ICT hardware

Sector Report - 9th in a series

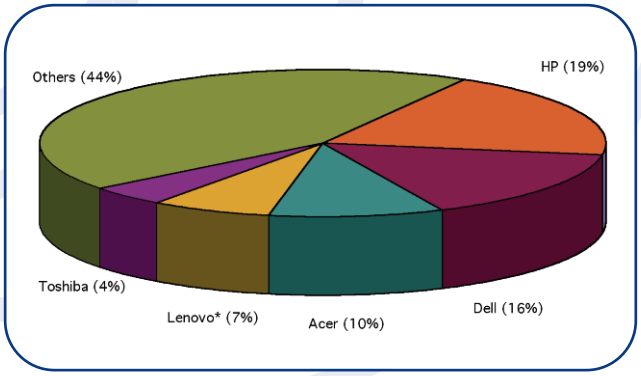
Eurosif

This Eurosif sector report has been compiled with research by West LB. It describes the major social and environmental challenges facing the Information & Communication Technologies (ICT) hardware sector (including computers and peripherals, communications equipment, and semi-conductors) and the associated risks and opportunities these challenges pose for long-term returns. This report does not cover software or service providers.

ICT OVERVIEW

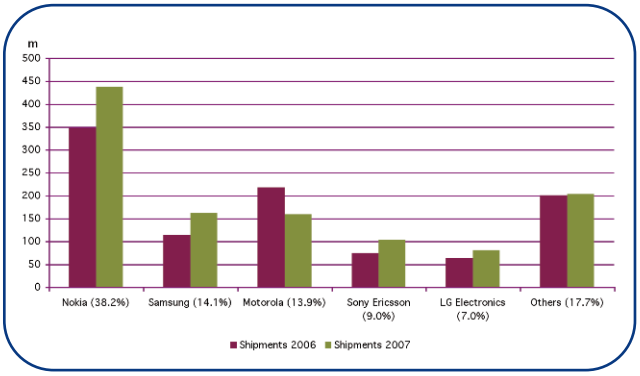
- The ICT hardware sector is characterised by a complex value chain with a substantial and ever increasing participation from emerging and developing countries in international production networks.
- ICT is becoming more and more ubiquitous. Miniaturisation is driving its use in an increasing number of appliances and devices (e.g. embedded computing). Boundaries vis-à-vis consumer electronics are blurring. We estimate the overall global market size of the ICT hardware sector to be more than 800 billion euros in 2008.

I: Global PC market Total shipments: 69.498m units (Q1 2008)



Source: IDC
** Lenovo bought IBM in 2004*
Note: Percentages in brackets represent market share

II: Worldwide Mobile Phone Market Total Shipments: 1,144.1m units (2007)



Source: IDC
Note: Percentages in brackets represent market share 2007

ICT TRENDS

- **Globalisation – focus shifts from supply chains to sales markets:** The globalisation of production and supply chains is being replaced by the globalisation of sales markets. Increasing wealth in emerging markets offers enormous growth potentials for producers of consumer products (e.g. PCs, mobile phones). There will be new market opportunities beyond the BRIC[1] countries given the low penetration rates in Africa and other developing regions.
- **The downside of optimised supply chains:** The efficiency of supply chains has improved over the last decade and is a prerequisite for remaining competitive. Enhanced efficiency, however, has come at a price. Operational risks have increased due to a concentration on only a handful of contractors and component manufacturers. For example, in March 2008, a fire at an LG Chem plant in South Korea – the fourth largest producer of power supply units for portable computers – brought the global notebook production process to a near standstill.
- **Innovation:** The commercialisation and obsolescence cycle for ICT hardware is extremely short, which continually challenges companies to anticipate, respond to and proactively set new trends with regards to consumer demand. Differentiation will no longer be based on hardware performance criteria alone, but increasingly on design and 'intangible differentiators' such as marketing capability, service and support, corporate reputation, as well as environmental performance. With respect to servers and data centres, energy efficiency will become a priority due to enormous cost savings potential and concerns about supply side security.
- **Convergence:** A major trend in the industry is the close integration of hardware, software and services (e.g. music downloads, navigation) in order to increase the user-friendliness of products. Providing ground-breaking products in this area will be the key to sector leadership in the future. Companies like Apple and Nokia have paved the way towards more integrated strategies. As a part of this process the ICT and consumer electronics sectors will become even more intertwined in the future.

