

FUTURE HORIZONS

Presents

The Annual Semiconductor Report



2009 Edition

**Annual Analysis & Forecast
Of The Worldwide & European
Semiconductor Industry**

Future Horizons

The Annual Semiconductor Report 2009 Edition

Annual Analysis & Forecast Of The Worldwide & European Semiconductor Industry

- Semiconductor Market Forecasts
- Semiconductor Applications Market
- Regional Market Analysis
- Market Trends and Outlook
- Economic Environment
- History From 2003-2008
- Forecast For 2009-2013

Future Horizons

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The Annual Semiconductor Report

Executive Overview

demand euphoria, a 9-11 driven economic slowdown and a massive inventory burn just as a huge amount of excess capacity was coming on stream. Everything that could have gone wrong did go wrong, the so-called 'perfect storm'. This disastrous combination has never happened before.

As a result, one fab in three was redundant in 2001 and the 2000 investment binge meant the problem would get worse before it could get better. It takes a year from turning the tap off for the added new capacity to stop flowing. This is why excess capacity-driven recessions take so long to recover from; with demand collapsing in parallel, the 2001 recession was apocalyptic.

The 2009 recession is likewise unique, caused this time as a side effect of the worldwide financial problems, not a problem of the industry itself. This will help to cushion the global recession impact, offset by the fact that, for the first time in the industry's history, this time all markets and all regions were simultaneously impacted.

Clearly the market has turned ugly, but it is important to remember that from a long-term perspective this time the downturn circumstances are significantly different.

First we have no serious overcapacity in place (pre-slowdown utilisation rates were in the 90 percent region), with Cap Ex deep in a retrenchment that started 12-18 months before the slowdown hit home.

Second, prior to the financial meltdown there was little sign of inflated demand, with IC units running at or below the 10 percent per year long-term trend line and no serious excess inventory in the supply chain.

Third, ASPs were in the midst of a structural recovery, having suffered the dual impact of the 130nm fiasco and the 300mm wafer conversion.

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leading-edge products for as long as possible in order to keep the fixed cost per wafer at a minimum and to maximize the overall revenue per wafer start.

Not surprisingly, it is the OEM that gains the real value-add. When translated into returns at the end equipment level, the industry average reaches US\$ 50 per square cm; perhaps a clear-cut justification (or competitive advantage?) for vertical integration!

At the other end of the scale, at the IP/chipless level, all that is available is US\$0.05 per square cm.

E3 2009 Outlook

Economy

Were it not for the dreadful state of the global economy, Figure E11, the chip industry would have entered 2009 in very good shape. As it is, forward visibility is as bad as it gets with the whole world teetering on the brink of global depression.

No one knows for sure when the global economy will recover but, given the immense size of the global stimuli packages around the world, one has to believe this will come sooner rather than later.

Right now business is preferring the 'stop everything/do nothing' approach, hence the dramatic fall in Q4 semiconductor demand, but this cannot continue forever. We therefore expect a gradual return to 'business as usual' - whatever the new 'usual' turns out to be - in the second quarter of 2009 once a degree of confidence returns to the markets.

For the moment what is clear is that a battered banking system and shell-shocked consumers are playing havoc with many businesses. This means it is currently

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Chapter 3 – Product Market Overview

For most DDR2 vendors the most popular product shipped was 512Mbit for the PC market in the early part of 2007 and 1Gbit at the close. Initially, the market moved at a very slow pace to change over to DDR2 as the first DDR2 product did not offer a significant performance increase over DDR1, although the second generation DDR2 chips are faster and selling well. Currently DDR2 DRAMs dominate the volume market and suppliers are already purchasing the next generation DDR3 chips, but in small volumes expect a lengthy transition to DDR3 in the future because of pricing and supply issues. The new memory brings advantages including lower power requirements and more bandwidth.

The first Intel chipsets to support DDR3 were available in the middle of 2007, supporting 800MHz and 1066MHz. By the end of 2007, the industry saw 1333MHz with 1600MHz arriving during 2008. In 2009, DDR3 will be the main technology sold having price parity with DDR2 as DDR2 did with DDR in 2006.

Specialised DRAM

It is essential to differentiate electronic product systems in today's competitive world particularly hand-held electronic devices. The designer must have 'usability' at the top of the list of priorities as well as functionality. Despite improved microprocessor speeds and larger lower-priced data memory; the device needs to be available for instant use rather than go through a lengthy boot-up process as is usual with most PCs. 'Instant on' will improve the appeal of products, such as PDAs, video games, and smartphones. What is needed is a technology that allows the PDA to be active the instant the stylus touches the input screen.

