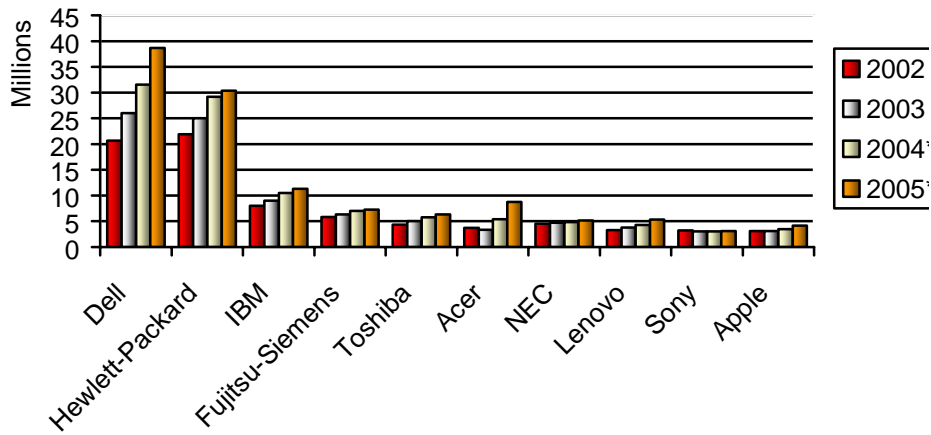
Country	Value in thousands of dollars	As % of country total	As % of developing countries	As % of world
World	182432630	2.97	-	100.00
Developed countries	98877723	2.45	-	54.20
Developing countries	83448176	4.30	100.00	45.74
China	16613033	5.62	19.91	9.11
Singapore	16051368	13.00	19.24	8.80
Taiwan	12041015	9.50	14.43	6.60
Mexico	9477750	5.94	11.36	5.20
Malaysia	7886908	8.66	9.45	4.32
Korea, Republic of	7863223	5.03	9.42	4.31
Hong Kong, China	5488924	2.79	6.58	3.01
Philippines	4410375	13.10	5.29	2.42
Thailand	1835307	2.74	2.20	1.01
Indonesia	1173112	2.07	1.41	0.64

Source: Unctad Statistics Handbook 2005¹³

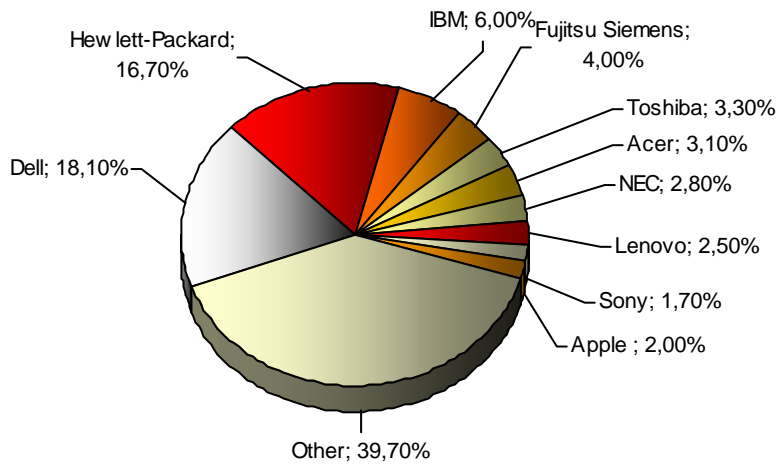
¹³ 1 January 2005 <http://www.unctad.org/en/docs/tdstat29p4_enfr.pdf>.

→ **Worldwide sales and markets shares for PC units¹⁴**

Worldwide sales PC Units¹⁵ (2004 and 2005 estimate)



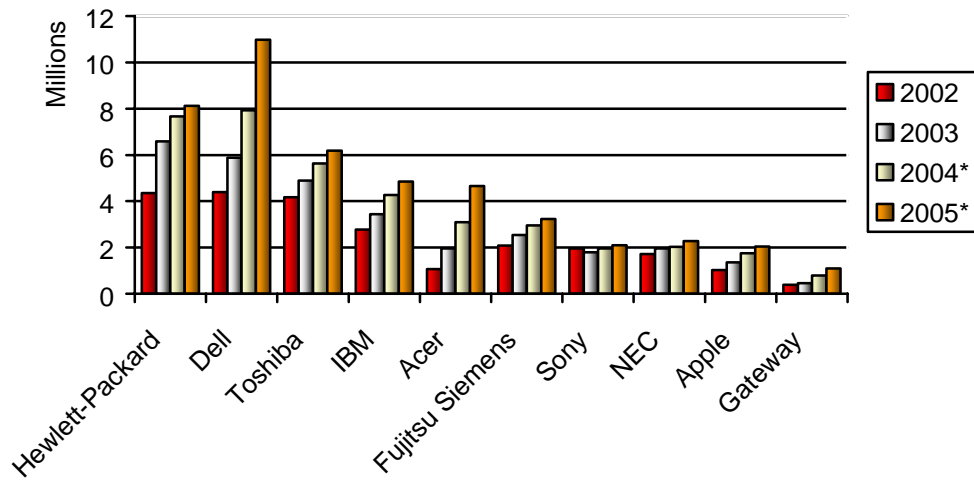
Worldwide total PC unit share (2004, estimate)



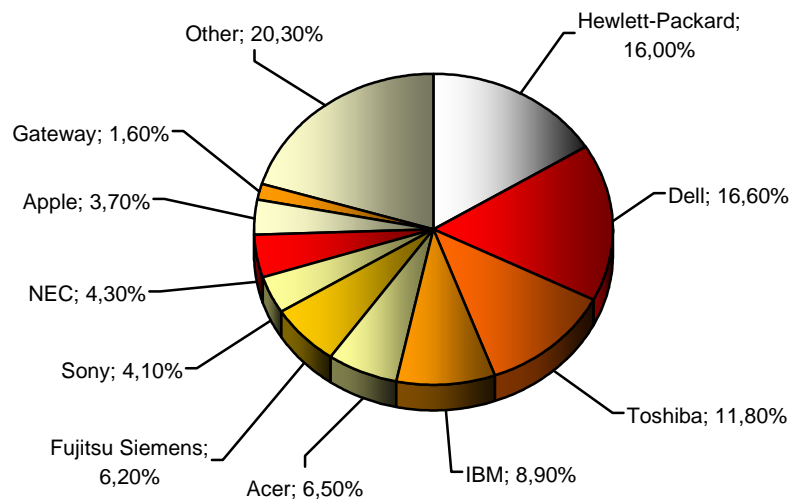
¹⁴ PC units are desktop computers as well as notebooks.

¹⁵ Morgan Stanley Total PC Unit Forecast 2002-2005.

Worldwide sales Notebook PCs units¹⁶



Worldwide Notebook PCs share (2004, estimate)



¹⁶ Morgan Stanley Notebook PCs Forecast 2002-2005.

1.4 Characteristics of the sector

Keywords in today's ICT sector are: increased competitive pressures, short product life cycles, complicated production chains, high level of outsourcing, globalised production networks, end-to-end solutions, flexibility, 'global footprint', cost reductions, and low cost countries.

ICT OEMs are continuously releasing new products to maintain their market share and margins. The actual production of these products is sourced out to Contract Manufacturers, which offer the ICT OEMs flexible production operations to maintain a competitive advantage and the possibility to react to market changes quickly. They offer what they call 'End-to-end solutions', a complete array of design, engineering, manufacturing, logistics and post-manufacturing services. In this way, the OEMs concentrate on their core competencies, such as research and development and sales marketing and branding, and less on design, manufacturing and distribution.

□ Globalised production networks

The electronics industry is the most globalised industry after the garment industry. A normal computer now contains components manufactured and assembled all over the world: semiconductor chips made in New Mexico or Scotland or Malaysia, a disk drive made in the Philippines, Singapore or Thailand, a CRT (cathode ray tube) monitor made in Japan, circuit boards made in China, and assembled in Mexico or Costa Rica.¹⁷ As a consequence countries are competing on wages, advantages and incentives to attract foreign investments, which is not necessarily in favour of the country concerned, the workers and the environment.

□ The modularity of the computer industry.

Computers, servers and internet-routers are assembled from standard key components like chips, disk-drives, modems and displays, which can be bought on the open market. The standard key components are assembled and configured in products for different competitors. One computer has a complicated production chain, consisting of more than a thousand different parts. Not only are various key component suppliers involved in the production chain, but also a high number of low-end suppliers of smaller components. At the moment OEMs are failing to integrate the low-end suppliers in their supply chain management.

□ High level of outsourcing

The sector is further characterised by its high level of outsourcing. There is an extensive, and still increasing, use of contractors and subcontractors for manufacturing. At the moment only 25% of production in the sector concerns 'in house production'. This means that 75% is outsourced to Contract Manufacturers, mainly in Asia. OEMs tend to leave the management of their supply chain and the management of labour processes to their manufacturing partners.

¹⁷ <<http://www.svtc.org/icrt/index.html>>

□ **Highly competitive sector**

Prices of ICT devices are in continuous decline, and profit margins for manufacturing are thin. This is one of the reasons for the continuing shift to low-cost countries, and is used as an excuse for putting pressure on the wages of the ICT-workers.

The highly complicated supply chain and the pressure to cut costs pose a challenge to the sector in the area of corporate responsibility. It requires involvement at different levels of the supply chain, both from OEMs, EMS and ODMs and companies will have to make efforts to understand and map their supply chain and involve all of their suppliers in the process.

Chapter 2

The globalised production network

2.1 Introduction

The electronics industry, and information technology in particular, is actually a trendsetter in creating globalised production networks. During the 1990s, outsourcing was the panacea. The key developments in the restructuring process in the assembly of IT hardware were:

- vertical specialisation;
- vertical disintegration of the value chain by brand name firms, also called the Original Equipment Manufacturers (OEMs), towards 'Fabless' manufacturing;
- Vertical reintegration by Contract Manufacturers, by acquiring manufacturing assets of the OEMs;
- The rise of the Contract Manufacturers: the EMS and ODM companies;
- Global production networks.
- The centralisation of supply chain management.

2.2 Vertical specialisation

The vertically integrated electronics manufacturers have traditionally managed products all the way from design and development through manufacturing and distribution. Companies such as IBM and Digital Equipment designed and produced the key components of their computer systems in their own facilities, including computer chips and operating software. But with the emergence of specialised technology companies such as Intel and Microsoft, the production system of the computer industry became increasingly modular: Computers, servers and internet-routers are assembled from standard components such as chips, disk-drives, modems and displays, and assembled and configured in various ways into products for different competitors. This process is called vertical specialisation.¹⁸ In this system, the leaders in the ICT sector try to achieve market-control by focussing on the design of key products in highly specialised market segments. Their aim is to create new product markets through the development of new technologies and their commercialisation.

¹⁸ Boy Lüthje, "The IT industry: labour flexibility, production networks and the global downturn", Asian labour Update, no.45 (October-December 2002).

2.3 Vertical disintegration of the supply chain

Together with the vertical specialisation, we see at the same time vertical disintegration of the computer supply chain. As leaders in the industry focus on achieving market control by product innovation they lose their interest in the “small” profit margins of manufacturing. Product innovation is increasingly separated from manufacturing. The first OEMs outsourced their low-margin operations to Contract Manufacturers in the mid-1980s. For companies such as IBM, Cisco, and Sun Microsystems, manufacturing was no longer where they added value. They got paid instead for understanding customer needs, design and distribution. This increases the pressure to get the less-profitable manufacturing assets off the balance sheet¹⁹. Some companies have ended up with minimal or no manufacturing capacities of their own, these companies are called ‘fabless’ companies.²⁰

2.4 Vertical re-integration by CMs by acquiring manufacturing assets of the OEMs

In the second half of the 1990s, OEMs started to sell off entire production units to Contract Manufacturers. CMs want to be able to offer full scale manufacturing and supply chain management from engineering to logistics. One way to achieve this is by acquiring not only the production units of OEMs, but also the specialised design manufacturing capabilities in components and software as well as the logistics. The idea behind this vertical reintegration is seizing greater market share through industry consolidation. The CMs believe they can make these operations more profitable than the OEMs were able to, seeing that manufacturing is their core competency. They expect, through consolidation, to achieve greater purchasing power, increased economies of scale, and less exposure to market variability.²¹ One can say that the vertical specialisation at the top (among the OEMs) is matched by vertical re-integration at the level of standardised manufacturing processes²².

¹⁹ Bill Lakenan, Darren Boyd, and Ed Frey, “Why Cisco Fell: Outsourcing and Its Perils”, Third Quarter, 2001 <<http://www.strategy-business.com/press/article/19984?pg=all>>.

²⁰ The Fabless Semiconductor Association (FSA) gives the following definition: ‘Fabless (without fab) refers to the business methodology of outsourcing the manufacturing of silicon wafers, which hundreds of semiconductor companies have adopted. Fabless companies focus on the design, development and marketing of their products and form alliances with silicon wafer manufacturers, or foundries. <<http://www.answers.com/topic/fabless-company>>.

²¹ The recent selling of IBM’s PC hardware division to China’s number one computer maker Lenovo, has another character, because they are both OEMs. Lenovo, formerly known as Legend, wants to spread its brand on the international stage. IBM, meanwhile, will be free to focus on its other more lucrative businesses, including business services, chipmaking and selling high-powered servers and storage systems. The combined operation will create the third-biggest PC vendor in the world. BBC News World Edition, Last Updated: Wednesday, 8 December, 2004 <<http://news.bbc.co.uk/2/hi/business/4077579.stm>>.

²² No 2.

2.5 Why OEMs outsource their production

OEMs feel the constant need to increase their flexibility, to respond to rapidly changing markets and technologies by scaling up or down production volumes, and to reduce manufacturing costs. The answer for this is outsourcing which allows OEMs to:

- reduce production costs, capital investment and fixed costs. CMs provide OEMs with flexible manufacturing services without additional capital investments;
- focus on core competences. OEMs can concentrate on product research and development, marketing and sales;
- have access to global manufacturing services. OEMs seek to reduce their manufacturing costs by having CMs manufacture their products in the lowest costs locations.
- have particular products manufactured simultaneously in multiple locations, often near end users, to bring products to the market more quickly, and meet local product requirements such as the local requirements for electrical systems. CMs with a 'Global footprint' can meet these requirements;
- accelerate time to market and time-to-volume production. OEMs can more quickly achieve volume production of their products by using CMs.
- Improve supply chain management and purchasing power. CMs are significant purchasers of electronic components and other raw materials and can capitalise on the economies of scale associated with their relationships with suppliers to negotiate price discounts.²³

The decisive factors for outsourcing

As we see above, chasing low wage rates is thus not the only factor considered when companies contemplate outsourcing parts of their production to other countries. At least three other factors are vital: transportation costs, labour intensity versus capital intensity and market responsiveness (lead time necessary to meet the customer demands).²⁴

□ Transportation costs

Companies look at the balance between transportation costs and low wage costs. The price of road, rail, sea and air transportation frequently offsets the savings from producing in developing countries.

□ Capital intensity

Outsourcing can be inappropriate because of the relative costs of capital and labour, a measure known as capital intensity. The savings from low-wage labourers can be largely irrelevant for highly capital intensive businesses. A way to understand capital intensity is to compare the sales to net fixed assets, or the amount of money invested in property, plant and equipment to generate those sales. Semiconductor manufacturing requires large capital investments to stay competitive; in this case labour costs are less important compared to the investments needed because they only form a small percentage of total costs. For the less capital intensive assembly and testing, where labour costs are more

²³ Sanmina-SCI, Form 10-K, fiscal year 2003.

²⁴ Tim Laseter, Strategy & Business, "When offshoring isn't a sure thing", fall 2004 <www.strategy-business.com/press/article/04303?pg=all>.

important, ICT hardware manufacturers have the luxury to shift from one country to the other, picking the lowest wage country in the region.

□ **Market responsiveness i.e. lead time**

The ability of a company to get its goods and services to its customers fast, i.e. the length of a company's 'supply pipeline' can be measured in days needed to convert inventory into revenue. A highly responsive operation has a short supply pipeline, which means that it holds little inventory and quickly converts its inputs into customer outputs²⁵. Highly responsive companies have to operate near their end users.

Big Contract Manufacturers such as Flextronics have taken all the decisive factors for outsourcing into consideration and have come up with the solution of the "Global Footprint" to fulfil all the needs of the electronics OEMs.

2.6 The current level of outsourcing

The level of outsourcing in the ICT sector is very high and is still increasing: the dynamics of the ICT sector have been driving the industry to increase its outsourcing to the EMS and ODM industry.

- OEMs outsourced 50% of the manufacturing of notebooks in 2002, over 80% in 2004, and the estimate is 85% for 2005. The major manufacturers in this segment were the Taiwanese ODMs such as Quanta, Compal, and Wistron.
- While the EMS and ODM industry manufacture virtually 100% of the motherboards for desktop PCs, it only assembled 67% of the final desktop computers. Some OEMs, such as Fujitsu Siemens Computers, still consider final assembly to be an important interface with the customer, so this is carried out internally by the branded OEMs. These OEMs use Contract Manufacturers for the large scale manufacturing of printed circuit boards or pre-assembled product kits (also called the 'bare bones').²⁶

According to some analysts, the overall ratio of manufacturing outsourced against manufacturing in-house in 2004 was 73% - 27%. The contract manufacturing industry achieved a double digit increase in 2004 (15.8 percent up for the EMS industry and 27.2 percent up for the ODM industry).²⁷

2.7 Global production networks

Through their continuing acquisitions, CMs are striving to build a global footprint, strategically positioning itself in every major regional market, and offering synchronised worldwide manufacturing that provides ICT OEM companies with a model that minimises

²⁵ Tim Laseter, Strategy & Business, "When offshoring isn't a sure thing", fall 2004 <www.strategy-business.com/press/article/04303?pg=all>.

²⁶ Flint Pulskamp and Shane Rau, "Modeling the Desktop PC, Mobile PC, and X86 Server Supply Chain", 16 June 2005 <<http://www.emsnow.com/npps/story.cfm?ID=12204>>.

²⁷ iSuppli Corp. , March 2005.

their manufacturing and material costs with advantages for the logistics because of the presence near the market. The strategy is to build 'Super Sites' in low-cost regions of Asia with access to local resources and suppliers, and 'High-competency Centers' in North America and Europe that specialise in high-tech services for infrastructure products²⁸.

In contract manufacturing, technology and processes in developed and developing countries are quite similar, because of the global standardisation of work procedures pursued by major CM firms. But a certain division of labour still exists; specialised products with high diversity in manufacturing requirements and with low volume in developed countries versus standardised mass production in low-cost locations.²⁹

These days, the more traditional ICT subcontractors are concentrated in low-wage manufacturing regions where they work as suppliers of cheap standard components (low-end suppliers) assembled at low wages for the CMs and OEMs.

2.8 Global one-stop shopping and Global footprint: the example of Flextronics

Flextronics was one of the first companies to foresee that the complexity of outsourcing of hundreds or even thousands of different parts would force customers to seek simplification. Flextronics's strategy to become a one-stop shop for the customer resulted in a vertical integration strategy. By providing more services, they set out to become a more integral part of the manufacturing process while creating stickier customer relationships.³⁰

Flextronics's expansion went both upstream and downstream from the core Printed Circuit Board (PCB) business. Flextronics's combination of vertical integration and its 'Global footprint', meaning its presence with the same end-to-end services in all the regional markets, is successful. It is now capable of offering its customers complete end-to-end services in five continents. (see also Box 1. The global reach of Flextronics). It is therefore well positioned to serve the OEMs current strategy to reduce the number of CM companies to deal with. Thanks to this globalisation, OEMs can easily transfer production from one site to another to cope with sudden shifts in demand or economic change. Mr Fawkes of HP cites an example of how Flextronics's global reach benefited HP: "A couple of years ago Mexico got very expensive for consumer products, and we moved our production to the Flex factory in Shanghai. To be able to do that is a beautiful thing. If I had to build or shut down my own factories, the lead times would be very long".³¹

²⁸ Website Flextronics.

²⁹ Boy Lüthje, "The IT industry: labour flexibility, production networks and the global downturn", Asian labour Update, no.45 (October-December 2002).

³⁰ Bill Lakenan, Darren Boyd, and Ed Frey, "Why Cisco Fell: Outsourcing and Its Perils", Third Quarter, 2001 <<http://www.strategy-business.com/press/article/19984?pg=all>>.

³¹ Strategic decision of HP in 2001 according to Mike Fawkes, senior vice president operations at HP. In By getting lean, vertical, and global, a Singaporean contract manufacturer became the biggest tech company you've never heard of. Article Winter 2004 <<http://www.strategy-business.com/press/article/04408?pg=all>> 24 January 2005

The Global Reach of Flextronics

Headquartered in Singapore, Flextronics is the leading Electronics Manufacturing Services (EMS) provider. Fiscal year 2004 revenues of USD\$14.5 billion. Global workforce (31 March 2004) 82,000 employees.

Global presence: Facilities in 32 countries on five continents.

Key words: global end-to-end solutions, global footprint, vertical integration with component capabilities, operating industrial parks.

Flextronics operates six **Industrial Parks** in low-cost regions around the world such as Latin America, Asia, and Eastern Europe. These parks enable ICT companies to extend their global reach by offering an infrastructure that combines leading-edge engineering, manufacturing, procurement and logistics services. Each park incorporates the manufacture of printed circuit boards (PCBs), components, cables, plastics and metal parts needed for final system assembly, functioning as complete manufacturing centres. These parks also integrate strategic suppliers onsite to reduce material procurement costs and accelerate new product introductions. In addition, as part of its global manufacturing strategy, Flextronics has two Super Sites in low-cost regions of Asia with access to established local resources and suppliers, plus High-competency Centers in North America and Europe that specialise in high-tech services for infrastructure products. The products produced on site can be shipped directly from the Industrial Park to the OEM's end users.