[1] *Brazil, Russia, India, and China*

ENVIRONMENTAL, SOCIAL AND GOVERNANCE ISSUES		KEY CHALLENGES	BUSINESS RISKS & OPPORTUNITIES	
• **The ICT sector causes around 2% of global CO_2 emissions – as much as air transport.**[2] This estimate includes the in-use phase of PCs, servers, cooling, fixed and mobile phones, local area networks (LANs), office telecommunications and printers. • The US Environmental Protection Agency found that data centres consumed about 61 billion kilowatt-hours (kWh) in 2006 (1.5% of total US electricity consumption) for a total electricity cost of about $4.5 billion. Consumption is expected to double by 2011.	• CO_2 emissions associated with mobile phone use are relatively low on a per user basis.[3] However, the **combined CO_2 emissions of all mobile phones are significant**, due to the exponential growth in the use of these devices across the globe.	**Energy Efficiency**	• Concerns about climate change are catalysing change in the sector. Specific drivers include: (1) Mounting regulation, leading to an increase in compliance costs. (2) Demand-side pressures exerted by green procurement policies and a shift in consumer preferences. • **Improvements in the energy efficiency** of products are likely to become a **substantial source of competitive advantage**. For example, most energy consumption at data centres comes from cooling requirements. Vendors could address this issue with new chipset designs, energy-efficient server blades, dynamic smart cooling and virtualisation.	• Many ICT equipment manufacturers ignore their products' carbon footprint created in the production phase and instead, concentrate on the operational phase.[4] A change in product policy towards longer life-cycles (triggered by companies or by regulation), potentially combined with more service-oriented business models, could present opportunities for companies. However, at this time, this development is hard to envisage.
• ICT devices are produced from a wide range of materials and components, many of which are toxic and create serious local pollution and health problems during both production and disposal/recycling phases.[5] **Electronic waste ('e-waste') is one of the fastest growing waste streams in the world.** The total amount of e-waste generation in the EU is estimated to range between 5 to 7 million tonnes per year, or about 14 to 15 kg per capita, and is expected to grow at a rate of 3% to 5% per year. • Most e-waste is exported to developing countries for processing (often illegally).[6] Uncontrolled disassembly, burning and disposal of this waste presents **serious environmental and human health problems**.	• Studies indicate that workers' exposure to toxic chemicals used during the manufacturing of semiconductors and other electronics products (including solvents used to clean/dust off microscopic dirt) is tied to increased rates of cancer, fertility problems and illnesses. • In 1998, the EU implemented a directive to protect workers from risks related to chemical agents at work.[7] The 1990 C170 Chemicals Convention from the ILO[8] is also intended to protect workers, while the EU directive on Waste Electrical and Electronic Equipment (WEEE) sets standards for the disposal of obsolete electronic equipment. A shift in responsibility towards producers is also intended to change the initial design processes, resulting in products that are easier to dismantle and recycle.	**E-Waste & Hazardous Substances**	• **Stricter environmental legislation** will increase compliance costs across entire supply chains, potentially exerting pressure on profit margins.[9] The complexity of supply chains will make compliance checks and controls a challenging task for Original Equipment Manufacturers and will constitute an ongoing source of litigation and reputational risk. Companies can differentiate themselves through the way they manage these costs. • The short life span of ICT products places great pressure on raw materials and manufacturing. **'Greener' and repairable products** may be an **important area of competitiveness** in the future due to regulation and/or consumer demand. Companies able to design cleaner and less toxic products that are easy to recycle and allow for repairs and upgrades would be well placed to benefit. • Companies in the electronic equipment sector may also be forced to bear huge remediation costs for cleaning up soil and groundwater pollution caused by their operations. Lawsuits related to occupational illness caused by chemicals used in production processes also present a potentially material risk to companies.
• Original Equipment Manufacturers (OEMs) outsource major parts of their production process to a concentrated number of Contract Manufacturers (CMs). CMs have production facilities in many countries and employ far more people (up to 70,000 – 80,000 employees according to SOMO[10]) than OEMs. • This configuration not only makes it **difficult to monitor and verify environmental and social performance**, but the system's intrinsic cost pressures may, themselves, conflict with environmental and social goals.	• Particularly in low-cost countries, worker rights, human rights and environmental standards are often neglected. Key challenges related to the use of hazardous substances as well as other environmental and social concerns are multiplied by these **complex supplier structures**.	**Supply Chain Issues**	• The complexity of the global production system has led to an **increase in reputational risks for brand name companies**. After engaging on supply chain issues within the footwear, apparel, retail and toy industries, NGOs are increasingly focusing on the ICT industry. The main issues include excessive hours, wages, health and safety and freedom of association and collective bargaining.	• Companies, OEMs in particular, demonstrating superior supply chain management practices are likely to be rewarded with reduced compliance costs and lower reputational risks.
• According to the World Health Organisation, electromagnetic fields (EMF) of all frequencies represent one of the **most common and fastest-growing environmental influences**. All populations are now exposed to varying degrees of EMF, and the levels will continue to increase as technology advances. Some stakeholders fear that extended exposure may lead to increased levels of cancer or other illnesses.[11]	• Scientific opinion regarding the health risks of EMF radiation from mobile phones and network base stations remains divided. The WHO has recently stated that "to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health". However, the organisation supports the Interphone Study, a series of multinational studies to assess **head and neck cancer risks of radio frequency exposure**.[12]	**Electromagnetic Fields & Human Health**	• Health concerns among consumers and communities where antennae are located already pose some risks for telecommunication and communication equipment vendors with class action lawsuits being the most significant threat. In the event that future research reveals a definite link between health problems and mobile phone usage, **reputational and litigation risks** would greatly increase.	• Companies that **contribute to research** in this field, as well as those that **provide information to the public**, are likely to face less significant brand value impairment than their competitors who do not.
• The semiconductor industry is rapidly entering the era of nanotechnology.[13] For example, it is possible to have a significantly higher density of bits on a chip with nanotechnology than what currently exists in complementary metal-oxide semiconductors. • Since their discovery, questions have been raised about whether nanoscale materials **may constitute a health threat**	for consumers and workers exposed to them. Ultrafine nanoparticles, especially those which are free floating as opposed to fixed, may cause respiratory and cardiovascular problems. They may also reach vital organs via the blood stream, and possibly damage tissue. A recent study shows long, thin carbon nanotubes may be as harmful as asbestos if inhaled in sufficient quantities.[14]	**Nanotechnology**	• **Regulatory pressure** will most likely increase over the next few years as consumers and workers are increasingly exposed to manufactured nanoparticles. The health risks of nanoparticles could be an ongoing source of litigation and reputational risk for the ICT hardware industry (**comparable to asbestos** for other industries).	• Nanotechnology may also present **opportunities for the sector**. Examples for usage include energy efficient batteries, computer disk drives and flat panel displays. It could help **reduce power consumption of ICT equipment**. For example, switching off PCs would be encouraged due to an extremely fast power-up of the computer.
• Widespread access to modern information and communication technologies (internet, TV, telephone) is considered to be a **driving factor for economic development**. However, there is an increasing digital divide worldwide.[15] Approximately two of every three people in the US have direct access to a computer; in sub-Saharan Africa that ratio is fewer than two in every 100. • In countries where the internet and other technologies are not readily available education is suffering, and uneducated people	cannot compete in the global economy. As **ICT affects innovation, productivity and growth**, lack of access to these technologies will most likely widen the income gap between countries.[16] • An EC study from 2005 conducted in 14 European countries found that within the EU, the digital divide is primarily a matter of age and education with the younger or more educated population using Internet.[17] The digital divide is also higher in rural areas.	**Access to ICT / The Digital Divide**	• Providing more people access to information technology is one of the **great challenges facing governments and the private sector**. Broadband access is instrumental in attracting foreign investment and will ultimately be a key driver of growth. • International cooperation between governments has begun. Two examples, approved by the UN, are: the Global Alliance for Information and Communication Technologies and Development (GAID), and the One Laptop Per Child (OLPC)	project that aims to distribute – free of charge – millions of Linux-based laptop computers. • Companies joining these initiatives can often gain governmental support and **easier access to new markets**. Expanding digital access is thus a vehicle for **expanding sales and profitability**. Furthermore, engaging in developing countries also has positive reputational effects.