With most microprocessor-based electronic systems, the start-up delay is a result of the operating system needing to load programmes that it launches into the main DRAM memory - DRAMs are fast but the contents are volatile. Using flash

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Chapter 3 – Product Market Overview

and hardware compatibility issues. This means that market share for other suppliers depends on non-PC applications.

Several other processor families are sold into non-PC markets at high volume, and some comprise intellectual property embedded into other chips, but at a lower price and revenue. These are the ARC, ARM (used in mobile phones by TI and Qualcomm), SuperH (now used internally by Renesas and STMicroelectronics), Motorola (Freescale) and NXP 68x series, MIPS family, and the SPARC RISC processors. Added to this are the multi-core CPUs used in the video games consoles and produced by IBM, Sony and Toshiba.

Several trends have occurred over the last three years, which will make a difference to the MPU market. Firstly, the PC is fast becoming more of a commodity item; secondly, the impact of the Internet and wireless and the introduction of more customised net browsing products; thirdly, the trend towards embedded processors in SoC solutions, and finally the introduction of PC-compatible 64-bit and dual and quad processors.

Until recently, a business or home PC user was forced to buy or upgrade their system to the most recent specification with the latest (Intel) processor every two to three years in order to stay abreast of software developments, and to benefit from increasing PC capabilities. Aside from improved processor performance, these upgrades also demanded ever-larger disk drives and larger capacity DRAMs.

Currently upgrades or purchase of new PCs have lengthened from a three-year cycle to one of five to six years. Present day entry-level MPUs are capable of running the Vista operating software, which was, introduced in 2007, given sufficient DRAM.

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Chapter 4 - Market By Product

4.1 Worldwide Semiconductor Market

Table 4.1 - Worldwide Market History, 2003-2008
(Millions of US\$)

Product Family							CAGR
	2003	2004	2005	2006	2007	2008	03>08
MOS Memory	32,506	47,136	48,519	58,473	57,854	46,348	7.4%
MOS Micro	43,526	50,734	54,687	53,939	56,211	53,140	4.1%
MOS Logic	36,922	49,303	57,670	60,158	67,292	73,531	14.8%
Analogue	26,794	31,367	31,922	36,940	36,453	35,637	5.9%
Bipolar Digital	217	232	na	na	na	na	na
Discrete	16,916	20,529	19,784	21,926	21,935	22,046	5.4%
Optoelectronics	9,545	13,726	14,902	16,280	15,901	17,902	13.4%
Total Worldwide	166,426	213,027	227,484	247,716	255,645	248,603	8.4%

Source: WSTS/Future Horizons

Table 4.2 - Worldwide Market Historical Growth, 2003-2008
(Percent Of US\$)

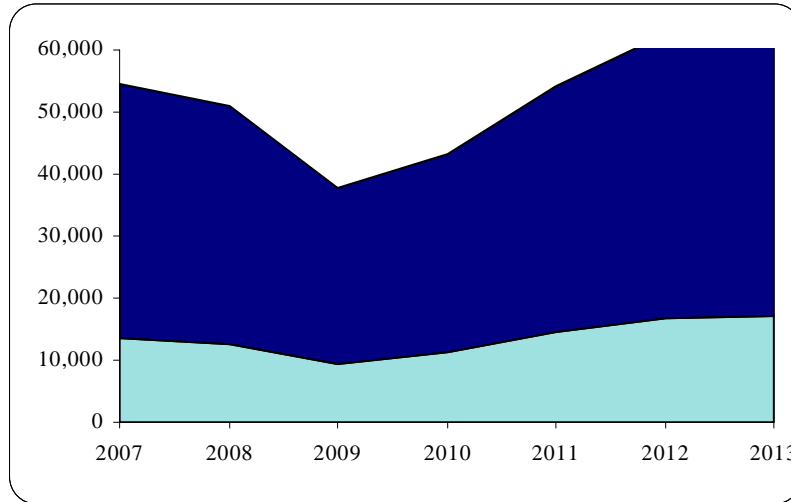
Product Family							CAGR
	2003	2004	2005	2006	2007	2008	03>08
MOS Memory	20.2%	45.0%	2.9%	20.5%	-1.1%	-19.9%	7.4%
MOS Micro	14.3%	16.6%	7.8%	-1.4%	4.2%	-5.5%	4.1%
MOS Logic	18.1%	33.5%	17.0%	4.3%	11.9%	9.3%	14.8%
Analogue	12.0%	17.1%	1.8%	15.7%	-1.3%	-2.2%	5.9%
Bipolar Digital	-4.2%	7.2%	-	-	-	-	na
Discrete	26.2%	21.4%	-3.6%	10.8%	0.0%	0.5%	5.4%
Optoelectronics	40.6%	43.8%	8.6%	9.3%	-2.3%	12.6%	13.4%
Total Worldwide	18.3%	28.0%	6.8%	8.9%	3.2%	-2.8%	8.4%