Industrial park locations		
Americas	Europe	Asia
Guadalajara, Mexico Sorocaba, Brazil	Gdansk, Poland Hungary	Doumen, PRC

Worldwide Partnerships

Partnerships with Alcatel, Dell, EMC, Ericsson, Epson, Sony Ericsson, Hewlett Packard, Microsoft, Motorola, Nokia Networks, Siemens, and Xerox.

Service Offerings: end-to-end solutions

Flextronics delivers a complete spectrum of service offerings that include component manufacturing, assembly services, design services and original design manufacturing (ODM), but also IT expertise, network services and logistics.³²

Strategy: expanding their ODM services. In 2004 Flextronics started with ODM services, designing, developing, and manufacturing complete products that are sold by the OEM customers under their brand name. Investing in their industrial park concept.

³² info Website Flextronics.

2.9 The centralisation of supply chain management

After the enormous growth figures of the CMs in the 1990s, heavy losses and declining figures followed after 2001 when the ICT sector suffered a global recession. The recession peaked in 2001 and 2002 and hit the CMs as well as the OEMs. They both implemented massive lay-offs and plant closures, affecting both industrialised and developing countries. OEMs also tried to solve problems through **consolidation**, see also the take-over of Compaq by Hewlett-Packard (HP) and through **restructuring their supply and purchasing operations**. The background for these company-wide supply chain organisations and policies is to overcome the global overcapacities and inefficiencies, which were at the heart of the recession.

The strategy of the major OEMs is to centralize their relationships with CMs; some have started to create special accounts for their relationships with CMs, resulting in the selection of a small number of preferred CMs for their global operations. Recently some OEMs have taken back part of their outsourced supply chain management (the purchasing of components) to counterbalance the bargaining power of the CMs.

CMs on their part are also centralizing their supply chain management. Purchasing decisions are shifted away from individual plants to a company-wide organisation. Their aim is a radical cut in the number of key suppliers with purchasing organisations for North America, Asia, and Europe. Company-wide supply chain organisations are developing company-wide schemes for supplier evaluation, bidding and purchasing procedures.³³

Although the background for these company-wide supply chain organisations and policies is to overcome global overcapacities and inefficiencies, they also offer opportunities as a tool for securing labour conditions and environmental requirements. An increasing number of ICT OEMs do have supply chain policies with environmental requirements, but social standards are rarely included. The reduced number of preferred CMs selected by the OEMs, and the reduced number of key suppliers for the CMs, are making the supply chain somewhat less complicated, and as a result the implementation of social and environmental policies is also becoming less complicated. The preferred status of the main suppliers, which presumably lead to large orders and long term relationships, is tightening the relationship between the OEMs and their Contract Manufacturers, which also offers perspectives for implementing CSR standards more successfully.

However, although the relationships between OEMs and their CMs are quite close, further down the value chain, OEMs and CMs do not maintain strong relationships with the low-end suppliers. So far, OEMs and CMs have failed to integrate the low-end suppliers into their supply chain management and accompanying policies. Such integration is complicated by the large diversity and number, smaller size, and the location in developing countries of the low-end suppliers.

³³ Boy Lüthje, "IT and the Changing Social Division of Labour: The Case of Electronics Contract Manufacturing", Institute of Social Research, University of Frankfurt (January 27-28, 2003).

2.10 The growing importance of supply chain management

In addition to the reasons mentioned above, supply chain management is of growing importance because of two EU directives that come into force in 2005 and 2006. These require the phasing out of four heavy metals (lead, cadmium, mercury and hexavalent chromium) and the brominated flame retardants PBB and PBDE, and they are setting recycling and recovery targets. As a consequence, Contract Manufacturers and component suppliers around the world are having to meet increased environmental requirements from customers. All electronics sold on the European market must comply with these directives. Ensuring compliance on the part of their suppliers before the deadline is a real challenge for the ICT OEMs, and this explains the current focus on supply chain management. A study published in November 2003 made clear that at that time there was still a lack of awareness and understanding of the RoHS and WEEE directives in China, and the writers expressed their concern that RoHS targets would not be met by mainland Chinese companies, especially the medium and small-sized companies, also as a consequence of a lack of financial resources and expertise. Awareness of the directives was higher in European and Japanese joint ventures in China and in companies that are in Japanese companies' supply chains³⁴.

³⁴ "Eco-design and environmental management in the electronics sector in China, Hong Kong and Taiwan", Global Watch Mission report (November 2003), report compiled by Martin Charter, The Centre for Sustainable Design.

Chapter 3

The contract manufacturing industry

3.1 The rise of Contract Manufacturers

Following the development of vertical specialisation and vertical disintegration, a new model of outsourced manufacturing emerged: Contract Manufacturing (CM). There are two major types of Contract Manufacturers in the electronics sector: EMS companies and ODM companies. The Electronics Manufacturing Services companies (EMS) are also known as Contract Electronics Manufacturing companies (CEM)³⁵, a slightly different name for the same group of companies. ODM stands for Original Design Manufacturing companies.

Contract manufacturers grew rapidly during the 1990s, and have become important players in the ICT production chain, some with revenues higher than those of the OEMs. The leading players in the Contract Manufacturing industry are hardly known by the public. Flextronics for example, is such a company the general public has never heard of. The name Flextronics doesn't resonate like Microsoft, Hewlett-Packard or IBM. The reason for this is that the name of Flextronics does not appear on the products it manufactures. In fact, it manufactures all Microsoft's Xbox game consoles (a contract worth \$750 million per year), most of Hewlett-Packard's inkjet printers (\$1 billion), and all of Xerox's desktop copiers (\$ 1 billion)³⁶. In 2005, Flextronics is going to provide almost all of Nortel Networks optical, enterprise and wireless manufacturing (2.5 billion per year), this is probably the largest CM contract ever awarded.

Most of the CMs are former assembly companies. Flextronics started as a printed circuit board maker in the US, and has moved on to become a global giant. Flextronics has shown steady growth from USD\$93 million in 1993 to USD\$14.5 billion in 2004. It had 82,000 employees in March 2005, which is estimated to have risen to 95,000 worldwide in March 2005.

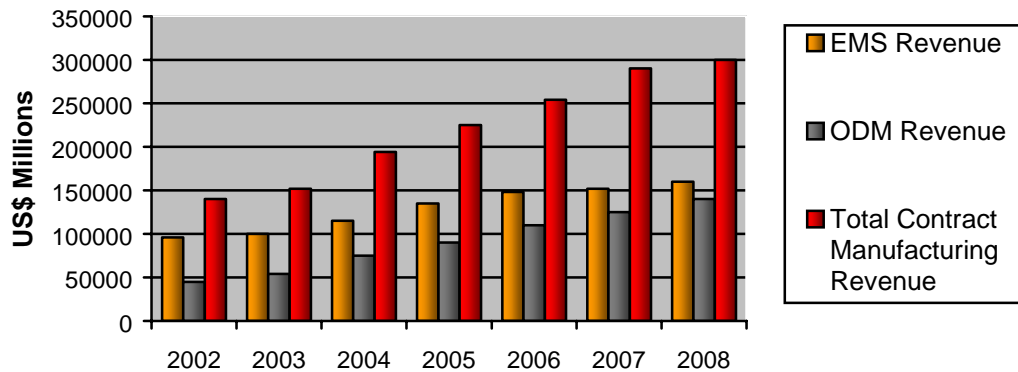
3.2 Market growth and market volume: EMS and ODM companies

After a period of relative stagnation, 2004 was a rebound year for the PC market. The figure below and attached shows iSuppli's forecast of EMS, ODM and combined contract-manufacturing revenue.

³⁵ For this report we have decided to use the term CM.

³⁶ "By getting lean, vertical, and global, a Singaporean contract manufacturer became the biggest tech company you've never heard of," Winter 2004 <<http://www.strategy-business.com/press/article/04408?pg=all>> (24 January 2005).

Figure: Worldwide EMS/ODM/Contract Manufacturing Market Revenue Forecast (2002-2008)



Source: iSuppli Corp. March 2005³⁷

After three years of marginal growth, the EMS industry achieved a double-digit rise in 2004, as sales increased to \$116.5 billion, up 15.8 percent from 2003, according to iSuppli. The ODM industry continued to expand at a blistering pace in 2004, with its revenue rising to \$73.6 billion, up 27.2 percent from \$57.6 billion in 2003.

3.3 Differences between traditional subcontracting and the CM industry

Contract Manufacturers are a new type of assembly companies which tend to be very large and global in scope. They enable OEMs to avoid multimillion dollar investments in complex PCB machinery. Nowadays, they provide all elements of manufacturing to OEMs, including product engineering, the highly automated assembly of printed circuit boards, final assembly, configuration of computers, components purchasing, distribution logistics and repair services. The PCB manufacturing process of the CMs is highly automated, using capital intensive equipment for production and assembly. By utilizing these services, OEMs can concentrate on their core competencies—such as research and development, sales, marketing and branding—and less on design, manufacturing and distribution.³⁸

→ Characteristic CM workplace

The profits margins of CMs are generally thin. As they have taken over the less profitable assets, sometimes even loss-making assets, of the ICT OEMs, they are aggressively focussing on cost reduction in order to make them more profitable.

ICT OEMs will need flexibility to be able to move products around fast, to deliver more of a suddenly popular product when the consumers are asking for it. ICT OEMs are

³⁷ <www.isuppli.com>.

³⁸ Boy Lüthje, "The IT industry: labour flexibility, production networks and the global downturn", Asian labour Update, no.45 (October-December 2002).

demanding the flexibility to scale production up or down when needed. The CMs' strength is their flexibility to deliver products when the OEMs need them. Their weakness is that in order to keep costs down they would rather have a predictable market and long-term commitments.³⁹

The CM workplace is influenced by its customer-orientation, which desires flexibility and cost reductions. In order to keep flexible and keep costs down, they expect workers in production facilities to be able to work whenever needed on flexible contracts, for low wages, a high proportion of which are production-related.⁴⁰

The supply chain for computers has changed a lot since the birth of the ICT sector. The traditional subcontractors, who used to be in Silicon Valley, the board-stuffers for example, are still part of the supply chain that is increasingly being managed by Contract Manufacturers. These low-end suppliers have moved to cheaper production sites, however, in Mexico, Asia and Eastern Europe.

Although the manufacturing process is technologically complex, the work situation can still be characterised by low wages and poor working conditions, especially with regard to health and safety (see chapter 5 for more information). The sweatshop-type working conditions of the "board stuffing" firms of the 1970s and 1980s are now reproduced thousands of kilometres further to the South and East.⁴¹

3.4 What are EMS companies?

EMS companies are global providers of integrated electronics manufacturing services. They provide these services primarily to original equipment manufacturers, or OEMs, in the following industries: communications, personal and business computing, enterprise computing and storage, multimedia, industrial and semiconductor capital equipment, defence and aerospace, medical and automotive. They focus on meeting the specialised needs of the electronics OEMs in a cost-effective manner.

They provide end-to-end services (see also the graphic for the end-to-end services) including:

- product design and engineering, including initial development, detailed design, preproduction services and manufacturing design;
- volume manufacturing of complete systems, components and subassemblies;
- final system assembly and test;

³⁹ Bill Lakenan, Darren Boyd, and Ed Frey, "Why Cisco Fell: Outsourcing and Its Perils", Third Quarter, 2001 <<http://www.strategy-business.com/press/article/19984?pg=all>>.

⁴⁰ Boy Lüthje, "IT and the Changing Social Division of Labour: The Case of Electronics Contract Manufacturing", Institute of Social Research, University of Frankfurt (January 27-28, 2003).

⁴¹ Journal of the association for History and computing, Vol. 5, number 2, September 2002, The Detroit of the New Economy: The Changing Workplace, Manufacturing Workers and the Labour Movement in Silicon Valley, by Boy Lüthje, Institute of Social Research, University of Frankfurt Germany. Paper presented at panel "Labour in the Silicon Valley Economy" Annual Convention American Historical Association San Francisco, California, January 6, 2002.

- direct order fulfilment and logistics services; and
- after-market product service and support.

Their volume manufacturing services are vertically integrated, allowing them to manufacture key system components and subassemblies for their customers. By manufacturing key system components and subassemblies themselves, they enhance continuity of supply and have control over the availability of key components.

The system components and subassemblies they manufacture include volume and high-end printed circuit boards, printed circuit board assemblies, backplanes and backplane assemblies, enclosures, cable assemblies, precision machine components, optical modules and memory modules.

EMS companies have a global presence, they seek to locate their facilities near their customers and customers' end markets in major centres for the electronics industry or in lower cost locations. Many of the plants located near customers and their end markets are focused primarily on final system assembly and test, while the plants located in lower cost areas engage primarily in less complex component and subsystem manufacturing and assembly.

Table: Top ten EMS

Rank	Company Name	2004 Annual Revenue (in millions)	2003 Annual Revenue (in millions)	Change
1	Flextronics	\$16,062	\$13,379	20%
2	Hon Hai	\$15,811	\$11,256	40%
3	Sanmina-SCI	\$12,484	\$10,793	16%
4	Solectron	\$11,630	\$11,145	4%
5	Celestica	\$8,839	\$6,375	39%
6	Jabil	\$6,575	\$5,169	27%
7	Elcoteq	\$3,899	\$2,905	34%
8	Benchmark	\$2,001	\$1,839	9%
9	Venture	\$1,945	\$1,942	0%
10	USI	\$1,613	\$1,259	28%
Total Top 10		\$80,859	\$66,863	22%

Data by iSuppli Corp.⁴²

The problem with rankings like this is that many Asian companies are both Contract Manufacturers and industrial OEMs or electronics OEMs. To make it even more complex,

⁴² SOMO decided to publish the content of the table of iSuppli Corp., as found on the website of EMSnow, integrally. Although some remarks can be made about this ranking: there are valid arguments to rank the Taiwanese company Foxconn as an ODM company instead of an EMS company, Foxconn is the registered trade name for Hon Hai Precision Industry Co. And according to the figures available on the website of Flextronics, its revenue over fiscal year 2004 amounts 14.5 billion dollar, where iSuppli mentions 16,062 million dollars. <<http://www.emsnow.com/spps/sitepage.cfm?catid=84>> Website: EMSnow, the global website for the Electronic Manufacturing Industry.

EMS companies increasingly offer ODM services and are component manufacturers as well.

As indicated above, EMS companies such as Flextronics produce for more electronics end-markets than the ICT sector alone. In the following paragraph, one can see the different end markets for which Flextronics and Solectron produce. 25% of Flextronics's revenue and 32.7% of Solectron's revenue comes from the computing end market.

End market	Percentage of revenues	
	Flextronics	Solectron
Handheld devices such as cellular phones, PDA's	33%	18.8%
Computer and office automation, such as copiers, scanners, desktop and notebook computers and peripheral devices such as printers and projectors.	25%	32.7 (this including storage)
Communications infrastructure, including cellular base stations, radio frequency devices, telephone exchange and access switches and broadband devices. (networking)	15%	21.6%
Consumer devices industry, such as set-top boxes, home entertainment equipment, cameras and home appliances	11%	19.3
Information technologies infrastructure, including servers, workstations, storage systems, mainframes, hubs and routers.	7%	(see computers etc.)
Other industries, including the automotive, medical, industrial and instrumentation industries	9%	9.8%

End markets, percentage of revenues.

Figures for Celestica: enterprise communications (25%), telecommunications (23%), servers (22%), storage (13%), other (10%) and workstations and PCs (7%)⁴³.

Figures for Jabil: Consumer (25%), Networking (20%), Computing and storage (13%), Instrumentation and Medical (12%), Telecommunications (11%), Automotive (8%), peripherals (6%), and other (5%)⁴⁴.

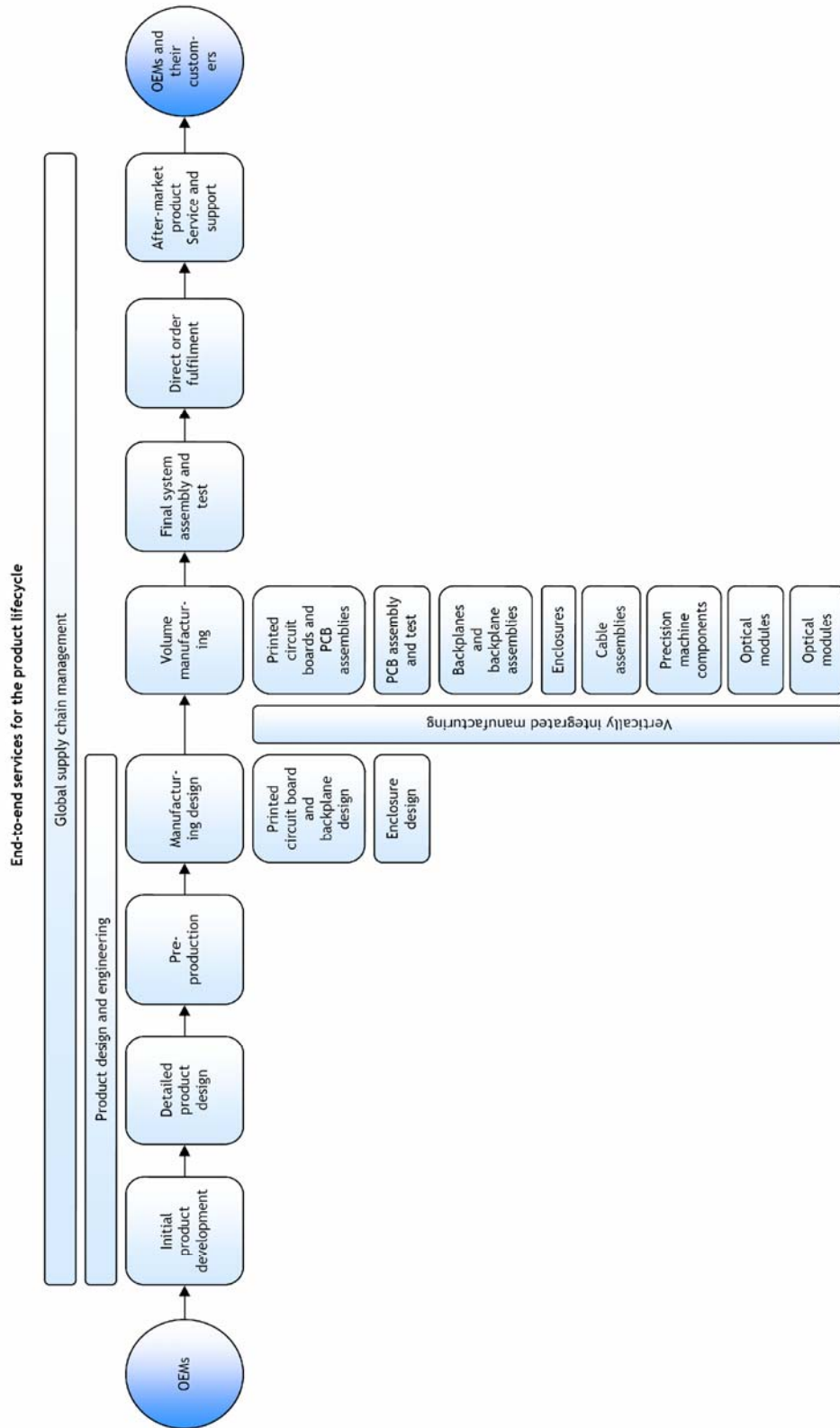
Figures for Elcoteq: Terminal products (78%), Communications network equipment (21%), industrial electronics (1%) which the company divested.⁴⁵

It becomes clear that the ICT end market is responsible for a big part of the outsourcing to EMS companies. It is expected however, that growth in the EMS market will be achieved in the category 'other industries', such as the automotive, medical and industrial industries. There is still a low level of outsourcing in these industries, but this is expected to grow in the near future.

⁴³ Annual report 2003, Celestica

⁴⁴ Annual report 2004, Jabil

⁴⁵ Annual report 2004, Elcoteq.



3.5 What are ODM companies?

Original Design Companies provide ICT OEMs with complete products of which the ODM companies own the design. The products however, are sold under the brand name of the ICT OEMs. This is typical for the notebooks supplied by Taiwanese companies to OEMs like HP or Dell.

The ODM industry grew from motherboard companies in Taiwan where many ODMs such as Hon Hai, Inventec, Compal, Delta Electronics Industrial and Gigabyte are located. Then they moved into computer systems. Most laptops are built by ODMs these days. They are now moving up to PCs, desktops and servers; telecommunications and handsets; and computer peripherals.⁴⁶ ODMs have a substantial share of the global market for ICT hardware production.

Design expertise is the competitive advantage for ODMs and many OEMs use ODMs for this technical know-how. An OEM will use an ODM when it wants to add to its product portfolio, but also wants to minimise cost.

Table: Top Ten ODM companies

Rank	Company Name	2004 Annual Revenue (in millions)	2003 Annual Revenue (in millions)	Change
1	Quanta	\$9,655	\$8,857	9%
2	Asustek	\$7,826	\$6,124	28%
3	Compal	\$6,433	\$4,915	31%
4	BenQ	\$5,016	\$3,662	37%
5	Lite-On	\$4,959	\$3,269	52%
6	Inventec	\$4,236	\$2,472	71%
7	Wistron	\$3,545	\$2,355	51%
8	Tatung	\$3,216	\$2,534	27%
9	Micro-star	\$2,010	\$1,878	7%
10	Mitac Intl	\$1,543	\$1,199	25%
Total Top 10		\$48,449	\$37,265	30%

Data by iSuppli Corp. (sources: company reports, iSuppli and investment firm estimates)

⁴⁶ Jim Carbone, "ODMs offer design expertise, quicker time to market," 16 January 2003, From the pages of Purchasing Magazine Online <<http://www.purchasing.com>>.