[2] Gartner: Green IT - The new industry shock wave, December 2007.
[3] Ericsson estimates that the average GSM subscriber creates emissions of around 25 kg of CO2 p.a., about the same as a single 5W light bulb powered continuously.
[4] It is estimated that the production process alone accounts for 81% of a PC's life-cycle energy use. Kuehr, Williams, 2007.
[5] These include flame retardants and heavy metals such as mercury, lead, cadmium and chromium.
[6] According to Global Action Plan, 70% of global e-waste is dumped in China, with most of the rest going to India and to African nations. This is often hidden under the umbrella of charity or 'computers for the poor'.
[7] http://europa.eu/scadplus/leg/en/cha/c11140.htm
[8] http://www.ilo.org/ilolex/cgi-lex/convde.pl?C170
[9] The REACH (Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals) and RoHS (the restriction of the use of certain hazardous substances in electrical and electronic equipment) directives are expected to drive product-detoxification trends within the consumer product industry.
[10] Centre for Research on Multinational Corporations. http://www.somo.nl/index_eng.php
[11] http://www.who.int/peh-emf/en/
[12] http://www.iarc.fr/ENG/Units/RCAd.html. Participating countries are Australia, Canada, Denmark, Finland, France, Germany, Israel, Italy, Japan, New Zealand, Norway, Sweden and the UK. This study is coordinated by the International Agency for Cancer Research (IARC).
[13] Nanotechnology is the art of manipulating materials on an atomic or molecular scale.
[14] www.nature.com/nnano
[15] The Digital Divide is defined as a gap between those people with effective access to digital and information technology and those without access to it. This can be used in socio-economic, racial, generational or geographical terms.
[16] UNCTAD report "Information Economy Report 2007 – 2008", UN, 2007.
[17] "eInclusion revisited: The Local Dimension of the Information Society", European Commission report SEC (2005)206.