3.6 Competition in the contract manufacturing industry

The CM industry is extremely competitive. CMs compete against each other but also with their customers, the ICT OEMs, who are still responsible for part of their own production. But more importantly the EMS companies face competition from Taiwanese ODM suppliers, which are almost exclusively producing in China. There is fierce competition between EMS and ODM companies, and the ODMs are gaining ground. According to some sector analysts, a breakeven point has now been reached, with both responsible for half of the subcontracting for ICT OEMs. It is obvious that in some cases EMS providers and ODMs are competing for the same business; there is an overlap between services that ODM and EMS companies provide. EMS companies like Solectron, Flextronics, Celestica, Jabil and Plexus have positioned themselves to also provide ODM services, because profit margins in the ODM industry are much better. The lines between EMS and ODM companies are blurring.

Table: Characterisation of EMS and ODM companies.

EMS = Electronics Manufacturing Services	ODM = Original Design Manufacturing
Mainly large US Corporations	Mainly Taiwanese companies
Service companies	Product companies
Offering 'end-to-end services'. That is, the complete spectrum of services including component manufacturing, design services, high volume manufacturing, assembly services, direct order fulfilment and after-sales services.	Delivering complete products of which they own the intellectual property. Enabling OEMs to launch new products for less investment, and to shorten the product development cycle.
Global presence and 'Global footprint'. That is, offering the same end-to-end services in low-cost regions near every major regional end-market.	Taiwanese companies with enormous facilities in China (some factories with more than 10,000 workers) but also an increasing presence in Eastern Europe.
ICT is one of their end markets for electronics, others are multimedia (audio/televisions), defence and aerospace, medical and automotive industry.	Mainly ICT, strong position in notebooks and mobile phones. Began to play an important role a year ago, driven by HP and Dell.
Their strength is that they offer flexibility in production which is used for increasing production volumes without expanding in-house capacity	Their strength is that they enable OEMs to launch new products at a lower investment, they share costs with OEMs
Their strength is that they have great component purchasing power and stronger ability to ensure supply of key components	Their strength is that they can shorten the product development cycle.

EMS companies do offer a fuller menu than ODMs in the area of global field support and service (the global footprint).⁴⁷ ODMs generally don't have manufacturing locations around

⁴⁷ The Taiwanese ODM paradigm for computer outsourcing, by Matthew Chanoff, Mar 16, 2005, Growth factors and limitations, <http://www.emsnow.com/spps2/sitepage2.cfm?catid=49> This

the globe as EMS companies do. One way ODMs can overcome the issue of the global footprint is to outsource to EMS companies. If a Taiwan ODM has a customer in Europe, there is the possibility to outsource it to Flextronics for example, which has facilities in Eastern Europe.

3.7 The emergence of OBM companies

One of the latest developments is that ODMs have started to compete with ICT OEMs by selling their designed products under their own name; the Own-Brand Manufacturer (OBM) model. Selling directly offers ODMs a significant improvement in gross margin. ODMs must however have the resources to take on the necessary investments in branding, sales, and distribution.

Own-Brand Manufacturers (OBMs) are ODMs with marketing capabilities to distribute their products into the (international markets) under their own brands. ODMs that announced their own-branded products included Elitegroup Computer Systems, Tatung Co., Inventec and GigaByte Technology Co. Ltd. But BenQ Corp. Inc. led the OBM advance into the international retail marketplace during 2004. BenQ's own-branded sales amounted to \$2 billion in 2004, representing approximately 30 percent of the company's annual turnover. In mobile phones, BenQ historically relied on international OEMs such as Motorola for the sale of its products. In 2005 however, 70 percent of all BenQ mobile phones shipments will be under the company's own brand. BenQ was projected to ship 16 to 18 million mobile phones during 2004.

The success of BenQ's retail presence appears to have impacted its long-standing relationship with mobile-phone maker Motorola Inc. Motorola has shifted orders from BenQ to Compal Communications as a result of BenQ's retail strategies in the mobile-phone market.

ODMs, acting as OBMs, have to deal with the problem of trying to sell to the OEMs and compete with them simultaneously. The dominant strategy is to segregate model types or distribution channels to avoid direct competition with particular models. The second most common strategy is simply to stay "under the radar" by selling only a small number of units directly. Some believe that this competition will be a hindrance to OEMs adopting higher levels of outsourcing in the future⁴⁸.

In 2004 a new supply chain model could be witnessed when large service providers, such as wireless communications companies Orange, AT&T and T-Mobile, bypassed the OEM

study was presented to members of the Quarterly Forum for Electronics Manufacturing Outsourcing and Supply Chain on March 10th at Flextronics International's Guadalajara, Mexico facility.

⁴⁸ Matthew Chanoff, "The Taiwanese ODM paradigm for computer outsourcing, Growth factors and limitations," 16 March 2005 <<http://www.emsnow.com/spps2/sitepage2.cfm?catid=49>>. This study was presented to members of the Quarterly Forum for Electronics Manufacturing Outsourcing and Supply Chain on March 10th at Flextronics International's Guadalajara, Mexico facility.

node of the supply chain and entered into direct relationships with an ODM, High Tech Computer (HTC), a Taiwan-based smart phone and PDA manufacturer)⁴⁹.

3.8 The risks for CM companies

Almost all CMs in the ICT sector mention their strategic relationships with their major customers as an important risk. The majority of their sales come from a small number of customers. If they lose any of these customers, their sales could decline significantly. The success of the CMs is therefore dependent to a large extent on the success achieved by their largest customers. And their customers compete in markets that are characterised by rapidly changing technology, evolving standards and continuous improvements in products. The successful development and marketing of their products is therefore crucial for the CMs.⁵⁰

⁴⁹ Adam Pick, "ODMs face rising competitive challenges amid rapid growth," 16 February 2005, <<http://www.emsnow.com/npps/story.cfm?ID=9667>>.

⁵⁰ Annual report 2004, Flextroncis.

Table: The largest customers of the top CMs⁵¹

CM	2004 the 10 largest customers accounted for % of sales	Large customers accounting for more than 10% of sales in 2004	Large customers accounting for more than 10% of sales in 2003
Flextronics	64%	HP 12% Sony 12%	
Sollectron	59.8%	Cisco Systems 13.2% (IBM) ⁵²	Cisco Systems 11.9% Nortel Networks 12.9%
Sanmina-SCI	69.3%	IBM 28.4% HP 12%	
Foxconn	n.a.	n.a.	n.a.
Celestica	n.a. 73% (in 2003) ⁵³	n.a. (IBM and Cisco) ⁵⁴	Sun Microsystems IBM Lucent Technologies Cisco systems
Jabil	n.a. 40 customers accounted for 93% of net revenue.	Philips Electronics 18% Cisco Systems 12%	Philips Electronics 15% Cisco Systems 16% HP 11%
Elcoteq		Nokia and Ericsson together account for 73% of Elcoteq's sales.	

Figures derived from the annual reports of the concerned CMs.

3.8.1 OEM divestments to CMs and the accompanying agreements

The CMs acquire inventory, equipment and other assets from OEMs, and lease or acquire their manufacturing facilities, while simultaneously entering into multi-year agreements for the production of their products. These agreements can potentially form a high risk for the CMs. On the one hand, these agreements guarantee that the CMs have production for a certain period of time. On the other, they generally do not specify a minimum volume of purchases by the OEMs, which does not give much stability for the CM as the actual volume can be less than the CM anticipated. This could result in lower revenues and excess capacity at the facility.⁵⁵

→ Profit margins

The profit margins⁵⁶ in the contract manufacturing industry are thin. As indicated before, CMs have taken over the less profitable manufacturing assets of the OEMs. The

⁵¹ Figures derived from the annual report of the mentioned CMs.

⁵² TFN investext, BEAR, Stearn & CO. Industry report, June 1, 2005, Electronics Manufacturing Services.

⁵³ Celestica improves its customers diversification by adding new customers, in 1998 the top ten customers accounted for 91% of sales, in 2002 85% and this further declined in 2003 to 73%. To be not too dependent on a small number of customers.

⁵⁴ TFN investext, BEAR, Stearn & CO. Industry report, June 1, 2005, Electronics Manufacturing Services.

⁵⁵ Annual report 2004, Flextronics.

⁵⁶ Indicator of a company's profitability. Determined by dividing net income by revenue for the same 12-month period. Result is shown as a percentage.

challenge for the CMs is to make them more profitable through a more aggressive focus on costs, including restructuring programs, massive lay-offs and increasing shift of high-volume production to low-cost regions. Ever since the recession in the ICT sector with its peak in 2001, when the CMs were caught with huge overcapacities in high-cost locations, many big CMs are struggling to stay alive. During the 1990s, the EMS companies were competing on the basis of revenue growth, now they are increasingly focusing on efficiency and profit margins. This is why the EMS companies are looking to provide high added-value services and are started to provide ODM services also: the profit margins of ODM companies are much better.

Table: Top Ten EMS and their net income figures

Rank	Company Name	2004 Annual revenue in millions (Source iSuppli)	2004 net income (loss) in thousands (source annual reports)
1	Flextronics	\$16,062	\$(352,378)
2	Hon Hai	\$15,811	n.a.
3	Sanmina-SCI	\$12,484	\$(11,398)
4	Solectron	\$11,630	\$(168,900)
5	Celestica	\$8,839	\$(854,100)
6	Jabil	\$6,575	\$166,900
7	Elcoteq	\$3,899	€39,816
8	Benchmark	\$2,001	\$70,991
9	Venture	\$1,945	\$1,942
10	USI	\$1,613	\$(170,226)
Total Top 10		\$80,859	\$66,863

Source: SOMO, based on figures of iSuppli and the annual reports of the companies concerned.

→ Restructuring costs

As one can see in the above table, almost all EMS companies were still suffering losses in 2004, and this has been the case since 2001. Restructuring costs (for example costs incurred closing high-cost manufacturing facilities and transferring them to cheaper Southeast Asian plants) are currently still impacting on the net income.

Solectron for example, has gone through some difficult financial times in recent years, losing \$3.5 billion in 2003 and \$168.9 million in 2004. At the end of April 2005, it announced a \$100 million restructuring plan that involved cutting another 3,500 jobs from its workforce of more than 50,000. Solectron has already had a succession of restructuring plans, eliminating thousands of jobs in recent years. In 2001 it decided to cut 16% of its worldwide workforce (20,000 jobs cuts).

Sanmina-SCI posted a \$1 billion restructuring loss in the six months period ending April 2005. Sanmina-SCI has moved 12,000 jobs from the US to Mexico, but its clients are now asking to take the advantage of the much lower labour rates in China. "We don't want necessarily want to do this, because there is a huge cost to us in shutting down a plant

here and starting one up over there”, said Randy Furr, Sanmina’s president and Chief operating officer of Sanmina-SCI. “But if we don’t do this, they’ll go to another competitor. If your client is competing against Dell, you have to take the advantage of a low-cost environment.”⁵⁷

Table: Profit margins of EMS and ODM companies.

EMS/ODM MARGINS: industry averages, 1999-Q1 2004						
EMS/ODM Margins: Rolled-up Averages	1999	2000	2001	2002	2003	Q1, 2004
EMS gross margins	10.7%	8.9%	8.0%	6.7%	6.0%	5.3%
ODM gross margins	15.8%	12.6%	13.6%	12.2%	10.0%	7.9%
EMS net income margins	3.7%	2.0%	0.4%	-11.0%	-6.0%	0.4%
ODM net income margins	11.5%	9.6%	9.1%	7.0%	6.2%	6.5%

Source: iSUPPLI

The following table reveals that the ICT OEMs are more profitable, only some Japanese companies are suffering losses (NEC, Fujitsu and Mitsubishi).

⁵⁷ Karl Schoenberger, “Probably made in China—by someone else: cutting and offshoring jobs, the key battle to cut costs,” Mercury News (25 May 2005).

Table: Top 20 Electronics OEMs

Rank 2003	Company Name	2003 Annual Revenue \$ billions	2003 Net Income \$ (000)	Primary end-use markets
1	IBM, U.S.	89.1	7,583.0	Computers and peripherals
2	Hewlett-Packard, U.S.	73.1	2,539.0	Computers and peripherals
3	Sony, Japan	68.3	801.4	Computers, consumer electronics, audio visual
4	Toshiba, Japan	47.2	154.4	Computers and peripherals, machinery, instruments
5	Dell Inc., U.S.	41.4	2,645.0	Computers
6	NEC, Japan	39.8	-206.1	Computers and peripherals, communications
7	Fujitsu, Japan	38.5	-1,018.5	Computers and peripherals, communications
8	Nokia, Finland	37.0	4,516.0	Communications
9	Samsung, Korea	35.6	5,008.5	Computers and peripherals, communications, audio/video, appliances
10	Philips, Netherlands	36.5	873.0	Computers peripherals communications, appliances
11	Mitsubishi, Japan	30.4	-98.7	Computers communications, machinery, appliances
12	Canon, Japan	29.9	2,576.9	Photography/ Computers and peripherals, audio/video
13	Motorola, U.S.	27.1	893.0	Communications
14	Cisco, U.S.	18.9	3,578.0	Communications, networking
15	L.G. Electronics, Korea	17.0	600.0	Communications Computers and peripherals, audio/video
16	Sharp, Japan	16.7	272.0	Computers and peripherals, audio video, appliances
17	Ericsson, Sweden	16.4	-1,507.0	Communications
18	Alcatel, France	15.7	-2,444.0	Communications
19	Ricoh, Japan	14.5	605.0	Computers and - peripherals, machinery
20	Thales, France	13.2	127.8	Aerospace

Source My-ESM58

⁵⁸ Bolaji Ojo, My-ESM, "Top 100 global OEMs: Their revenue already dwarfs the GDP of many developing nations, but the world's leading OEMs aim to get even bigger," 1 August 2004, <<http://www.my-esm.com/print/showArticle.jhtml?articleID=25600429>>.

Since the 90s the Contract Manufacturers have gained importance in the growing ICT market. 75% of the actual manufacturing of ICT products is sourced out to the Contract Manufacturers. OEMs are using various Contract Manufacturers at the same time, spreading production among a small number of large CMs. As a result, the top CMs are actually producing the majority of the well-known brand-name products.

The fact is that ICT OEMs all use the same CMs and many of the same component manufacturers. The end products, the computers, do not differ that much from one OEM to the next. Many of the components in different computers carrying different brand names will come from the same manufacturing site. The consumer who has the choice between an IBM computer, a HP computer, a Dell and many others might in reality only choose between the name on the computer, with the rest being the same.

Chapter 4

ICT OEMs and their supply chains

4.1 Introduction

What are the outsourcing strategies of the ICT OEMs? A company like Dell doesn't have manufacturing sites, but it does have final assembly sites; HP doesn't need to touch its PCs at all before selling them, IBM still has its own manufacturing sites although less and less, and Japanese companies have the highest percentages of in-house production but this is also declining.

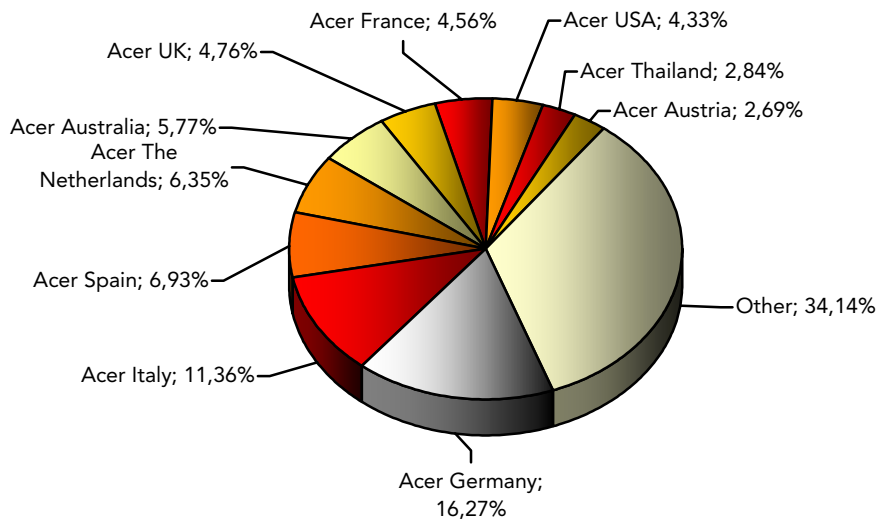
In this chapter, we will be using Acer and Fujitsu Siemens Computers as examples to explain two different outsourcing strategies. And we look at who are the Contract Manufacturers for the top PC vendors.

4.2 The supply chain of Acer⁵⁹

The Taiwanese company Acer has shifted from being a manufacturer into a pure brand company that markets and distributes its products, while leaving the actual production process in the hands of Contract Manufacturers. Its biggest market is the European market, its main product is notebook PCs.

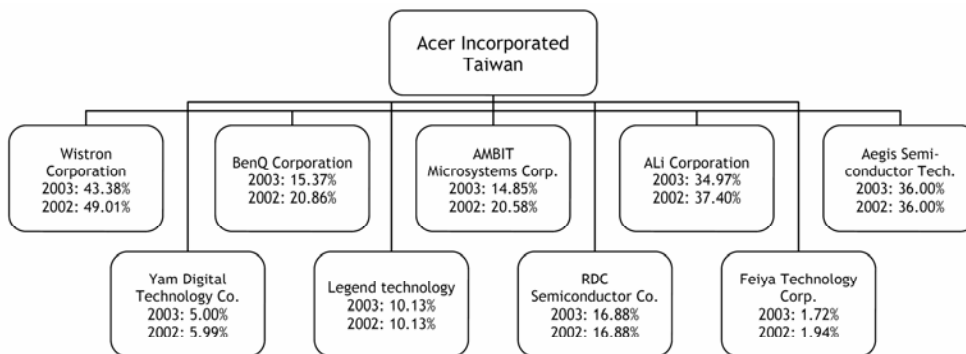
⁵⁹ The information on ACER is derived from the company report on ACER, written by SOMO, Bart Slob, July 2005, and partly based on cases studies in China and the Philippines.

→ **Percentage of total net sales (%)⁶⁰**



Acer's supply chain management strategy can perhaps best be characterised as a strategy of "vertical disintegration". In the recent past, Acer sold majority stakes in both subsidiaries Wistron and BenQ. These companies were main providers of manufacturing services in Acer's supply chains. By giving up control over these companies, Acer clearly demonstrated that it intended to "disintegrate" its supply chains and focus on branding and marketing.

→ **Acer and its Electronic Manufacturing Services (EMS) and Original Design Manufacturers (ODM)**



⁶⁰ Acer Incorporated, 2003 annual report (translation), <http://global.acer.com/about/investor/pdf/Y2003AnnualReportEnglish.pdf> (7 April 2005).

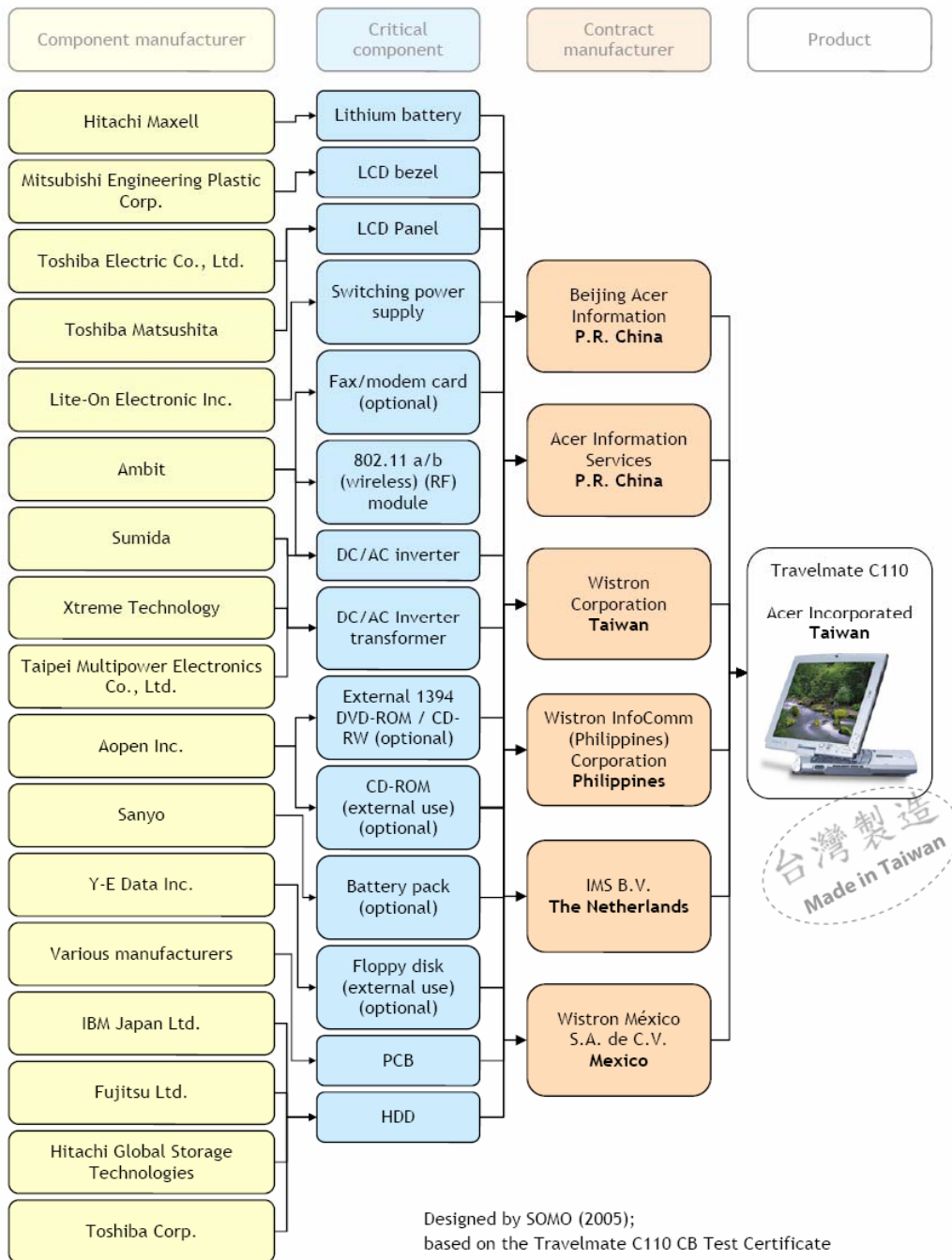
Acer sources components from many different component manufacturers, while assembly is carried out by a small group of selected Contract Manufacturers. In some cases, Acer (still) holds a considerable stake in these Contract Manufacturers, although it almost never owns these companies. The selected Contract Manufacturers are allowed to manufacture final products for Acer. It does not matter whether a desktop computer or notebook is assembled in China, the Philippines or in the Netherlands. In the end, all Acer products are sold as “made in Taiwan”.