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Green data centre: Deutsche Telekom (T-Systems)

T-Systems is one of the main partners in a pilot project that started in 2007 at the Euro Industrial Park data centre in Munich. A section of the centre is run on electrical power exclusively generated by a fuel cell made from locally generated biogas. The fuel cell, currently being tested, is designed for continuous use: around the clock, seven days a week. The aim of the project is to develop a model for a doubly secured data centre that is independent from the public power supply, while providing for the highest possible levels of availability and reliability.

The distribution of the fuel cell's energy output is perfectly suited for use in the data centre, where half of the energy is needed for air conditioning. As no combustion takes place in the fuel cell when converting biogas into electrical current, there are no exhaust fumes that can harm the environment. Therefore the use of biomass produces the desired ecological effects: Climate conservation through the use of renewable resources, and the avoidance of unnecessary energy transportation through the cultivation of crops in the immediate vicinity. In addition, the residues from the biogas plant can be used as valuable fertilizer.

Source: West LB research

Waste management: Konica Minolta

Konica Minolta has implemented "zero waste" measures to minimise landfill disposal by promoting recycling. Their target rate for recycling is over 90%, and for final landfill disposal it is less than 5% (including secondary residue). Konica has implemented risk management methods to ensure that discarded waste is properly handled. In pursuing resource recovery, top priority is given to the in-house recycling of leftover materials produced in the manufacturing process. Konica researches and develops new recycling and production technologies to facilitate this. Konica reports that, as a result, the total volume of waste from group manufacturing sites worldwide in 2006 was 35,681 tons, the volume of recovered resources (the volume recycled both in house and externally) was 34,500 tons and the volume of landfill was just 662 tons. Thus, the resource recovery rate was 96.7% and the final disposal rate (the landfill rate) was 1.9%. All these activities resulted in approximately €12 billion in annual savings.

Source: www.konicaminolta.com

Supply-chain management: Sun Microsystems

Sun Microsystems is starting to use its influence to raise standards in its supply chain through its Corporate Social Responsibility and Environmental Program. The company conducted a self-assessment of 59 contract suppliers in 2007, which showed that many have programmes in place to address the areas covered by Sun's Code. Sun plans to conduct physical audits of the 22 "high-risk" facilities as determined by a specific supplier risk assessment process. Supplier progress will be tracked by Sun and rated through its scorecard tool and quarterly performance reviews. From 2009 on, all contract suppliers will require that their suppliers with contracts demonstrate adherence to Sun's Supplier Code of Conduct.

Sun states that it continues to seek common standards, and thus is engaging in collaborative efforts like the Electronic Industry Code of Conduct (EICC) and Global e-Sustainability Initiative (GeSI), and that it works with its stakeholders to make progress on these fronts.

Source: www.sun.com

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