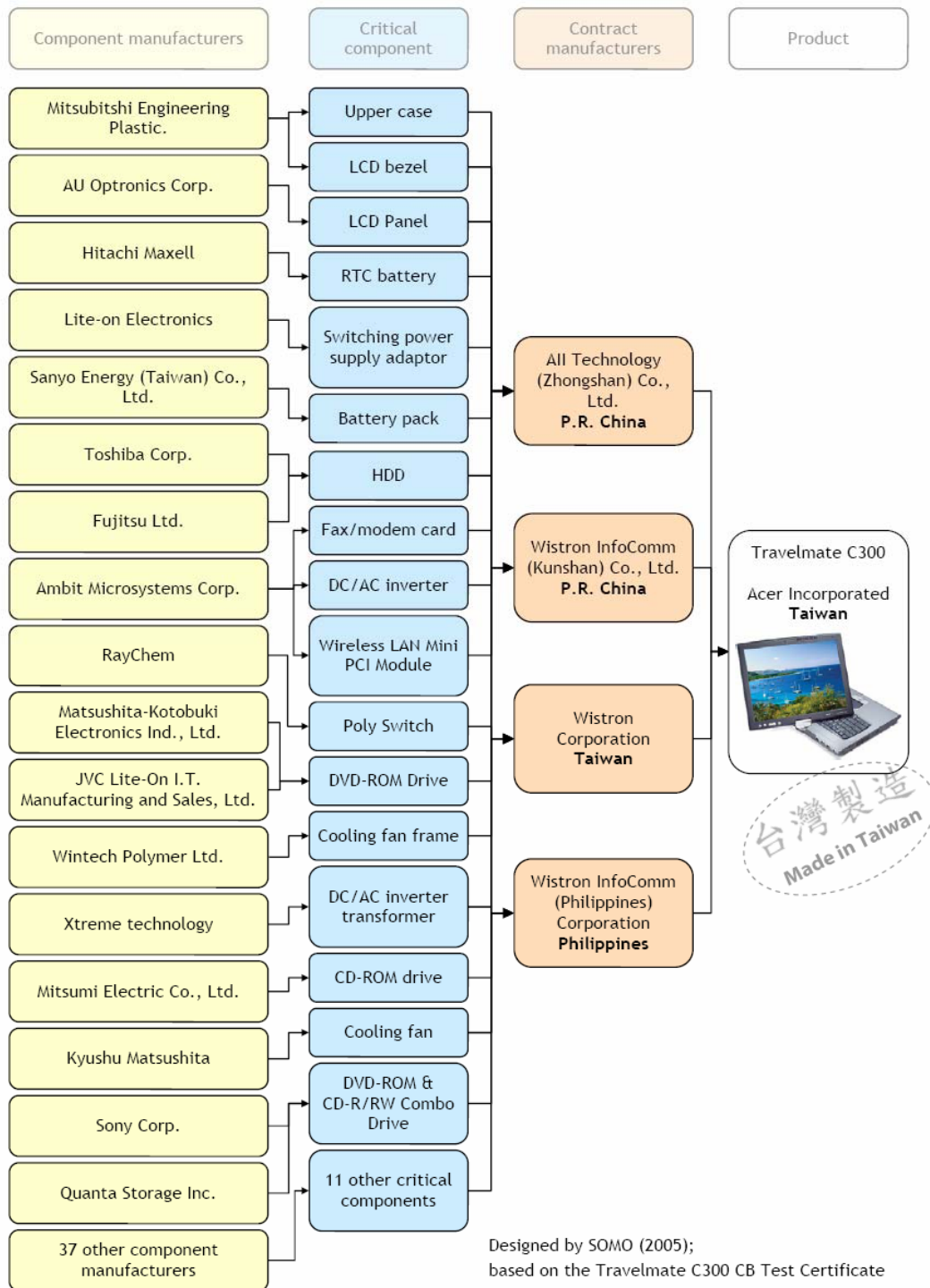
→ **The supply chain of Acer's Travelmate C110 and C300**

The following charts show the supply chains for two Acer notebooks: the **Travelmate C110** and the **Travelmate C300**. Of course these charts are a snapshot composed with detailed information from Acer's CB test certificates⁶¹. Each chart provides information on one particular notebook on a specific moment. Still it gives a good insight of the composition of a supply chain. The CB certificates of Acer's notebook computers reveal a complex web of suppliers. In most cases, one particular component can be provided by two or three different component manufacturers. A hard disk drive (HDD) for the Travelmate C300, for example, can be supplied by Toshiba or Fujitsu. This is necessary to guarantee continuous supply of critical components.

⁶¹ The IECEE CB Scheme is an international system for acceptance of test reports dealing with the safety of electrical and electronic products. It is a multilateral agreement among participating countries and certification organisations. A manufacturer utilising a CB test report issued by one of these organisations can obtain national certification in all other member countries of the CB Scheme. The Scheme is based on the use of international (IEC) Standards. If some members' national standards are not yet completely harmonised with IEC Standards, national differences are permitted if clearly declared to all other members. The CB Scheme utilises CB Test Certificates to attest that product samples have successfully passed the appropriate tests and are in compliance with the requirements of the relevant IEC Standard and with the declared national differences of various member countries. Report dates: Travelmate C110 (model MS2133) 21 Februari 2003, Travelmate C300 (model MS2140) 18 September 2003.

Critical Issues in the ICT hardware manufacturing sector





It is worth mentioning that Acer actually depends on the performance of some of its competitors in the IT market. Many critical components in Acer's supply chain for notebook computers are provided by its key competitors. Fujitsu, a company that also engages in the production of notebooks, supplies the hard disks for the Travelmate C300 and the Travelmate C110. For the same notebook, Sony provides the DVD-ROM. Sony also produces notebooks as an Original Equipment Manufacturer. Other key competitors for Acer Incorporated in the consumer electronics market are Toshiba, Hitachi, IBM and Matsushita. All these companies provide components for Acer notebooks. This situation may be described as a sort of "entrepreneurial endogamy", as companies have no alternative but to engage in commercial relationships with their industrial peers (competitors), rather than to integrate essential parts of their supply chains. Large multinationals such as Sony and Toshiba can not be labelled as pure original equipment manufacturers (OEMs), because they also provide services that are typical of component manufacturers or electronics manufacturing services (EMS) companies.

→ **The supply chain of Acer in the Philippines**

The next graphic shows the supply chain of Wistron in the Philippines. Wistron is one of the main Contract Manufacturers of Acer in which it still holds a 43.38 % ownerships stake.

The Philippine subsidiary, Wistron Infocomm (Philippines) Corporation (formerly Acer Information Products Philippines) is one of the biggest ICT firms in the country today, and was selected by SOMO for a case study on labour conditions (see also chapter 6).

Wistron Infocomm (Philippines) Corporation manufactures and distributes desktop and mobile computers, motherboards, and other computer parts and peripherals. It produces for the parent company Wistron Corp. of Taiwan, Acer International and other affiliates.⁶² It also contracts products for IBM of the United States and Hitachi of Japan⁶³; however, according to the company management⁶⁴ all its products are sent to the parent company that distributes it on to different clients.

The machinery and equipment are supplied solely by the parent company. Suppliers of its raw material requirements aside from the parent company are affiliates including: ⁶⁵

- AU Optronics Corporation,
- Acer Sertek Ltd.,
- Ambit Microsystems Inc.,
- Wistron Infocomm (Kunshan) Co. Ltd.,
- Acer International,
- Darfon Electronics Corp and others.
- AOPen Inc.,

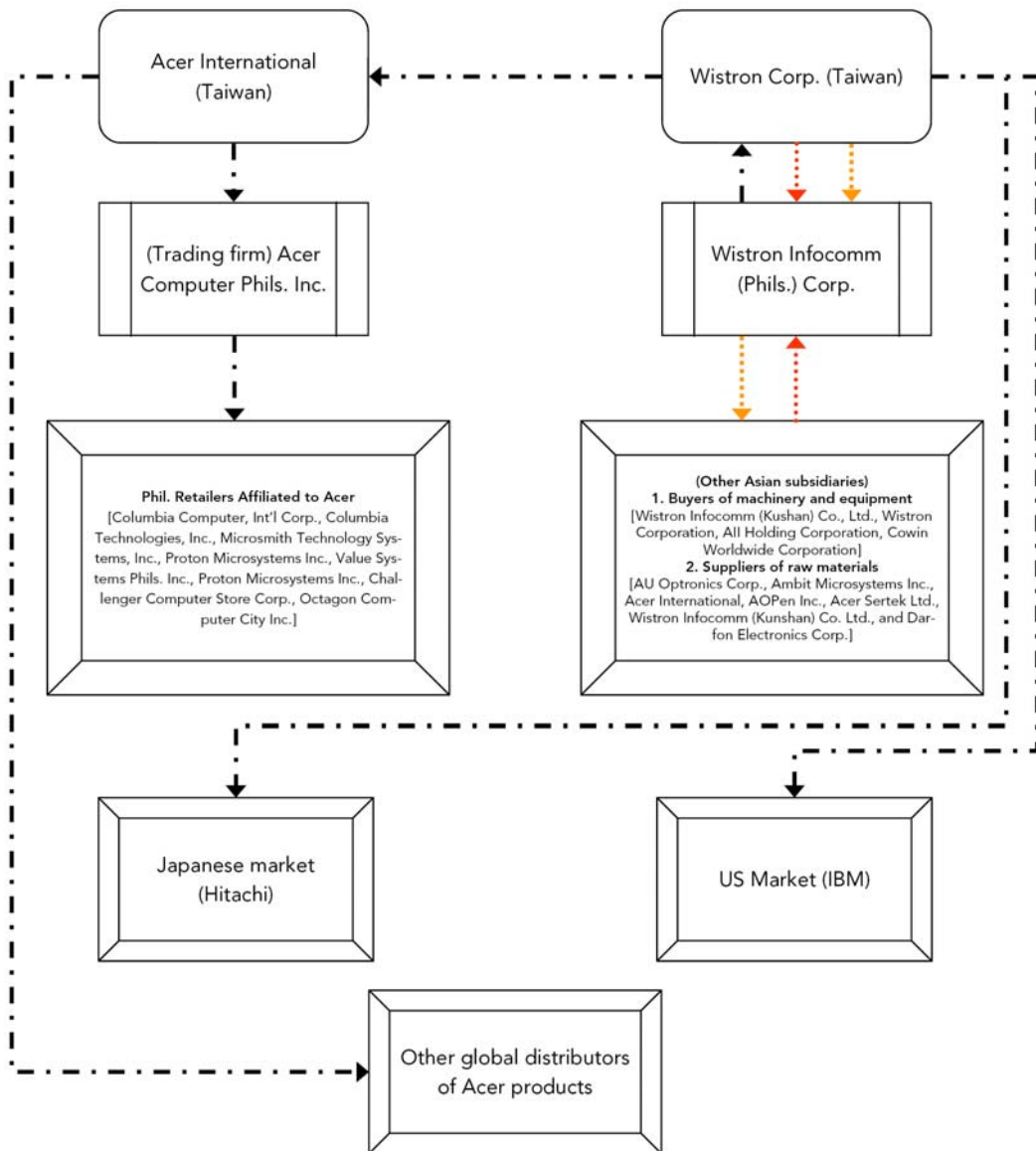
⁶² Ibid.

⁶³ Loc. cit. endnote 70.

⁶⁴ Based on an interview with Miss Beth Santos and Mildred Escobel (HRD head and Executive Assistant to the Manager of Wistron Infocomm (Phils.) Corporation.)

⁶⁵ Ibid.

Figure: Structure of the Wistron supply chain in the Philippines

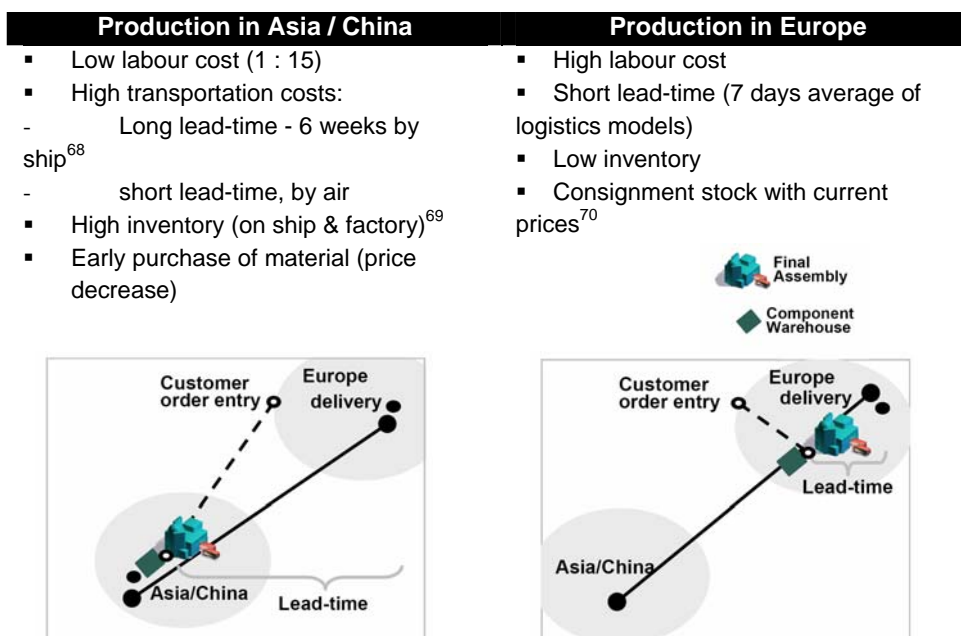


Legend:

- · - · → Flow of finished computer products
- → Flow of raw materials
- → Flow of equipment and machinery

4.3 The supply chain of Fujitsu Siemens Computers⁶⁶

Fujitsu Siemens Computers provides a complete portfolio of IT products including notebooks, peripherals, tablet PCs and workstations. The majority of the company's sales stem from Europe, with Germany alone accounting for about fifty percent of revenues. Fujitsu Siemens Computers B.V. is a private limited company registered in The Netherlands.⁶⁷ This holding company was founded in October 1999 as a joint venture of Fujitsu Limited (Japan) and Siemens AG (Germany), the company is jointly owned by its founders, both holding 50 percent ownership of the company. Most personal computers are produced in Asia, while some production still takes place in Europe. The considerations for the design of Fujitsu Siemens' supply chain for personal computers are the following:



⁶⁶ The information on Fujitsu Siemens Computers is derived from the company report on Fujitsu Siemens Computers, written by SOMO, Bart Slob, July 2005, and partly based on cases studies in China and the Philippines.

⁶⁷ A private limited company is a company with a small number of shareholders whose shares are not quoted on the stock exchange.

⁶⁸ Lead-time: In terms of a supply chain, lead-time is the total time needed for an order to be processed. Lead-time starts when the order is received by the sales department and ends when the client pays the invoice.

⁶⁹ Inventory: the monetary value of a company's raw materials, work in progress, supplies used in operations and finished goods. Excess inventory on a company's balance sheet could indicate a slowdown in sales and a lack of pricing power.

Taking into account these considerations, Fujitsu Siemens Computers argues that producing at a single location does not meet customer requirements. According to Fujitsu Siemens, the production of desktop and server products in Europe still offers cost advantages, due to the fact that transportation costs (air cargo) for these particular products are higher than manufacturing costs⁷¹. Therefore, the company applies a so-called “barebone strategy”. According to this strategy, the competitive advantages of Asian and European production plants are combined. The preproduction process is carried out in Asia (particularly China), while the final assembly takes place in plants close to European customers. By using the barebone strategy, Fujitsu Siemens Computers sets the prerequisites for a short lead-time to its customers and low inventory levels. The “barebone” share of Asia has increased considerably in the last five years. In 1999, only 20% of Fujitsu Siemens’ computers were produced in Asia. In 2005, 85% of Fujitsu Siemens’ production will take place in Asia.

→ **The supply chain of Fujitsu in the Philippines**

Fujitsu owns four subsidiaries in the Philippines; one of those is related to the ICT hardware sector⁷²: Fujitsu Computer Products Corporation manufactures magnetic hard disk drives. It is a top ICT firm in the country, ranked 5th in 2002.

Fujitsu Computer Products of the Philippines purchases raw materials, machinery, equipment and tools from its parent company and certain affiliated companies, and sells finished goods to them according to the company’s financial statements. Records of the Central Bank of the Philippines show that aside from the mother company, the affiliates to which it exports its commodities are located in Hong Kong, Singapore, Thailand, the US and Vietnam.⁷³ Fujitsu Siemens Computers is in turn purchasing components, through its Japanese parent company Fujitsu. It is safe to assume that the hard disk drives produced in the Philippines are used in the PCs of Fujitsu Siemens Computers, which are mainly sold on the European market.

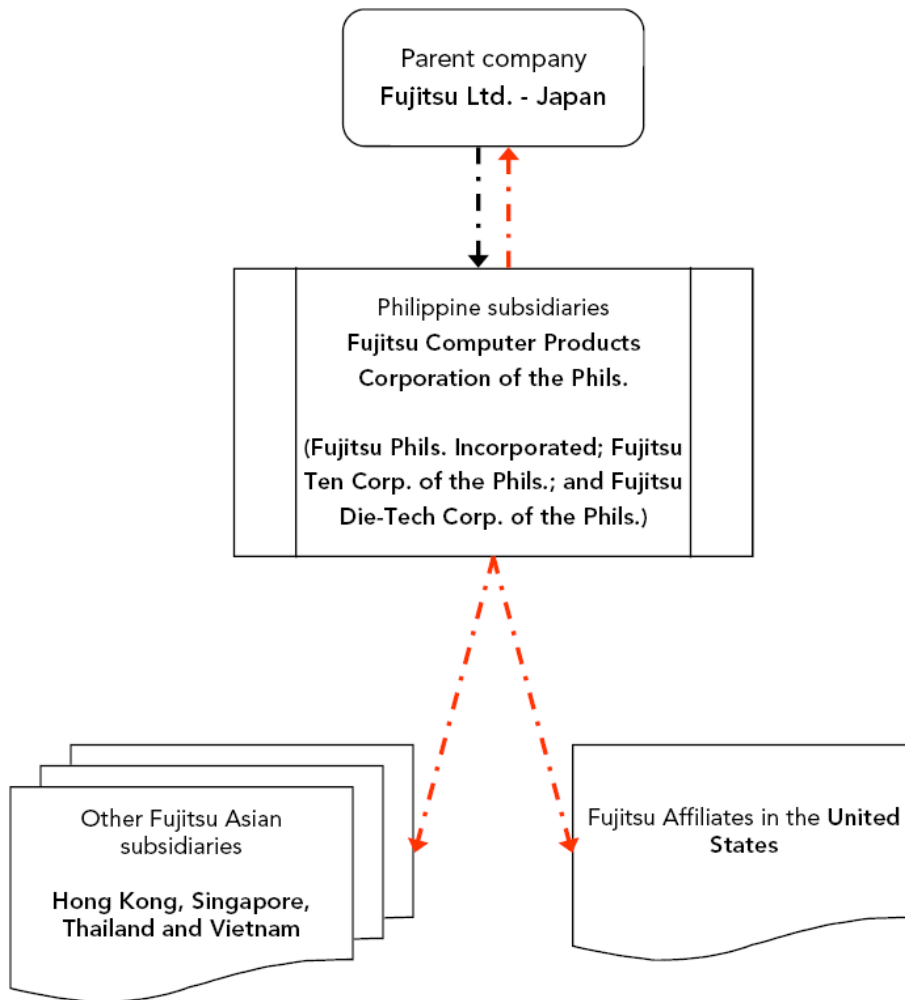
⁷⁰ Consignment stock by definition is a marketing arrangement whereby physical control of merchandise, but not title, is transferred from one business (the Consignor) to another (the Consignee). Title to the goods remains with the consignor until the goods are sold.

⁷¹ About 2,000 workers are still involved in the production of Fujitsu Siemens computers in Europe. Most of these workers are employed at the Fujitsu Siemens computer assembly plant in Augsburg, Germany. This plant employs between 1,000 and 1,300 people. Roughly 600 of these workers are permanently employed. All the other plants are staffed by temporary workers, who are called up by the management whenever necessary. Source: “Keeping it flexible”, Dialog Online, Magazine for International Advanced Training and Development, issue 3/2004, <
http://www.dialog.inwent.org/en/rub_20020220093742/artikel_20040914165536.html> (7 January 2005).

⁷² Two subsidiaries manufacture electronic commodities other than computer hardware.

⁷³ Bangko Sentral ng Pilipinas, International Operations Department, Directory of Philippine Exporters 2002.

Figure: Structure of the Fujitsu Supply Chain in the Philippines



Legend:

- . - . ► Flow of raw materials, machinery, tools and equipment

- . - . ► Flow of ICT finished products

→ **The 'barebone' strategy**

The term 'barebone' strategy has already been used in the context of the supply chain strategy of Fujitsu Siemens Computers. In this paragraph, we examine an example of the barebone strategy.

As already explained, the characteristic of the ODM is that they are responsible for the full product design, and they are the owners of the design. The ODM can sell its notebook to multiple ICT OEMs, who subsequently market the notebook under their own brand names. This results in the same notebook, produced on the same assembly line, being sold on the market under various brand names and at various prices. While it is not quite the same notebook which is bought eventually by the consumer, the so-called 'barebone' is the same. A barebone computer is a computer without a central processing unit (CPU), random-access memory (RAM), hard disk drive (HDD), and/or optional accessories such as W-LAN modules. ICT OEMs buy these barebone computers and have them (some do the final assembly themselves) filled to the desired specifications.

In Germany there is a case of a barebone computer (Model number MS2137) which is sold under 8 (!) different brands: Maxdata NB Pro 7000D X, Xeron Sonic Pro X155G, Wortmann Terra Aura 8100, Fujitsu-Siemens Amilo M7400, Issam Smartbook i8090C, and the Bullman C-Klasse 8 Cen.

Prices vary between €1,150 and €1,550.

Other examples of barebone computers sold under multiple brands:

It is interesting to note that:

- The **Dell Latitude** X300 is the same (barebone) computer as the **Samsung Q20** and the **Gateway 300**.
- The **Acer Travelmate** 291LCi is the same computer as the **Fujitsu-Siemens Amilo** D6830 and the **Gericom Hummer Advance**, made by the ODM Uniwill.
- The **Acer Aspire** 1200/1400 is the same computer as the **Hitachi Flora**270W, the **Dell Smartstep** 200N/250N and the **Fujitsu-Siemens Amilo** D7800/8800.⁷⁴
- Etcetera!

⁷⁴ Report: die Marken-Lüge, "Wer ihr notebook wirklich baut..", Magazine Chip (November 2004).

4.4 The Taiwanese ODMs producing for the top ICT OEMs

Table: Major ODMs and their OEM client mix, 2004 estimated

Notebook PC Brands	Compal	Quanta	Inventec	Arima	Wistron	Asustek
Toshiba	16%		19%			
HP	32%	25%	73%		7%	
Dell	37%	33%			20%	
IBM		4%			20%	
NEC		8%		25%		
Fujitsu Siemens Computers	2%				5%	
Sony		8%				25%
Acer	7%	9%			33%	
Apple	4%	6%				39%
Others	1%	7%	8%	75%	15%	36%
Total top 10 PC OEMs	6	8	2	1	5	2

(E)= Morgan Stanley Research estimates. Source: MIC, Morgan Stanley Research.⁷⁵

How to read this:

- **Compal's** major customer for notebooks is Dell, 37% of Compal's notebook production is for Dell. Compal has 6 customers for its notebook production. The category others is only 1%.
- This in contrast with **Arima**, Arima has only 1 customer which is a top 10 PC OEM (NEC).
- **Quanta** has the most diverse client mix, with 8 top 10 PC OEMs among its clients.
- The major customer of **Inventec** is HP, with 73% of its notebook production for HP.
- **Wistron** is not only producing for **Acer**, even though there is an ownership relationship between Acer and Wistron⁷⁶. And **Acer** is not exclusively outsourcing notebook production from its former production company Wistron, but also from competitors Compal and Quanta.
- The ODMs Compal and Wistron are supplying **Fujitsu Siemens Computers** according to this scheme.

⁷⁵ Investext © Thomson Financial Networks.

⁷⁶ Acer spun off its production company Wistron, but still owns 43.38% of the shares.

Table: Global top 10 Notebook PC Vendors and their Taiwan outsourcing partners, 2002 - 2004 Estimated

Brands	2002		2003		2004 Estimated	
	Supplier	%	Supplier	%	Supplier	%
Toshiba	Compal	26	Compal	26	Compal	27
	Inventec	4	Inventec	6	Inventec	9
HP	Inventec	21	Inventec	20	Inventec	19
	Arima	33	Arima	7	Arima	0
	Quanta	24	Quanta	57	Quanta	40
	Compal	13	Compal	12	Compal	35
					Wistron	4
Dell	Quanta	49	Quanta	45	Quanta	48
	Compal	41	Compal	44	Compal	42
	Wistron	9	Wistron	8	Wistron	10
IBM	Wistron	29	Wistron	16	Wistron	21
	Quanta	0.18	Quanta	5	Quanta	11
NEC	Quanta	19	Quanta	31	Quanta	52
	FIC	46	FIC	50	FIC	35
	Arima	21	Arima	10	Arima	11
Fujitsu Siemens	Quanta	12	Quanta	8	Quanta	0
	Compal	4	Compal	8	Compal	6
	Wistron	6	Wistron	12	Wistron	11
Sony	Quanta	12	Quanta	45	Quanta	51
	Asustek	21	Asustek	29	Asustek	30
Acer	Wistron	43	Wistron	38	Wistron	42
	Compal	35	Compal	27	Compal	20
	Quanta	22	Quanta	34	Quanta	38
Apple	Quanta	44	Quanta	19	Quanta	49
	ECS	56	ECS/Asustek	47	ECS/Asustek	46
			Compal	34%	Compal	5%

Source: Investext report number 7997372, page 19 of 29, April 21, 2004, Thomson Financial Networks

How to read this:

- Taiwanese ODMs producing for **Toshiba** are Compal (27% in 2004) and Inventec (9% in 2004).
- **HP** stopped outsourcing from Arima in 2004, although in 2002 33% of its notebooks purchased from Taiwanese ODMs were sourced from Arima. Arima lost a big client.
- The ODM partners of **Dell** are Quanta, Compal and Wistron, with Quanta as the biggest supplier.
- ODM partners of **IBM** are Wistron and Quanta.
- NEC is using Quanta, FIC and Arima to have its notebooks produced.
- In the first table only Compal and Wistron are mentioned, but according to this source, Quanta is also an outsourcing partner of **Fujitsu Siemens Computers**.
- **Sony** is making an increasing use of Quanta, in 2004 half of the notebook production went to Quanta.
- **Acer** is outsourcing almost an equal part from Wistron (42%) and Quanta (38%) in 2004, but Compal is also producing notebooks for Acer.
- **Apple's** outsourcing partners are Quanta, ECS/Asutec and a small part for Compal.

Chapter 5

Identification and description of the CSR issues

This chapter will be describing the CSR issues, in accordance with the CSR Frame of Reference, while also looking at sector specific issues. The frame of reference for Corporate Social responsibility has been developed by the Dutch 'CSR Platform', a coalition of Dutch civil society organisations actively promoting CSR⁷⁷.

5.1 The social issues⁷⁸

5.1.1 Introduction

Working conditions in the production facilities that produce or assembly computer parts are often appalling. Research carried out in the context of this project has revealed a picture of predominantly women workers working up to 72 hours a week, with compulsory overtime, insecure employment contracts, unsafe factories and workers not adequately protected when working with hazardous materials, wages below the subsistence level, suppression of union rights and degrading treatments. Conditions that up until a few years ago were more often associated with the garment industry. However, as several reports in the past few years have made clear, these conditions are also endemic in the ICT hardware sector, and are potentially worse because of the toxicity of some of the materials.

In December 2003, Cafod in the UK started a campaign aimed at improving working conditions in factories producing for major computer brands. The campaign – clean up your computer campaign – published a report⁷⁹ which detailed labour conditions in Mexico and China and was instrumental in getting the - until then - almost unchallenged companies to adopt a code of conduct and to set up a working group on monitoring its implementation (see chapter 7 for more information on the code).

⁷⁷ The CSR frame of reference can be found at <http://www.mvo-platform.nl/mvotekst/CSR%20frame%20of%20reference.pdf>.

⁷⁸ Unless otherwise stated the part on labour conditions in the ICT sector is based on the research carried out by the Philippines Resource Centre in the Philippines and the Hong Kong organisation Labour Action China, within the realm of this sector study on CSR issues in the ICT sector. The research done in the Philippines has been published in the following report: "Corporate Social Responsibility Behavior of Multinational Corporations in the Global Information and Communication Technology Supply Chain in the Philippines", which can be found on www.somo.nl.

⁷⁹ Cafod, "Clean up your computer. Working conditions in the electronics sector", (2004).

The globalisation of the ICT sector has led to a new division of the work, with most of the specialised, high value added production being carried out in more technologically advanced countries with the labour-intensive, low-skilled part of the production being carried out in developing countries⁸⁰. There are few benefits for these countries, with most of the profits going to the mostly foreign owners of the production facilities, and the end buyers.

This section of the sector report will look at conditions in the factories producing ICT products, based on research carried out in 2004 and 2005 by organisations in the Philippines and China, earlier research by Cafod and other organisations and interviews with workers in Guadalajara, Mexico.⁸¹

5.1.2 Labour rights

The International Labour Organisation (ILO), a tripartite organisation (employers, governments and workers' representatives) is the international organisation responsible for setting labour standards, which standards can be found in over 180 Conventions and more than 190 recommendations. None of the conventions are ratified by all governments, but the core labour standards should always be practiced, even when they are not ratified. Most trade unions and NGOs, when looking at the supply chain responsibility of companies, focus on the core labour standards - freedom of association, right to collective bargaining, no discrimination of any kind, no forced or slave labour, a minimum employment age - and several other generally accepted labour standards - health and safety measures, a maximum working week of 48 hours and voluntary overtime of 12 hours maximum, a right to a living wage and the establishment of an employment relationship.

Research carried out on labour conditions in the ICT hardware sector in recent years has, in general, focussed on these rights, as did the research conducted for SOMO by the Philippine Resource Centre and Labour Action China into the ICT sector in the Philippines and China.

5.1.3 Export Processing Zones

As is common in the garment industry, ICT hardware production is often located in Export Processing Zones (EPZs), for which the ICFTU estimated an employment of just under 42 million people in 2004. EPZs are defined by the ILO as industrial zones that are set up with special incentives to attract foreign investors, where imported materials are processed before re-exporting.⁸² The economic benefits of EPZs to the economy of a country are limited, due to the nature of the production being mostly low-tech and low skilled with limited transfer of technologies and skills, with the benefits of foreign exchange earnings sometimes not even covering the countries' investment in the zone and infrastructure and the incentives given by the government to the investors, with short-term

⁸⁰ Cafod, "Clean up your computer. Working conditions in the electronics sector" (2004).

⁸¹ Interview with workers in Guadalajara at 17 April 2005.

⁸² International Confederation of Free Trade Union (ICFTU), "Behind the brand names, Working conditions and labour rights in export processing zones" (December 2004).

investment, with most of the materials needed imported and inadequate social and environmental safeguards against pollution and labour rights abuses⁸³.

In the research carried out in the Philippines by the Philippine Resource Centre, the researchers found that the low labour costs and the incentives that were offered by the Philippine government paved the way for the massive influx of Multinational Companies, among others in the ICT hardware sector. The electronics sector, which includes the ICT hardware sector, grew rapidly in the 90s, and by the end of the decade it was employing more workers than the garment and textile sector, which had been the number one industry up to that point. In the Philippines, the companies in the EPZs are granted priority in the appropriation of foreign exchange, duty-free importation of raw materials and tax credits on imported capital machinery. The companies that operate inside the zones are exempted from import duties and national taxes on imported raw materials and capital equipment. Furthermore, the companies are given incentives such as tax holidays, additional reduction for labour costs, simplified customs procedures and reduced costs for electricity.

5.1.4 Unionisation in the sector

The ICT hardware sector is notorious for the lack of unions in its worldwide factories. Historically its manufacturing was already concentrated in traditionally non-union areas such as Silicon Valley, the US South, Scotland and Wales⁸⁴. In the Asian ICT industry, many countries have either banned unions in export processing zones, or the unions have very limited access. Workers who try to organise often face severe oppression and often lack support at the national and international level.

In the Philippines, the EPZs are normally fenced in and tightly guarded by armed men, which makes organising workers a very difficult task. As an example, one of the researched companies, Wistron Infocomm Philippines Corporation, can be found in the Subic Bay Freeport Zone, a former Subic Naval Base, former home of the US 7th fleet. The workers employed in the factories in the zone usually come from far away and can only be contacted at the gate of the zone by the unions when workers are in a hurry to go home.

Labour laws are not properly enforced in EPZs, and as described for the Philippines this “combined with many legal restrictions deprives most workers of their trade union rights”.⁸⁵ Although the government states that workers have the right to organise in the zones and that there are severe penalties for companies not adhering to that rule, in practice this is not the situation and workers are actively discouraged from organising.

⁸³ International Confederation of Free Trade Union (ICFTU), “Behind the brand names, Working conditions and labour rights in export processing zones” (December 2004).

⁸⁴ Boy Lütthje, “The IT industry: labour flexibility, production networks and the global downturn”, Asian labour Update, no.45 (October-December 2002).

⁸⁵ International Confederation of Free Trade Union (ICFTU), “Behind the brand names, Working conditions and labour rights in export processing zones” (December 2004).

5.1.5 *Specific issues*

As has been referred to above, most research into labour conditions in the ICT sector have concentrated on the 8 labour rights, which are specified in most model codes of conducts. Companies are asked to make sure that their production will adhere to these norms.

ICFTU base code

□ Employment is freely chosen

There shall be no use of forced, including bonded or involuntary prison, labour (ILO Conventions 29 and 105). Nor shall workers be required to lodge "deposits" or their identity papers with their employer.

□ There is no discrimination in employment

Equality of opportunity and treatment regardless of race, colour, sex, religion, political opinion, nationality, social origin or other distinguishing characteristics shall be provided (ILO Conventions 100 and 111).

□ Child labour is not used

There shall be no use of child labour. Only workers above the age of 15 years or above the compulsory school-leaving age, whichever is higher, shall be engaged (ILO Convention 138). Adequate transitional economic assistance and appropriate educational opportunities shall be provided to any replaced child workers.

□ Freedom of association and the right to collective bargaining are respected

The right of all workers to form and join trade unions and to bargain collectively shall be recognised (ILO Conventions 87 and 98). Workers representatives shall not be the subject of discrimination and shall have access to all workplaces necessary to enable them to carry out their representation functions. (ILO Convention 135 and Recommendation 143)

Employers shall adopt a positive approach towards the activities of trade unions and an open attitude towards their organisational activities.

□ Living wages are paid

Wages and benefits paid for a standard working week shall meet at least legal or industry minimum standards and always be sufficient to meet basic needs of workers and their families and to provide some discretionary income.

Deductions from wages for disciplinary measures shall not be permitted nor shall any deductions from wages not provided for by national law be permitted without the expressed permission of the worker concerned. All workers shall be provided written and understandable information about the conditions in respect of wages before they enter employment and of the particulars of their wages for the pay period concerned each time that they are paid.

❑ **Hours of work are not excessive**

Hours of work shall comply with applicable laws and industry standards. In any event, workers shall not on a regular basis be required to work in excess of 48 hours per week and shall be provided with at least one day off for every 7 day period. Overtime shall be voluntary, shall not exceed 12 hours per week, shall not be demanded on a regular basis and shall always be compensated at a premium rate.

❑ **Working conditions are decent**

A safe and hygienic working environment shall be provided, and best occupational health and safety practice shall be promoted, bearing in mind the prevailing knowledge of the industry and of any specific hazards. Physical abuse, threats of physical abuse, unusual punishments or discipline, sexual and other harassment, and intimidation by the employer is strictly prohibited.

❑ **The employment relationship is established**

Obligations to employees under labour or social security laws and regulations arising from the regular employment relationship shall not be avoided through the use of labour-only contracting arrangements, or through apprenticeship schemes where there is no real intent to impart skills or provide regular employment. Younger workers shall be provided the opportunity to participate in education and training programmes.

Studies carried out by the Philippine Resource Center, China Labour Action and others have revealed the following labour rights violations.

➔ **Employment relationship and job security**

Job security in the ICT manufacturing sector is increasingly under attack with a growing number of workers being employed on short-term contracts, sometimes being dismissed before their contracts convert into long-term arrangements. As a result, workers feel that their precarious employment position is hampering their ability to speak out about their labour conditions, engage in activities to protest against these conditions and/or join trade unions.

In Mexico, the workers are increasingly employed on short-term contracts and hired through employment agencies. Some of them continue working for years on short-term contracts. Workers live in constant fear of dismissal⁸⁶. One worker in Guadalajara tells in an interview that she was dismissed after one year of work, as the employer did not want to give her a long-term contract. This is normal practice⁸⁷. Workers in the Philippines identified as one of the largest problems they encounter the practice of hiring workers on short term contracts, whereby the workers are not entitled to benefits such as the 13th month pay, etc.. This practice has been on the increase during the past year.

⁸⁶ Cafod, "Clean up your computer. Working conditions in the electronics sector" (2004)

⁸⁷ Interview with workers in Guadalajara at 17 April 2005.

In the Philippines, many workers work on a contractual basis, so that they can be easily dismissed when the production is slower and without getting certain benefits. Sometimes they work for a much longer time on short term contracts than is legally permitted (6 months).

In the Philippines, workers are laid off when the demand for the products is low. Mergers and partnerships between companies also cause workers to feel unstable in their employment as they never know if they will be next. For example, in 2002 and 2003 Fujitsu Computer Products of the Philippines dismissed 1700 and 1293 workers in a reorganisation. Many of these workers accepted a financial package for voluntarily dismissal. Many of those who accepted could not find another job afterwards. In the next wave of dismissals, therefore, a number of the workers did not accept voluntary dismissal. Those who resisted were then dismissed - the employer used tactics such as dredging up old records that showed that they had been late on several occasions, being below or above a certain age when they applied, exceeding sick leave etc. Although these "faults" were in the past, the company used them to dismiss workers when it suited them, without severance pay. Workers are now afraid to refuse overtime and are afraid that they can be dismissed if they make mistakes. At the time of the study, the company announced the transfer of workers to another company which caused a lot of anxiety among the workforce. At the same time, Fujitsu Computer Products of the Philippines is hiring new workers, with the emphasis on hiring younger workers.

→ **Difficulties resigning**

In China workers, at one of the factories studied are complaining about having difficulties resigning. The company has relatively high mobility and the management does not approve resignation in the peak season, although the labour law requires only a one-month advance notice. Workers usually sacrifice their back pay if they want to quit without approval.

→ **Discrimination in employment**

In Mexico, "troublemakers" are weeded out by the employment agencies by means of discriminatory and humiliating practices. For example, through psychological interviews in which reasons for rejecting applicants included homosexuality, more than two tattoos, conflictive personality and that the applicant's father was a lawyer. Or through a socio-economic interview which looks into the lives of the applicants, for example interviewing the applicants' neighbours to find out whether they have a brother who is a drug addict or union inspector.

→ **Sex Discrimination**

Systematic pregnancy-based discrimination occurs in Mexico's free trade zones, both post-hire and in the hiring process⁸⁸. In export processing zones, or maquiladoras as they are called in Mexico, companies, including ICT hardware companies, are forcing women workers to undergo pregnancy testing⁸⁹ as a condition of employment. Potential female

⁸⁸ Documented by Human Rights Watch in August 1996 and December 1998, and by Cereal in 2005.

⁸⁹ Pregnancy discrimination can take many forms. Some common practices include:

employees are compelled to take urine tests and answer invasive questions on applications and interviews about their pregnancy status, sexual activity, use of birth control, and menstrual cycles. Those who are pregnant are not hired. Those who become pregnant once they have been hired are sometimes forced to resign, or are subjected to abusive and discriminatory treatment.

In January 1998, the U.S. National Administrative Office also concluded that the practice was widespread. And the U.N. Committee on Economic, Social and Cultural Rights (CESCR) stated in 1999 that it was “deeply concerned about the situation of women workers in the maquiladoras, some of whom are subjected to pregnancy tests upon recruitment and at intervals during work, and are dismissed if found to be pregnant.”⁹⁰ Recent studies have indicated that these practices are still common.⁹¹

→ **Freedom of association and the right to collective bargaining**

In the whole global ICT sector, we find almost no trade unions in the production facilities, which is effectively hampering the ability of workers to improve their own conditions. Workers are discouraged from joining unions, afraid that if they join unions they might be victimised and effectively dismissed for speaking out for workers rights, joining or setting up trade unions.

In the Philippines, unions are almost non-existent in the EPZs. As has been mentioned above, officials are actively keeping unions away from the EPZs. In one of the companies studied, the Fujitsu Computer Products of the Philippines, contractual workers were told that anyone who joined a trade union or attempted to form one would have their contract terminated. Union organisers in the Philippines were told by officials from Wistron Infocomm Philippines Corporation to desist from further organising activities.

In Mexico, workers are mentioning that those that are active for the rights of workers are dismissed and blacklisted, which makes it impossible for them to find employment.⁹²

-
- The obligation to submit to a pregnancy test in the form of providing a doctor or nurse with a urine sample, or submitting to a physical exam that includes a pregnancy test as a condition of employment.
 - The obligation during the interview process to answer questions about your menstrual cycle, use of contraception, or whether you are sexually active. When you apply for work, human resources or personnel managers warn you that if you are pregnant you would not be hired.
 - The obligation to answer questions on an application form about whether you are pregnant.
 - A boss or supervisor at work tells you that you may be demoted or fired if you become pregnant.
 - The obligation to sign a letter or a contract promising to resign if you become pregnant, when you were first hired.
 - Plant supervisors oblige you to work overtime, do more physically dangerous or demanding work, or verbally assault, upbraid, or harass you for being pregnant.
 - Your employer forces you to resign, lowers your pay or changes your position, or tells you the terms and conditions of your employment will change for the worse if you become pregnant.

Source: website Human rights Watch <<http://hrw.org/campaigns/wrp-mexico/ans3.html>>.

⁹⁰ <<http://hrw.org/english/docs/2005/02/09/mexico10156.htm>>.

⁹¹ Cafod, “Clean up your computer. Working conditions in the electronics sector” (2004) and interviews with workers in Guadalajara in April 2005.

⁹² Interview with workers in Guadelajara at 17 April 2005.

In Thailand organisations started a campaign to get 10 workers back to work after they had been dismissed for trade union activities. According to Ms Panga Turata: "Coming from a very poor rural family, I sought employment in Volex to subsidise family income. I felt good earning an income at Volex and contributed to the productivity of Volex. For the last 5 years. However now after we formed the Union to protect our rights as women workers, things started to happen". "I was dismissed under other pretexts, for the fact just for distributing Union pamphlet, which is the right of the Union".⁹³

Obviously in China, as there is only one, state-controlled, union, it will be very hard for workers to assert their rights through a representative organisation. Workers are generally not aware of their rights. This is no reason for the industry not to take efforts, however. In the garment and footwear industries, in particular, there have been increasing efforts made to more innovative strategies to address abuses which includes educating workers about their rights under Chinese labour law and seeking to protect the rights of labour activists.

→ Living wages

In the Philippines, as in some of the factories in China⁹⁴ the wages in the electronics sector are relatively high, compared to other manufacturing sectors. In the Philippines for example the average wage in the industry is higher than the average for the whole manufacturing sector. Having said that, the wages are still far from reaching the level of a living wage. In 2002 for example, the Food and Nutrition Research Institute calculated that at least PHP 434 (8.51 US dollars) per day was needed to feed a Filipino family. Looking at the wages in 2004, the amount paid to the highest paid workers, according to the research, was still 175 PhP short of this amount prescribed for food alone! The study therefore concluded that decent housing, health services, clothing, education, recreation, are "impossible dreams" for workers in the electronics sector.

In Mexico, workers earn between 50 and 100 US\$ per week in the larger factories, sometimes below this amount. Only with a lot of overtime can they reach about 100 US\$. As a basic healthy food basket costs about 75 US\$ for a family of 4, it is clear that the wage, even with overtime, falls a long way short of covering the food, let alone rent, transport, clothing, education, etc.⁹⁵

A worker at the Fujitsu factory in the Philippines tells researchers how, after the birth of her first child, her husband had to sell his tricycle, which he used to earn some money, as they were desperate for money at that time. As her husband no longer had the means to earn money, the family, with two children, was slowly drawn into debt. They live mostly on bread, rice, instant noodles and canned or dried fish and only eat better food with meat, fish and vegetables for 4 days a month.

⁹³ Volex campaign by Tie-Asia, <<http://www.tieasia.org/Documents/Volex%20Campaign%20amended%20version%20First.pdf>> (15 June 2005).

⁹⁴ SOMO, "2nd ICT Round Table, Strategies for Campaigning", June 2005 (internal report).

⁹⁵ Cafod, "Clean up your computer. Working conditions in the electronics sector", 2004.

In China, one of the factories studied does not pay the minimum wage. In three factories, the basic wage is below the minimum wage with performance-related incentives, such as attendance and performance bonuses, topping up the wage. In the other three factories at least the minimum wage, 480 RMB per month, is usually paid for the normal working hours. If there are no work orders, however, or when workers are waiting for materials and parts supply in two of these factories producing for Acer, workers' monthly income would be deducted on an hourly and daily basis. Also, one of the factories does not pay the minimum wage in the low season, when orders are low, so workers earn as little as 200-300 RMB per month in this factory supplying semi-finished plastic Acer products, among other things. In the other factories they will only just reach the minimum wage. Factories generally have a very low basic wage and use incentives to push up the productivity. In the high season, with a lot of overtime, workers can make about 900-1000 RMB or even sometimes 1600 RMB.

Workers in a factory in China producing for Nokia, Siemens and others have to pay fines ranging from 50 RMB upwards for violations of factory rules or quality requirements.

→ Hours of work

The workforces in all countries are expected to be flexible and to work when production is needed. In a highly globalised industry, the companies offer consumers a customised product in as little time as possible. Suppliers are expected to react to changing demands on a day-by-day basis. As a consequence the workforce in these factories is expected to be as flexible as needed.

In the Philippines, labour law article 84 states that "the normal hours of any employee shall not exceed eight hours a day". Article 89 allows for employers to require employees to work overtime in emergency cases. The key phrase is of course 'emergency cases', which gives factories a licence to impose mandatory overtime when needed under the pretext of an emergency. In many factories in the Philippines there is a mandatory 4 hours overtime, which means that most of the workers are effectively working 12 hours per day, 6 days a week, and are sometimes requested to work for 6 to 8 hours on their days off. This is clearly violating the law, as the overtime is normal and cannot be attributed to an emergency case. Workers at Fujitsu Computer Products of the Philippines told researchers that managers force them to sign papers stating that they volunteer to work overtime. Workers can refuse to do overtime on their free day if they have worked overtime during their day off in the previous week, or if they have a valid reason, such as a sick family member. At Wistron Infocomm Philippines Corporation, also, at least 30% of the workers are working 12 hours per day, 6 days a week. No overtime rate is paid, as in most factories.

In China, during the peak season the factories very seldom give workers a day off. Workers make long days, often 7 days a week. Workers in one of the factories producing for Acer, Philips, HP, Dell, Apple, Sony, Nokia and Lenovo told the researchers that they have no day off at all for months on end, and even have to work on statutory holidays during the peak season. They are given time off only when there is an electricity shortage or when they are waiting for materials and parts supply. Some of the other factories producing for Acer give at least 2 or 3 days off per month, while in another factory workers have to work roughly 60-100 overtime hours a month. Workers in the colour coating

department work on 2 shifts of 10 hours a day, while assembly line workers work 8-12 hours a day and sometimes overnight in the peak season. In other factories, producing for Fujitsu, Dell, IBM, Siemens, Nokia and others, workers work days of 10-13 hours in peak seasons, without a day's rest. In a factory producing for Fujitsu, Dell, IBM and others, if workers do not make the quota during the normal hours, they are not paid for the extra hours.

→ **Labour flexibility in Europe**

At some European production sites, Fujitsu Siemens Computers implements flexible work arrangements. The production site is organised along the lines of the "breathing factory" principle, i.e. the output is flexibly adapted to meet demand. This means that employees don't know when they will return home in the evening. It is also never clear whether the family outing at the weekend can go ahead. Each morning, the management decides whether working shifts will last seven, eight or nine hours. Should the orders received change during the day, then the working hours are adapted accordingly. At mid-week, the workers are informed whether they need to be at the assembly line on Saturday as well⁹⁶.

5.1.6 Health and safety issues

As described before, electronic products are a complex mixture of several hundreds or thousands of components, many of which contain heavy metals and hazardous chemicals. Working with these dangerous chemicals puts workers at risk at the production phase. A study conducted in 1994 already showed that an electronics worker's exposure to toxics is higher than in the chemical industry, than even in pesticide manufacturing.⁹⁷ Information uncovered during SOMO's research shows that workers are still at risk and are enduring health problems.

The working conditions in factories in China are often dangerous, working with hazardous and toxic materials without appropriate protection or health and safety measures, nor training on how to handle materials and situations⁹⁸. In the studied factories in China, there is no regular and specific physical check-up for occupational diseases. Workers in Guadalajara, Mexico, mention receiving safety training, but these courses are not sufficient and are not repeated after certain periods of time. Most workers are not up to date with the safety regulations and measures. In some cases, the safety measures would slow down production. As the workers have to meet their targets, they do not employ the measures.⁹⁹ As workers have to work such long days, with some workers standing the whole time, workers are extremely tired and complain about related illnesses, such as headaches and dizziness.

Exposure to chemical dust and welding smoke is a common problem for assembly workers in the researched factories in China. Workers in one of the factories producing for Acer have to put a chemical coating on the CPU board before automatic assembly. Ventilation is not good enough in this section and as a consequence the workers suffer from skin allergies and respiratory problems. The noise of the automatic assembly

⁹⁶ SOMO, "Fujitsu Siemens Computers Company Profile" (2005).

⁹⁷ LaDou, 1994., data used from the Bureau of Labour Statistics of the U.S. website SVTC.

⁹⁸ Cafod, "Clean up your computer. Working conditions in the electronics sector" (2004).

⁹⁹ Interview with workers in Guadalajara at 17 April 2005.

machines is also a major problem here and workers do not receive adequate protection. In one of the factories producing for Siemens and Nokia, among others, the workers are using solvents to clean the circuit boards. Although the factory provides them with nylon gloves, the long exposure time, the lack of education on Health and Safety as well as the enormous work pressure leads to the gloves not being adequate and problems as skin allergies and eye irritation.

In another factory in China, producing for Acer among others, the workers are exposed to chemicals in the colour coating department; workers complain about feeling dizzy, weak, experiencing loss of appetite and feeling nauseous after working 10 hours a day. Other workers in the trimming department are also exposed to chemicals. Their work is to flatten the plastic boards with heat pressure and they are exposed to chemicals in this process. They report similar problems as feeling dizzy and having skin allergies.

The electronics sector requires a high level of quality control, and this becomes one major factor adversely affecting the occupational health and industrial relations at the workplace. Workers from the factories studied in China admit to feeling pressured at work, due to stringent quality control. They receive severe criticism from the middle management when defects are found in production. Workers from one of the factories mention that there are penalties if they fail to follow the rules at work, or in the dormitory, and also if they fail to meet the quality requirements. Their productivity bonuses are deducted. Workers in three of the factories, producing for Acer, Philips, HP, Dell, Apple, Sony, Nokia and Lenovo, are not allowed to talk or leave without authorisation from the workplace.

In a factory of Sanmina SCI, the Tlajomulco de Zuniga plant, an accident occurred in the plant which caused poisonous fumes, endangering the health of the workers, leading to miscarriages in pregnant women and many of the workers experiencing problems with their health afterwards.

In the Philippines workers, report having chronic colds, back pains, nausea, fever and very long menstrual periods with heavy bleeding. The workers in Fujitsu Computer Products of the Philippines estimate that about 5% of the workers are suffering from tuberculosis.

In another plant in Mexico, a worker interviewed told about the production for IBM, where workers have to be standing all day in the production line, lifting 40 kg a time, including any workers who are pregnant.¹⁰⁰

5.2 Human rights

5.2.1 Introduction

Corporations have an obligation to observe, respect and promote human rights. This responsibility is set out in the preamble to the Universal Declaration of Human Rights (UDHR). Consequently, corporations should investigate how human rights might be

¹⁰⁰ Interview with workers in Guadalajara at 17 April 2005.

affected by the various types of business operations in a given country before launching business activities there, as well as during the operations. Issues such as labour and environmental rights are part of this, as well as community issues, for example the implications of environmental damage for the communities around the production and waste disposal sites, and the effect on agriculture of increased water use by the ICT hardware sector.

There is often no sufficient buffer between the factory and the residential area. In the US there is the requirement of a 1000-foot buffer between industrial and residential areas. In Taiwan, for example, this does not exist and people live only a few feet away from the high-tech plants in the Hsinchu Industrial park (the fenceline communities). People complain about air, water and noise pollution.¹⁰¹

5.2.2 Doing business in conflict zones.

If we look at the ICT hardware sector specifically, some of the relevant conflict zones are Burma, DRC Congo and Sudan.

→ Burma

Burma, which has been ruled by a military dictatorship for several decades, is one of the worst human and trade union rights offenders in the world. The ruling military regime in Burma has been condemned by the United Nations Commission on Human Rights, the Asian Institute for Democracy, Amnesty International, Asia Watch and the European Community, among others. Torture, murder, rape and other abuses by the SLORC military are widespread. Ethnic minorities are frequently subjected to forced labour. There is no freedom of association and no democracy. The international trade union movement believes that it is impossible to conduct any trade or engage in other economic activity with Burma without providing direct or indirect support, mostly financial, to the military junta. Since 1994, the opposition in Burma appealed for a worldwide economic boycott of Burma, resulting in a pullout by most of the multinational companies investing in Burma. ICT OEMs still active in Burma are Acer Inc., Hitachi, LG Electronics, and Siemens¹⁰².

→ Investments in Sudan

Attention has recently been focused on Sudan. For example, the divestment campaign Divest Sudan has been arguing for a suspension of all commercial and economic projects and investments in northern Sudan, pending a halt to the genocide in Darfur and completion of a north/south peace agreement. It is their view that no company, regardless of the scale of its operations, should be willing to do business with Khartoum until the killings are stopped¹⁰³.

¹⁰¹ Taiwans pollution report 2001, From Silicon Valley to Green Silicon Island: Taiwan's pollution and promises in the era of High-tech globalisation. A report describing the environmental exchange in Taiwan in March 2001, by SVTC, ICRT and TEAN, Leslie Byster and Ted Smith.

¹⁰² Source: <http://www.global-unions.org/burma/default3.aps>. This database had been compiled by the ICFTU, based on publicly available information.

¹⁰³ <http://www.divestsudan.org/>

Plenty of big European blue chips that are mainstays of global portfolios, such as Germany's Siemens and Alcatel of France, have ties with Sudan. A Siemens spokesman says that the company has a "very limited business, mainly focused on infrastructure and medical products." Some U.S. investors disapprove of companies' presence in Sudan. In October 2004, Edward Smith, chairman of the Illinois investment board, sent letters to top officials at Siemens warning of growing pressure from U.S. investors. If there is no change in its commercial support for Sudan, Smith warned, "investors will be under continued pressure to reconsider their relationship with Siemens."¹⁰⁴

→ **The issue of Coltan originating from DRC Congo**

Coltan -- short for colombo-tantalite -- is refined into tantalum, a "magic powder" essential to many electronic devices. The Democratic Republic of Congo is one of the main African suppliers of tantalum raw materials, but other supplier countries are Ethiopia, Nigeria, Zimbabwe, Mozambique, Namibia, South Africa and Egypt. An important part of the world's supplies of tantalum comes from Australia. Tantalum minerals are also mined in Canada, Brazil and China. Tantalum is also produced in Thailand and Malaysia as a by-product of tin mining and smelting.

Tantalum oxide is an essential element in the production of products such as Camera lenses, X-ray film and Inkjet printers. Tantalum powder is used for Tantalum capacitors for electronic circuits in laptop computers, cellular phones, Playstations, video cameras, digital still cameras, mobile phones and desktop computers¹⁰⁵.

The Congolese war caused the death of millions of people, a war defined by some as a war about coltan. A May 2002 report from the United Nations Security Council said the huge coltan profits are fuelling the war and allowing "a large number" of government officials, rebels and foreigners "to amass as much wealth as possible." Reports of rampant human-rights abuses pour out of the rebel-controlled mining region. Local men, women and children are forced into mining, fighting and sex work, threatened with torture, rape and murder.

Tantalum traders claim it is impossible to accurately trace the source of coltan. In the opinion of European NGO's¹⁰⁶, leading ICT hardware corporations should immediately refrain from using components containing tantalum originating from DRC Congo. Concern over the Congolese war has prompted some industry players to claim they are now more diligent about where their coltan comes from.¹⁰⁷

¹⁰⁴ A. Borrus, "Hitting Sudan In The Pocketbook", BusinessWeek Online, 2 May 2005.

¹⁰⁵ Website of the Tantalum-Niobium International Study Center <<http://www.tanb.org/coltan.html>>.

¹⁰⁶ A coalition of 30 European development NGOs, most of them from the Concertation Chretienne pour l'Afrique centrale/Great Lakes Advocacy Network and the Reseau Europeen Congo, in 2002.

¹⁰⁷ <<http://www.seeingisbelieving.ca/cell/kinshasa/>> The campaign Seeing is believing is financial supported by the Government of Canada through the Human Rights Program, a program of the Department of Canadian Heritage.

→ **Other countries**

There are many other countries with bad records on human rights, including the biggest production countries of ICT Hardware: China, India, and Mexico, for example. There is no easy advice available to companies, when looking at human rights issues in these countries. The industry will have to look at its activities and how human rights are affected by its business operations and take into account reports about the human rights situation in countries where they work and source.

For example, a company that sells equipment knowing that it could be used for repressive purposes may be seen as a **partner in repression**. Motorola is one company that has come under the scrutiny of campaigning organisations within this context. Human rights Watch called on Motorola in February 2001 to reassess its promotion and sales of communications equipment to the police in China.

5.3 Environmental issues

5.3.1 Introduction

In the early days of the high-tech industry, when it started in California, US, it was referred to as the "clean industry". The industry has built a clean and non-polluting image that appears on the surface to be free from environmental and occupational hazards. But already in 1982 the first environmental problems caused protests; the Silicon Valley Toxics Coalition was formed in response to the discovery of substantial groundwater contamination throughout Silicon Valley, caused by toxic chemicals leaking from underground storage tanks belonging to high-tech companies. It was in this region, the birthplace of the ICT industry, that the full extent of the environmental impact of the industry was shown for the first time. In just one generation, the high-tech revolution has spread out all over the world, and it has become evident that environmental qualities, community sustainability and the health of ICT workers are seriously threatened by the rapid expansion of high-tech development. The same environmental problems are emerging in all major production countries. Developing countries are especially vulnerable in this context because the governmental policies are focussing on industrial growth while environmental impacts and community values are overridden in this context.

Environmental justice issues in this regard are focused on the unequal distribution of environmental impacts. In the U.S., the burden of polluting activities is unequally and disproportionately distributed to women, immigrants, the poor communities and communities of colour. Globally the burden goes to poor countries, as most old computers are sent to these countries to be disassembled.

5.3.2 Environmental implications of the characteristics of the ICT hardware sector

There is not enough overview, leadership and willingness from the top of the chain on the implementation of environmental standards further down the chain in the production phase. The mobility of capital and the flexible production networks create difficulties in

tracing environmental responsibilities. The current period of consolidations is also affecting the responsibility issue, as when a factory is faced with severe contamination problems, which of the various owners should bear the responsibility? Transnational mobility grants more bargaining power to the industry in negotiations with governments, who compete hard to attract ICT investments. The whole structure makes it hard for local and international organisations to address this issue and responsibilities.

Other environmental problems have to do with the short product life cycles and intensive chemical use in the sector. While production processes are constantly changing, risk assessment takes years of trials. In addition, accelerated product cycles and rapid changes in technology are generating tremendous waste problems¹⁰⁸. Consumers are encouraged to throw away short life-span electronics products. There are hundreds of millions of used computers worldwide and the systems for handling them safely are lacking or insufficient, or have not been implemented.

The life cycle of toxic materials in electronics can be divided into 3 phases:

- ❑ Extraction of raw materials
- ❑ Manufacturing/assembly
- ❑ Recycling and disposal

Another possible phase to be distinguished is the phase of usage. One important aspect during this phase is the energy level, a well designed computer has energy-efficiency specifications.

→ **Extraction of raw materials**

The electronics life cycle starts with the extraction and processing of raw materials, often obtained through mining. Coltan, an ore containing the rare tantalum metal, is a well known issue in relation with its origin from the Democratic Republic of Congo (see also doing business in conflict zones). The extraction of non-renewable resources (minerals and metals) for ICT products can have a devastating impact on local ecosystems and the environment. More indirectly, mining activities can cause social disturbances, such as prompting an influx of migrant workers or destabilising local communities, which in turn leads to environmental damage.¹⁰⁹ It is therefore important that ICT OEMs take responsibility for their supply chain, including the extraction of raw materials.

→ **The environmental impact of the manufacturing phase.**

Several problems can occur in the manufacturing phase:

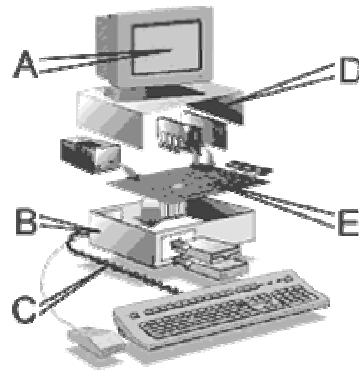
1. The use of highly toxic and hazardous materials in production and assembly that are embodied in consumer products;
2. The high intensity use of water and energy in the manufacture and assembly of circuit boards, silicon chips and semiconductors;

¹⁰⁸ Wen-Ling TU, Doctor of Philosophy in environmental planning, "Challenges of environmental planning and grassroots activism in the face of IT Industrial dominance: a study of Science-based Industrial parks in Taiwan", University of California, Berkeley (2004).

¹⁰⁹ "The ICT sector: The management of Social issues and environmental issues in supply and disposal chains, Survey undertaken by ISIS Assets Management plc," (January 2004).

3. Waste production during manufacturing which includes toxic emissions by manufacturing companies that are causing pollution (i.e. waste water discharge, air emissions, toxic dumping which causes air, water and soil contamination).

→ **The toxic and hazardous materials in a PC.**



The toxics in a PC are a health hazard, to workers during the manufacturing phase of a PC, but also during recycling and disposal. The chemical toxics inside do not pose a danger during normal use of the PC.

- ❑ **Monitor**—Cathode ray tubes contain 4 to 8 pounds of lead in the radiation shielding of the glass and in lead solder on wires and connections. Barium is also used in the glass shielding. There is phosphorus in the inside coating of the faceplate. Hexavalent chromium is applied on galvanised steel parts for corrosion protection. Flat screens can contain mercury.
- ❑ **PC Chassis**—hexavalent chromium is used on steel plates to prevent corrosion.
- ❑ **Cables and Wires**—the plastic covers of the wires inside and outside of a PC contain both PBDE and PVC.
- ❑ **Plastic Shell**—Polybrominated diphenylethers (PBDE) are used as flame retardants in computer plastics. Polyvinyl chloride (PVC) components, when burned, give off dioxin fumes.
- ❑ **Circuit Boards**—Most manufacturers use lead solder to connect semiconductors and other components and wires to motherboards and integrated chip sets. Beryllium is commonly found on boards and connectors. Printed wiring boards contain mercury. Cadmium can be found in semiconductors and resistors.

Health risks:

- ❑ **Lead**—Toxic to the kidneys, damages nervous and reproductive systems, inhibits mental development in infants and young children.
- ❑ **Barium**—Exposure can cause brain swelling, muscle weakness and damage to the heart, liver and spleen.
- ❑ **Hexavalent Chromium**—can cause DNA damage and asthmatic bronchitis.
- ❑ **Phosphorus**—Health effects aren't fully understood, the U.S. Navy brands it "extremely toxic."

- ❑ **Beryllium**—Recently classified as a human carcinogen.
- ❑ **Mercury**—High levels of exposure contribute to brain and kidney damage and cause birth defects.
- ❑ **PBDE**—Can potentially harm a developing foetus.
- ❑ **Dioxin**—Can cause cancer, damage the immune system and interfere with the regulatory hormones.¹¹⁰

For a complete overview of the toxics used and their effects, see also the Greenpeace Briefing paper: Toxic Tech, the dangerous chemicals in electronics products. This paper mentions Beryllium, Cadmium, Chromium hexavalent, Lead, Mercury, Brominated Flame Retardants (BFRs), PVC, Phthalates and Organitins.¹¹¹

➔ **High water and energy use**

In Taiwan, water shortage is a big issue and the unlimited expansion of the ICT factories has caused a water use conflict. Water consumption for a factory producing 30,000 8-inch wafers per month requires 2,000 to 2,500 tons of water a day (see table). In 2002 the Taiwanese government decided to reallocate agricultural water for the use of the ICT industry and to build a dam and a desalination plant among other things to supply the high-tech sector. Farmers and local residents are protesting against the uneven distribution of water and related environmental impacts, but the government has favoured the high-tech industry.¹¹²

Table: Water Consumption for IC production

Notebook PC Brands	A factory with 30,000 wafers production per month (water consumption per day)			Water consumption for producing each wafer		
	6-inch	8-inch	12-inch	6-inch	8-inch	12-inch
Wafer manufacturing						
Water consumption/tons	1500-2500	2000-2500	4500-5000	1.5-2.5	2-2.5	4.5-5

Source: Chen, 2002:82

➔ **Waste production**

Before a computer reaches the user, the manufacturing process will already have generated significant amounts of waste. If you look at the environmental impact for the production of an eight inch wafer for instance, it is almost hard to believe the amounts involved. In 2004 the SVTC made the following overview:

¹¹⁰ Karl Schoenberger, "Where Computers Go to Die: Poor Cities in China Become Dumping Ground for E-Waste," San Jose Mercury News 23 November 2002 <<http://www.mindfully.org/WTO/Computers-Go-To-Die23nov02.htm>> and paper for the US.

¹¹¹ Greenpeace Briefing paper "Toxic Tech , the dangerous chemicals in electronics products" <<http://www.greenpeace.org/raw/content/china/en/press/reports/toxic-tech-chemicals-in-elec.pdf>>. See also the following publication of Greenpeace International, Toxic Tech: pulling the plug on dirty electronics, may 2005. <<http://www.greenpeace.org/raw/content/china/en/press/reports/toxic-tech-pulling-the-plug-o.pdf>>.

¹¹² Weng-li, page 132.

Production of an eight inch wafer:

- 4,267 cubic feet of bulk gases
- 3,787 gallons of waste water
- 27 pounds of chemicals
- 29 cubic feet of hazardous gases
- 9 pounds of hazardous waste
- 3,023 gallons of de-ionised water

Source: SVTC 2004

The manufacturing of a circuit board weighting 4 pounds produces 46 lb of waste, of which 40lb is classified as hazardous.¹¹³

Waste treatment problems are often related to mismanagement of hazardous waste. In Taiwan one of the most important environmental management issues that has emerged during a study is that most of the IT firms in the Hsinchu Science Industrial Park depend on contract waste management companies to handle organic chemical toxic waste. A licensed treatment firm legally transports the waste, but other companies are then commissioned to dump it.¹¹⁴

Waste water is sometimes illegally discharged into local irrigation ditches and creeks. Waste water typically contains heavy metals, various organic solvents and/or acid/alkaline waste liquid. Waste water treatment facilities often fail to reduce the Volatile Organic Compounds (VOCs) which are an important by-product of IC production.¹¹⁵

Air pollution can include waste gas containing acid and alkaline, organic solvents, toxic compounds and flammable gasses.¹¹⁶

¹¹³ Do You Compute?: Mary Rayner and Bruce Bingham investigate the high-tech world of computer hardware. *The Ethical Consumer*, No 10, Aug/Sept 2003.

¹¹⁴ The Sheng-li incident, reported by TEAN. Can be found in ¹¹⁴ Challenges of environmental planning and grassroots activism in the face of IT Industrial dominance: a study of Science-based Industrial parks in Taiwan, by Wen-Ling TU, Doctor of Philosophy in environmental planning, University of California, Berkeley, 2004.

¹¹⁵ The dissertation of Weng-Li Tu includes an extensive overview of environmental events related to toxic release and pollution problems associated with one of the industrial high-tech parks in Taiwan. It concerns water pollution, air pollution, groundwater pollution, coastal pollution, waste problems and public health concerns.

“Wen-Ling TU, “Challenges of environmental planning and grassroots activism in the face of IT Industrial dominance: a study of Science-based Industrial parks in Taiwan”, University of California, Berkeley, 2004, p. 114.

¹¹⁶ Weng-li, table 5.4 Air pollutants generated from IC production processes, p. 116.

5.3.3 Recycling and disposal

→ Electronic Waste (E-Waste)

E-waste is a fast growing problem. An estimated 12.75 million computers were recycled in 2002 in the USA, and most of the old computers were exported to developing countries such as China, India, and Pakistan for disassembly, countries which lack the capacity and regulations or political will to implement sound environmental policies¹¹⁷. Due to the rapid success of new technologies and designs and the marketing techniques of ICT companies, product lifecycles are short which cause an even heavier burden for the waste disposal and subsequent environmental impact.

Most companies use third party contractors, who form part of a nascent industry, to handle product disposal and recycling. Only a limited number of these providers are certified as operating under adequate environmental standards and social standards have yet to be introduced. Export of electronic waste by these third parties presents a growing problem.¹¹⁸

¹¹⁷ BAN, "Exporting harm: the high tech trashing of Asia," 2002
<<http://www.crra.com/ewaste/ttrash2/ttrash2>>.

¹¹⁸ "The ICT sector: The management of Social issues and environmental issues in supply and disposal chains," Survey undertaken by ISIS Assets Management plc (January 2004).
<<http://www.computertakeback.com/docUploads/ISIS%5FICT%5FJAN%5F2004%2Epdf?CFID=9154074&CFTO KEN=15076694>>.

Dumping E-waste from the UK to India

Under UK law, no waste, including electrical or electronic waste, can be being sent abroad for disposal. It is illegal to send any hazardous waste, including e-waste, to any developing country for disposal or recovery. In 2004, reports by the British Environment Agency (BEA) indicate that there are several companies exporting e-waste from the UK to India, Pakistan and China¹¹⁹. According to the BEA's communication with the Indian environmental organisation, Toxics Link, e-waste exports are worth hundreds of millions of pounds. Last year, such waste involved thousands of old computers, 500,000 television sets, three million refrigerators, 160,000 tonnes of other electrical equipment and millions of discarded mobile phones — all sent to India, China and Pakistan. "The trade is absolutely illegal and against the spirit of the Basel Convention," said Kishore Wankhade of Toxics Link in Delhi. He said the electronic waste contains several hazardous and toxic materials such as mercury, cadmium, and PVC plastics, which are dangerous to the environment and human health.¹²⁰

The problem on the Indian side is that the Central Pollution Control Board (CPCB), Government of India's regulatory and monitoring body, continues to deny that e-waste is coming into India. The Government and Port Authorities in India do not implement its Hazardous Waste Rules¹²¹ and do not themselves monitor illegal imports of hazardous e-waste at the entry points.

¹¹⁹ There are two reports, not released by the Environment Agency but seen by the Guardian. One, by the Industry Council for Electronic Equipment Recycling (Icer), is based on confidential interviews with businesses and concludes that most computer exports are certainly waste because the goods are neither tested nor repaired before export, which is necessary for legitimate international trade in goods with an overseas market for usable equipment such as computers and TVs. Another, by Impel, a grouping of six European countries' environment agencies including Britain's, says that exporters are finding new ways of bypassing the rules and that governments have neither the resources nor the will to give any priority to checking what leaves the country.

Source: John Vidal, "Poisonous detritus of the electronic revolution: Thousands of tonnes of 'e-waste', some of it highly toxic, is being sent illegally from Britain to Africa and Asia," The Guardian, 21 September 2004.

¹²⁰ The Hindu, 18 December 2004

<<http://www.thehindu.com/2004/12/18/stories/2004121803231300.htm>>.

¹²¹ E-waste is included in the List A and B of Schedule 3 of the Hazardous Waste Rules, 2002, where its import is restricted.

Chapter 6

Overview of regulations and initiatives

6.1 Industry response to CSR issues

6.1.1 *The Electronics Industry Code of Conduct (EICC)*

Codes of Conduct are not as widespread in the ICT sector as in some other sectors, such as the garment or coffee industries. However, several of the brand name companies have adopted or revised their codes of conduct in recent years after being targeted by campaign groups. For example Dell adopted supplier principles in February 2004 and IBM adopted Supplier Conduct Principles in April 2004 and revised them in July 2004. Several of the companies have taken their own CSR initiatives in the last years, some of which are based on their own or the industry's Code of Conduct.

The industry has reacted to the pressure by public campaigning recently by adopting a code of conduct for the sector. In October 2004 the Electronics Industry Code of Conduct¹²² was adopted by Hewlett-Packard, Dell, IBM¹²³ and five Contract Manufacturers (Solectron, Sanmina-SCI, Jabil, Celestica and Flextronics). Cisco Systems, Microsoft and Intel signed up to the electronics code in November 2004. The Press release for the code mentions the “participating companies’ commitment to leadership in the area of corporate social responsibility, which will potentially reduce inefficiency and duplication, and make performance easier to audit and verify”¹²⁴

→ Criticism on the EICC

In general, criticism has focussed on the formulation of the standards, which do not refer to internationally accepted standards and which are not always clear, the lack of enforcement mechanism and verification requirements, as well as low level of commitment to making sure that the code is actually implemented by the suppliers. There is no common reporting framework. There is further lack of involvement of stakeholders, both locally and internationally, in every aspect of code drafting and implementation. The code will be reassessed by the industry in October 2005, which will provide an opportunity for NGOs and unions to influence the contents of the Code of Conduct. However, this is nowhere near enough initiative on the part of the industry to include the stakeholders. No compliance and enforcement mechanism exists, there is no complaint procedure, etc. The industry should take its lead from the efforts of several multi-stakeholder initiatives, mostly active in the garment industry that have gone through a long process of establishing mechanisms for code implementation and involving stakeholders. Learning experiences

¹²² <<http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/supcode.pdf>>.

¹²³ Although IBM gives its suppliers the choice which code they wish to implement; IBM's own code or the EICC.

¹²⁴ <<http://www.celestica.com/uploadedFiles/CodeofconductRELEASE.pdf>>, 7 July 2005.

show for example that training and capacity building form an integral part of code implementation.

No information is available to date on the impact of this code on workers, communities or the environment.

6.1.2 Environmental issues

On the environment side, the issues mentioned so far are the need to include end-of-life management through Extended Producer Responsibility or Producer-Paid Models (which include take back demands and clean electronics with a longer life span that are easier to recycle). The code would also need to include materials policy, water issues (more detailed) and the location of facilities so that they do not disproportionately impact poor communities¹²⁵. Another major issue mentioned by the Silicon Valley Toxic Campaign is to include a commitment to carry out social and environmental assessments before new technologies are deployed. Parts of the standards mentioned are unclear, for example the product content restrictions. Greenpeace, for example, is demanding that the hazardous materials list include all hazardous materials, which would include, in addition to the ROHS materials, all brominated flame retardants and other halogenated materials, including PVC. As national laws will not always be sufficient, the requirements should be internationally specified for all environmental standards.

6.1.3 Labour issues

Most of the criticism of the EICC to date has focussed on the labour part of the code. The IECC is not in line with the internationally accepted **ILO labour standards**, as described in most model codes of conduct, nor does it mention them. The code makes reference to other standards that were used as references in preparing the code, specifically SA8000 and the ETI, but fails to include the part of the standards these refer to. For example, the Code of Conduct does not specify that overtime should be voluntary and compensated at a higher rate, nor that workers shall not on a regular basis be required to work in excess of 48 hours per week and overtime shall not exceed 12 hours per week. The Code of Conduct does not fully protect **Freedom of association**, only in accordance with national laws, and does not mention **Collective Bargaining**. It is seen as very important that the code be amended to comply with international standards in this regard.

6.1.4 Working group

A working group has been formed by another group of companies, the Global e-Sustainability Initiative (GeSI) group of telecommunications firms (including BT, Nokia, Deutsche Telekom and Vodafone). They have identified labour issues as a priority for the industry to address. The GeSI Working Groups are looking at shared tools for monitoring implementation of individual company codes of conduct, the ETI base code and the Electronics Industry code. Again, there is no involvement of international and local NGOs

¹²⁵ Silicon Valley Toxics Coalition in an e-mail on 12 July 2005, on file at SOMO.

and Trade unions, the whole process is not transparent, and up to now it has been very unclear what the working group set out to achieve.

6.2 EU initiatives on environmental issues

6.2.1 EU initiatives

- Directive WEEE, passed on 11th October 2002
- Directive RoHS
- The EuP: the energy using Products directive.
- REACH.

→ The WEEE

The EU Directive on Waste Electrical and Electronic Equipment¹²⁶ is designed to shift the responsibility for recycling onto producers. The EU member States must adopt appropriate measures in order to minimise the unsorted municipal waste element from electronic waste and achieve a high level of separate collection of electronic waste.

It sets recycling and recovery targets for ten categories of products.

- Large household appliances (e.g. fridges and washing machines)
- Small household appliances (e.g. vacuum cleaners, irons)
- IT and telecommunication equipment (e.g. PCs, photocopiers, telephones)
- Consumer equipment (e.g. TVs, videos, hi-fi equipment)
- Lighting equipment (e.g. fluorescent lamps)
- Electrical and electronic tools (e.g. drills, sewing machines)
- Toys (e.g. video games)
- Medical equipment systems (e.g. radiotherapy)
- Monitoring and smoke equipment (e.g. smoke detectors)
- Automatic dispensers (e.g. drinks machines)

The directive will shift the responsibility for waste management towards the producers. This is also intended to change the initial design processes, resulting in products that are easier to dismantle and recycle. Manufacturers must modify supply chain systems to report product information for recyclers as part of WEEE. Details down to the material composition level will be required.

The directive will come into effect in August 2005. In March 2005, the UK government postponed the implementation of the EU WEEE directive, because "the government has encountered major practical difficulties in meeting the directive's legal deadline of 13

¹²⁶ Directive 2003/108/ec of the European Parliament and of the Council of 8 December 2003, amending Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

August 2005. The UK government has postponed implementation of the recycling until January 2006. Germany is also going to postpone recycling until January 1 next year¹²⁷.

→ **The RoHS**

The RoHS¹²⁸ Directive requires the removal of six hazardous substances from all electronic products shipped into the EU, and will come into effect on July 1, 2006. It places a ban on four heavy metals (lead, cadmium, mercury and hexavalent chromium) and the Brominated Flame Retardants (PFR) PBB and PBDE.

Manufacturers in the ICT and electronics sector have hundreds or thousands of suppliers, and all of them must be checked for compliance. The contract manufacturer Celestica has researched compliance with RoHS/WEEE legislation since 1999. Supplier awareness is a valuable side-effect of the RoHS. Companies must keep their fingers on the pulse of their entire supply chain to determine if and when their suppliers plan to convert their products to RoHS compliance. It is suggested that RoHS compliant components may be slightly more costly at first, as suppliers must cover the expense of conversion. In time however most of the component suppliers will have to be compliant.¹²⁹

Traceability is a key part of the ban on the 4 heavy metals and 2 BFRs. Documenting the traceability of parts is required, because it is necessary to show that parts are compliant with the European directive. The positive side effect of this is the increasing transparency of the supply chain. Just like the CB safety reports enabled SOMO to trace the key components of the Travelmate laptops of Acer (see the charts on the supply chain of Acer's Travelmate C110 and C300 in chapter 4), the documents that are required to prove that the ICT products are lead free will give insight into the global supply chain. Hopefully these documents will be publicly available.

→ **REACH**

The REACH legislation (Registration, Evaluation, and Authorisation of Chemicals) requires companies to test the safety of more than 30,000 chemicals already on the market; it therefore puts an end to the current artificial distinction between "new" and 'existing' chemicals.¹³⁰ It not only concerns the electronics sector but all sectors in which

¹²⁷ Paul Brown, environment correspondent, "TV and computer recycling delayed after firms' plea," *The Guardian*, 25 March 2005 <<http://www.guardian.co.uk>>.

¹²⁸ The RoHS Directive exempts the inclusion of hazardous materials used in the following soldering applications:

- lead in high melting temperature type solders, that is tin-lead solders containing more than 85 per cent lead

- lead in solders for servers, storage and array systems - these are exempted until 2010

- lead in solders for network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunications

- Lead in electronic ceramic parts (e.g. piezoelectric devices).

Source; Steve Dowds, global product manager, Henkel Electronics, "The case for exemption," 25 January 2005 <<http://www.emsnow.com/npps/story.cfm?ID=9271>>.

¹²⁹ Dan Shea, Chief Technology Officer, Celestica, "The Road to RoHS," 2 March 2005 <<http://www.emsnow.com/npps/story.cfm?ID=9911>>.

¹³⁰ Existing chemicals are the chemicals already on the market, inasmuch as they are not subject to safety tests.

chemicals are used. REACH requires companies that produce and import chemicals to assess the risks arising from their use and to take necessary measures to manage this risk. This would reverse the burden of proof regarding whether chemicals are hazardous or not from public authorities to industry for ensuring the safety of chemicals on the market. Companies that manufacture or import more than one ton of a chemical substance per year would be required to register it in a central database, along with the outcomes of the risk assessment. The aim of the REACH Regulation¹³¹ is to improve the protection of human health and the environment.¹³²

→ **The EuP: the Energy Using Products directive.**

The EC proposal for a framework directive to promote eco-design of energy using products was adopted in August 2003. Until now, however, there have been no separate implementing measures adopted, and there is no legal obligation on manufacturers.

6.2.2 The implications of the EU directives for manufacturers and assemblers worldwide

The European standards set by the EU directives WEEE and RoHS have a worldwide impact, as production for the European market is global. Statistics released by the China Electronics Imports & Exports Corp. indicate that products falling under the directives account for about 70% of the country's export to the EU market. A levy will be charged from 1 to 20 euros on every product exported into the EU which does not comply. These new costs will place a heavy burden on Chinese firms, and companies will therefore be motivated to take appropriate measures. Electronics OEMs selling on the EU market will ask their suppliers worldwide to meet the EU directives and will have them checked for compliance.

6.3 Environmental Campaigns

6.3.1 The Basel Action Network (BAN)

BAN¹³³ is an international watchdog network of activists and groups around the globe monitoring the illegal trade in hazardous waste and technologies from developed countries to developing countries. BAN is based in Seattle, USA and conducts both domestic (US) and international programs to halt toxic trade.

¹³¹ The text can be found at

<<http://europa.eu.int/comm/enterprise/chemicals/chempol/whitepaper/reach.htm>>,
<<http://europa.eu.int/comm/environment/chemicals/whitepaper.htm>>.

¹³² IP/03/1477, Brussels, 29 October 2003, Chemicals: Commission presents proposal to modernise EU legislation.

¹³³ <<http://www.ban.org>>.

Current Campaigns of BAN:

→ **E-Waste Stewardship Project**

Program to ensure that exports of hazardous electronic waste (particularly from the USA) to developing countries, exposed by BAN, are eliminated and replaced with producer responsibility and green design programs/legislation.

→ **Campaign for Ratification of International Toxics Agreements**

The Basel Action Network (BAN), the International POPs Elimination Network (IPEN) and other NGOs concerned about the global toxics and health crisis are urging all governments to make every effort to ratify four international treaties of major significance at the earliest opportunity.

These treaties are:

- ❑ **The Basel Convention** (unlike other regulations, the Basel Convention is a legally binding global instrument on hazardous waste) on the trans-boundary movement of hazardous wastes (1989) -- together **with the Basel Ban Amendment** (1995) effectively banning hazardous waste exports from OECD and Liechtenstein to all other countries;
- ❑ **The London Convention Protocol (1996)** forbidding most forms of ocean dumping;
- ❑ **The Rotterdam Convention** (1998) requiring prior informed consent on the export of certain dangerous product chemicals;
- ❑ **The Stockholm Convention** (2001) which will effectively move to phase out and reduce the release of persistent organic pollutants (POPs).

Countries with a ranking of 'excellent', which means those countries that have ratified all four treaties, are: Denmark; France; Germany; Norway, Spain, Sweden; Switzerland. Notable countries that are failing (0 Ratifications) include: India, Russia and the United States. Some countries have signed 3 treaties, but still ended up in "the Hall of Shame", because they refuse to ratify the Basel Ban Amendment; these are: Australia, New Zealand and Canada. The Netherlands has ratified 3 treaties¹³⁴.

6.3.2 **Silicon Valley Toxics Coalition (SVTC)**

The SVTC is a coalition that engages in research, advocacy, and organising around the environmental and human health problems caused by the rapid growth of the high-tech electronics industry.

An important activity is **The Computer Take Back program and Extended Producer Responsibility work**. The goal of the Computer Take Back program is to protect the health and wellbeing of electronics users, workers, and the communities where electronics are produced. The campaign requires consumer electronics manufacturers and brand owners to take full responsibility for the life cycle of their products. SVTC will accomplish this goal by establishing **extended producer responsibility (EPR)** as the policy tool. Three principles are essential to the Campaign's goal:

¹³⁴ <http://www.ban.org/country_status/report_card.html>.

- a) Producer responsibility; hold manufacturers/brand owners responsible for meeting specific goals for electronics recovery, reuse and recycled content that are at least as stringent as the goals adopted by the European Directives (WEEE).
- b) Toxics use reduction; require manufacturers/brand owners to meet specific reduction goals at least as stringent as the European Directive (RoHS) on phasing out hazardous materials from the products.
- c) Recycle Responsibility.

The Computer Take Back program of the SVCT includes several methods for moving the work forward, through legislative action, through corporate campaigns, through procurement guidelines, by promoting the '**Recyclers pledge of True Stewardship**', the Prison Labour Campaign and the annual Report Card. The pledge means that recyclers will not export hazardous waste, not dump in landfills, use incineration or use captive prison labour, and that workers have full rights to organise.

Corporate campaigns were directed at Dell and HP, which have now signed the statement on extended producer responsibility. Apple is the current corporate target.

The goal of the **Prison Labour Campaign** is to end the exploitation of captive prison work in the dismantling of toxic electronics. Prison workers, predominantly poor people of colour, are exposed to toxics and are not in a position to defend their (human) rights. Prison systems are also exempted from fair labour and minimum wage laws.

6.3.3 The Greenpeace Toxics campaign

Greenpeace is campaigning for all electronic companies to make toxic-free products and take them back globally for reuse, safe recycling or disposal. Companies such as Sony, Nokia and Samsung have committed to remove toxic chemicals from their products, but most have not. One recent publication by Greenpeace is 'Toxic Tech - Pulling the plug on dirty electronics', published by Greenpeace, 23 May 2005¹³⁵.

On the 23rd of May 2005, Greenpeace actions were directed at HP in Beijing and in Geneva.

6.3.4 Toxics links India

Over the years, Toxics Link has released several reports on the status of e-waste, which have revealed that more than 70% of electronic waste collected in the recycling units of Delhi was actually exported or dumped by developed countries such as the USA. In India this waste is subjected to primitive and highly polluting recycling operations, which contaminates air and water and impacts the health of workers.

¹³⁵ <<http://www.greenpeace.org/raw/content/international/press/reports/toxic-tech-puling-the-plug- o.pdf>>.

6.4 Environmental company performances

6.4.1 Company ratings on environmental performances

It is not possible within the scope of this sector report to discuss the environmental policies of individual companies. We have therefore taken some existing ratings established by Greenpeace and the Silicon Valley Toxics Coalition. The Greenpeace rating is more recent (2005), the rating of SVTC is based on data from 2003, but the differences are also due to the different demands.

The SVTC is keen on take-back programs in the US, recycling programs and prison labour, while Greenpeace is more focused on schedules and time frames for phasing out the hazardous substances.

One issue worth noting is the extremely divergent opinions about HP. Greenpeace has the more problematic relationship with HP. Greenpeace claimed that tests carried out in late 2003 showed that the amount of brominated flame retardants (BFRs) contained in HP computers is much higher than in other computers tested. TBBPA, a kind of BFR, made up 20 percent of all plastic weight in the HP pavilion A250 desktop model, a material that is used worldwide in HP computers. But the Silicon Valley Toxics Campaign is giving HP the highest marks.

BOX: The company ratings of Greenpeace.

Greenpeace asked various companies if and when they planned to start phasing out the chemicals "of Very High Concern" as defined by the European Union, from their products.¹³⁶

Company	Product rating	Comments of Greenpeace
Acer	RED	Since Acer provides no list of hazardous chemicals that it bans or restricts from its products, it is impossible to substantiate their claims of being ahead of legal requirements.
Apple	RED	Apple has decided to phase out hazardous substances in its products. But Apple does not say when PVC and brominated flame retardants BFRs will be banned.
Dell	RED	Dell is progressive in its phasing out of hazardous chemicals, in advance of regulatory requirements. Dell is phasing out the use of PVC but the extent of the phasing out is not clear. In addition, the company still uses some brominated flame retardants and has not yet presented a complete phase-out plan. Dell has indicated that they are investigating alternatives and will present their findings in 2005. Dell is a good candidate to become yellow in the near future.
Fujitsu Siemens Computers	RED	Fujitsu Siemens Computers is working hard to phase out hazardous substances, as well as PVC. An increasing number of computer parts, produced by the company itself, are free from brominated flame retardants (BFRs). Fujitsu Siemens Computers has brought out a 'green' computer with a BFR-free printed circuit board. However, no definite timeframe has been given for the phasing out of hazardous substances, so Fujitsu Siemens, for the time being, is rated red.
Hewlett-Packard	RED	The public perception of Hewlett-Packard is often that of an environmental leader and HP is happy to maintain this delusion. Testing commissioned by Greenpeace showed that a HP computer contained very high levels of brominated flame retardants (BFRs). In a statement and in discussions with Greenpeace, HP is clear is that it is not prepared to eliminate BFRs from its products. The company refuses to go further than EU requirements ¹³⁷ .

¹³⁶ <<http://www.greenpeace.org.uk/Products/Toxics/chemicalhouse.cfm?productypeid=27&productid=160>>.

¹³⁷ Greenpeace qualifies the EU requirements as inadequate. Reasons for this is that TBBPA, on of the BFR's, is not included.

IBM	RED	IBM has stated to Greenpeace that it is very conscious of its responsibility for human health and the environment. Unfortunately this is not reflected in IBM's policy on chemicals. IBM has taken few initiatives to phase out hazardous chemicals, except where it has been required to do so by legislation
Samsung	YELLOW	Samsung is fully committed to phasing out hazardous chemicals, and is currently working on a phase out programme which sets dates for a ban on PVC, organotins and brominated flame retardants. Greenpeace applauds Samsung for introducing a corporate policy embracing the precautionary approach and sees Samsung as the trendsetter among electronics companies for its plan to phase out hazardous substances.
Sony	YELLOW	Sony is working hard to remove hazardous chemicals from its products. From 2006, the electronics giant hopes to be PVC-free. Following discussions, the company informed Greenpeace in March 2005 that it will remove all brominated flame retardants from all its products worldwide. This will happen in phases and Sony will keep Greenpeace updated on developments. Sony has been upgraded to a yellow ranking.
Tulip	RED	According to its website, Tulip computers 'is aware of' environmental concerns, also with 'regard to product development'. However, the company failed to answer questions about hazardous chemicals in its products. Tulip remains red for the time being.

Source: info based on the website of Greenpeace: the Chemical House, June 2005.

Product rating: red The manufacturer / retailer has informed us that the product does contain one or more harmful chemical pollutants and they have no plans to remove them OR the manufacturer/retailer has refused to supply us with any information about its product.

Product rating: yellow. The retailer / manufacturer has told us that the product contains one or more harmful chemical pollutants but they have also specified a date by which these chemicals will be removed.

Product rating: green. The manufacturer / retailer has told us explicitly that it does not use harmful chemical pollutants.

6.4.2 The Report Card 2004 of SVTC.

The report card is grading companies on the environment quality. In the Report Card of May 2004 the companies could earn a total of 100 points in five categories¹³⁸.

¹³⁸ The Report Card of the SVTC is focused on domestic environmental performances.

Scoring on:

- Computer TakeBack Program and Policies
- Toxics/labelling
- Information to Consumer about Recycling Programs
- Export/Recycling
- Environmental Health & Safety

The Beginners		Those Warning the Bench	
HP	54.5	Acer	0
Dell	52.5	AST	0
NEC	49.5	Brother	0
Those Trailing the Beginners		Canon	0
IBM	47.5	Daewoo	0
Sony	42.5	Epson	0
Toshiba	40	Fujitsu	0
Apple	37	Hitachi	0
Philips	34.5	Lucky Goldstar	0
Lexmark	32	Okidata	0
Still at the Starting Gate		Seiko	0
eMachines	0	Samsung	0
Gateway	0	Sun Microsystems	0
		Viewsonic	0
		Wyse Technologies	0

❑ Hewlett Packard

High Points: Publicly supports brand-owner takeback

Low Points: Unable to provide data on recycling rates

Hewlett Packard (HP) performed best across all categories, widening the point spread between its first place position and those following close behind (Dell and NEC) by actively supporting take back legislation in Maine and Minnesota.

❑ Dell

High Point: Support CTBC Statement of Principles for Producer Responsibility for Electronic waste. Also, most improvement in overall environmental performance

Low Point: Unable to provide or post air monitoring data for its facilities or its contractors.

Dell successfully climbed from the bottom rung of last year's report card to the second place spot this year. This transformation was largely due to the company's launch of a domestic recycling program and elimination of prison labour for processing hazardous electronic waste. Dell lost points on the Environmental Health and Safety section of the survey because it doesn't take supply chain responsibility.

❑ **NEC**

High Points: The only company to post 2004 re-use and recycling goals on their website

Low Points: Doesn't have a U.S. recycling program

NEC earned third place, despite the absence of a U.S. take back program. NEC earned 28 of the total 35 points in the toxics section of the survey. The company earned consistent points for progressively phasing-out toxic chemicals banned by the European Union and for NEC's higher than average recycled content glass and plastic in its new products.

NEC claims to use lead-free solder in 50-100% of its products, while its top competitors HP and Dell, report that only 2 % of its products are lead free.

Those Trailing the Beginners

❑ **IBM**

High Points: IBM invests in recycling facilities

Low Points: IBM not taking responsibility for legacy waste and is the leading opponent to state level e-waste producer responsibility policy

❑ **Sony**

High Points: Phasing out Toxics

Low Point: Possibly uses prison labour

Sony reported 50-100% phase-outs in lead and earned the second highest score behind NEC in phasing out toxics.

❑ **Toshiba**

High Points: Launching new recycling program

Low Points: Not much progress to report

Toshiba recently established a trade-in program that provides customers an opportunity to trade up to a new model. The old model may be refurbished/rebuilt and resold as "B" stock, or the PC is recycled or properly disposed of, according to Toshiba.

❑ **Apple**

High Points: Supply Chain Audits

Low Points: No recovery data for recycling, aggressively opposed Maine's producer take back bill

Apple was one of the few companies to take the CTBC up on the offer to provide additional environmental and/or health information about the company that consumers will find useful and that we will help to disseminate. Apple provided a list of chemicals that it has banned from its products that aren't on the RoHS list.

❑ **Fujitsu and Canon**

which earned first and second place respectively in last year's Report Card, did not return the survey this year.

Chapter 7

Conclusions

The ICT sector is a relatively young sector, using and producing the newest technologies and radiating innovative energy and progress. The industry is projecting a clean image, reflecting highly skilled jobs in Research and Development and 'clean rooms' where professionals work in a controlled and dust-free environment. How can we even imagine that behind this radiant image of young professionals building the industry of the future we find poisonous production sites where workers assemble computers during 12 hours workdays, sometimes for months on an end without a single day's rest?

Behind the clean façade, working conditions in this sector are horrendous. The industry has continuously shifted to countries that are perceived as cheaper, producing predominantly in export producing zones where labour rights and environmental issues have no priority. The industry predominantly employs young women, on wages below subsistence level. Forced overtime is endemic, and a lack of unions and barriers to organising means that the workers cannot negotiate improvements. Workers are hired on short term contracts for years, blacklisted, subjected to discriminatory application processes which examine aspects such as their family, body tattoos, sexual preferences and pregnancy. The case studies carried out by SOMO in China and the Philippines between October 2004 and January 2005 looked at suppliers of Acer and Fujitsu Siemens Computers, and confirmed this bleaker picture of this industry that has started to emerge in the last few years.

7.1 Characteristics of the ICT sector

The ICT OEMs, such as HP and Dell do not exert overly control on their supply chain through **the high level of outsourcing**, on average 75% of actual production is sourced out to EMS-, ODM-, and assembly companies. The ICT OEMs are increasingly concentrating on their core competencies, such as Research and Development, to stay ahead in this highly competitive industry, the release of new products, and marketing and branding of these products. The industry is characterised by complicated production chains entailing thousands of different parts in one computer, many of which are standardised and can be used by different brand names. **The globalised production networks** are highly developed, with increasing participation of developing countries in the low-end "mass production". Contract manufacturing companies are striving to offer their clients a 'global footprint', that is offering the same extensive and complete end-to-end services in low-cost regions near every major regional end market. The vast supply chain of the OEMs, and their lack of control over it, places challenges on these companies to address the labour, human rights and environmental abuses in these chains. Especially in the context of the low-end suppliers in the supply chain.

There has been **rapid growth** in the sector since its beginning in the early 1980s, characterised by **strong competition**, resulting among other things in ongoing pressure on prices and narrow profit margins, for the manufacturing companies in particular. There has been an **enormous growth of the contract manufacturers**, companies not known to a wider public. The largest of these are of American origin, but increasingly there is participation by companies from Asia. Their anonymous character makes it difficult to address these companies through consumer campaigns to implement changes in their CSR policies. Descriptions are therefore needed of the links between the OEMs and the Contract Manufacturers, and the companies at the top of the supply chain, as well as the large Contract Manufacturers, must be made to take responsibility for their entire supply chain, while at the same time the broader sector must also be challenged to define a functioning policy on CSR.

There are current trends which will have an influence on the supply chain management. The **centralisation of the supply chain management** by the ICT OEMs to overcome overcapacities and inefficiencies which were at the heart of the global recession and to counterbalance the purchasing power of the Contract Manufacturers, as well as the EU-directives WEEE and RoHS, has resulted in OEMs currently reducing and centralising their main suppliers and tightening the relationships. This offers opportunities for the ICT OEMs to gain more control over their supply chain management, thereby making it easier for them to take responsibility for their supply chain regarding labour conditions, human rights and environmental requirements.

There is fierce competition between EMS and ODM companies: the main types of Contract Manufacturers and the ODM companies are advancing. EMS companies (most of which originated from the US) offer a complete range of services to OEMs, but ODMs deliver complete products for which they own the intellectual property. ODMs are mainly Taiwanese companies with enormous facilities in China (some with more than 10,000 workers), although some also have a presence in Eastern Europe.

As some of the ODM companies are increasingly acting like OEMs and have decided to market part of their products under their own brand name, for example BenQ and Asus, they will be more visible, making it easier to address these companies directly. The companies are looking for ways to increase their profit margins, which are very small in electronics manufacturing, but they risk losing their OEM clients because they become direct competitors, often selling (exactly) the same product.

7.2 Corporate Social Responsibility issues

The industry can be characterised as one of short product lifecycles leading to extensive waste, rapid changes in technology with an extensive use of toxic materials, and a low degree of unionisation worldwide. The labour intensive part of the production, in particular, has moved to countries where the governments work to attract investment and create employment. This leads to competition between governments, with incentives being given to the industry, as tax relief and discounted water tariffs, and labour and environmental laws and standards not being implemented.

→ Toxic chemicals

The extensive **use of toxic chemicals** in the production of ICT devices creates huge problems during the entire product lifecycle of ICT products. There are subsequent problems with Occupational Health and Safety (OHS) in the production facilities, environmental problems in the neighbourhood of the factories and around the waste disposal sites, as well as community problems around these two sites.

Environmental and health problems already come into play at the extraction phase of the raw materials by mining. Subsequently at the manufacturing phase, workers are exposed to toxic chemicals without adequate protection and safety standards. The communities living in the neighbourhood of the factories have health and safety problems due to toxic emissions by the factories, i.e. waste water discharges, air emissions, toxic dumping resulting in air, water and soil contamination. The problems are aggravated by the lack of a sufficient buffer between the factory and the residential area. At the phase of waste disposal and recycling, there is the issue of E-waste illegally transported to developing countries, where there is an absence of controlled conditions to ensure the safe handling of the toxic e-waste.

There is no substantial evidence that the chemical toxics inside pose a danger for the user of a PC with normal use.

→ Labour issues

OEMs are looking for the highest flexibility, in order to deliver products as fast as possible and for the lowest price. The need for flexibility is provided at the expense of workers who have no job security, are increasingly employed on short term contracts, have wages with high variable proportions depending on the amount of products they are supposed to make and the overtime worked, workers who are expected to be available when needed, and are often requested to work overtime without advance notice and without much possibility to refuse to work these hours.

The degree of unionisation is extremely low globally. The ICT sector is a very young sector, which started in traditionally low unionised areas in the US and the UK. Globally, the ICT sector has not been a priority for the unions to organise in. The labour-intensive part of the industry has shifted to countries where wages are low, mostly to Export Processing Zones where labour rights are not given priority and where labour laws are not

enforced properly. In the production countries studied, such as Mexico, China and the Philippines, workers face severe opposition to organising themselves.

→ **Environmental issues**

The mobility of capital and the flexible production networks create diffusion in tracing environmental responsibilities, and they allow firms to escape environmental restrictions. Another aspect affecting this is the consolidation of companies, as the tracing of environmental responsibilities becomes even more difficult if a factory has a number of different owners. Globally we are seeing an unequal distribution of environmental impacts. The disproportional burden of polluting activities is unequally distributed to poor countries and poor communities.

The increasing production in EPZs in developing countries where environmental laws are often not enforced properly and have no priority can lead to major environment problems around the production areas. As has been mentioned above, transnational mobility gives the sector bargaining power, leading to competition between governments to attract ICT investments, at the expense of the environment.

The short product lifecycle and intensive chemical use in the industry poses risks. While production processes are changing continuously, risk assessments take years of trials. ICT companies and governments are therefore taking public health risks by using chemicals for which the effects are not yet known. In addition, the short product lifecycle and rapid changes in technology encourage consumers to throw away their short life-span electronic products, generating tremendous waste problems. E-waste is a rapidly growing problem, and most of the old computers are illegally exported to developing countries such as China, India and Pakistan for disassembly, countries which lack the capacity or political will to implement controlled conditions to ensure the safe handling of toxic e-waste.

Waste production during manufacture is enormous; the toxic emissions by ICT factories are causing pollution of groundwater, rivers, air and soil. Water consumption in ICT production is very high and can cause conflicts with the irrigation needs of agriculture.

→ **Regulations**

The European Union has recognised that e-waste poses problems and in 2002 it adopted two directives to tackle this, the RoHS and WEEE directive.

The **Restriction of Hazardous Substances** directive requires the removal of six hazardous substances from all electronic products for the European market; it places a ban on four heavy metals and two brominated flame retardants¹³⁹. Environmental organisations have welcomed the directive but want it to be extended to ban the use of all hazardous chemicals, in particular all brominated flame retardants and other halogenated materials including PVC. Companies active on the European market will phase out the six hazardous substances by July 2006.

¹³⁹ Lead, cadmium, mercury and hexavalent Chromium, PBB and PBDE.

The directive on **Waste Electrical and Electronic Equipment** is designed to shift responsibility for recycling onto producers, and for the EU members to adopt appropriate measures before August 2005. Germany and the UK recently postponed implementation of the measures, the Netherlands has an appropriate system in place. The intention of making producers responsible for the end-of-life phase of the life cycle of electronics goods has already changed the initial design processes, resulting in products that are easier to dismantle.

The positive effect of the EU directives is that it forces the ICT OEMs to take responsibility for their global supply chain; companies must keep their fingers on the pulse of their entire supply chain and make sure that their suppliers convert their products to RoHS compliance.

The documents required to prove the compliance can make the supply chain much more transparent. In the end, compliance can be easily checked with tests, which unfortunately is not possible with regard to compliance with labour conditions.

7.3 Recommendations

The industry could and should do more. Some of the companies have adopted their own code of conduct and several companies have taken small steps in terms of implementation of their code of conduct. The industry has recently reacted to criticism of their CSR policy by adopting a Code of Conduct for the electronics industry. This is obviously an important step and shows willingness on the part of the industry to collectively address problems in its supply chain. The Code has important shortcomings, however, as has been discussed in this report, which the industry should amend. A working group has been formed that will be looking at implementation of the code, but so far there is no transparency in that area, and it remains unclear what the status of the working group is and what the issues are that they are working on. The industry should learn from other sectors when addressing CSR issues, and not repeat the same mistakes. Other experiences, notably in the garment and sportswear sector, have shown the importance of the involvement of stakeholders in the drafting of the code, and in working on implementation and verification of the code. It is obviously very important that implementation of a Code of Conduct should contribute to the improvement of labour conditions. Inviting stakeholders to comment on the code and the steps of the industries is not the same as involving them in the process. Local stakeholders, such as NGOs and trade unions, in particular, have so far been absent in the whole process.

Several of the companies have taken steps towards making environmental commitments. According to Greenpeace Samsung, SONY, Sony Ericsson and Nokia have made substantial commitments to phase out hazardous chemicals in products, but they are not on speaking terms with HP. According to the Silicon Valley Toxics Campaign, HP and Dell both support the take back responsibility of ICT devices by the brand owners.

Consumers might be able to use the environmental commitments as benchmarks when making choices. As has been described above, with regard to social issues the choice

would be problematic. Although some of the companies are increasingly committing themselves to Codes of Conduct, either individually or as a sector, up to now no knock-on effect on the work floor has been reported.

The codes have not been implemented yet, and still have to be improved, and verification systems must be set up involving local stakeholders. OEMs have to take sufficient control over their supply chain management to fulfil the supply chain responsibility they claim to have taken in their Codes of Conduct.