Source: WSTS/Future Horizons

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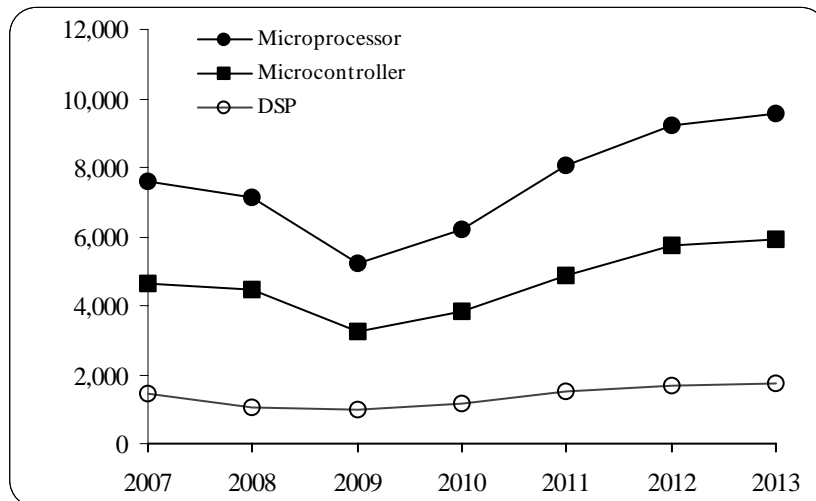
Chapter 4 - Market By Product

Figure 4.30 - Microcomponents Share Of Total Market, 2007-2013
(Millions of US\$)



Source: WSTS/Future Horizons

Figure 4.31 - Microcomponents Market Forecast, 2007-2013
(Millions of US\$)

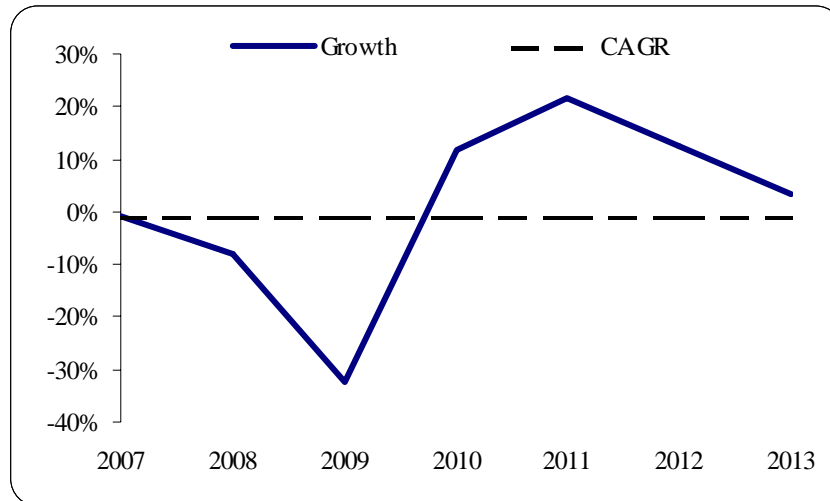


Source: WSTS/Future Horizons

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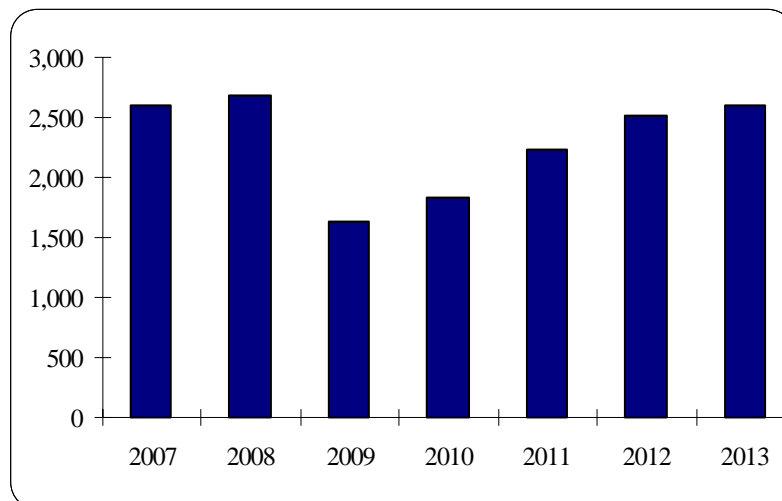
Chapter 4 - Market By Product

Figure 4.44 - Analogue Market Growth & CAGR, 2007-2013
(Percent Of US\$)



Source: WSTS/Future Horizons

Figure 4.45 - Standard Analogue Market Forecast, 2007-2013
(Millions of US\$)

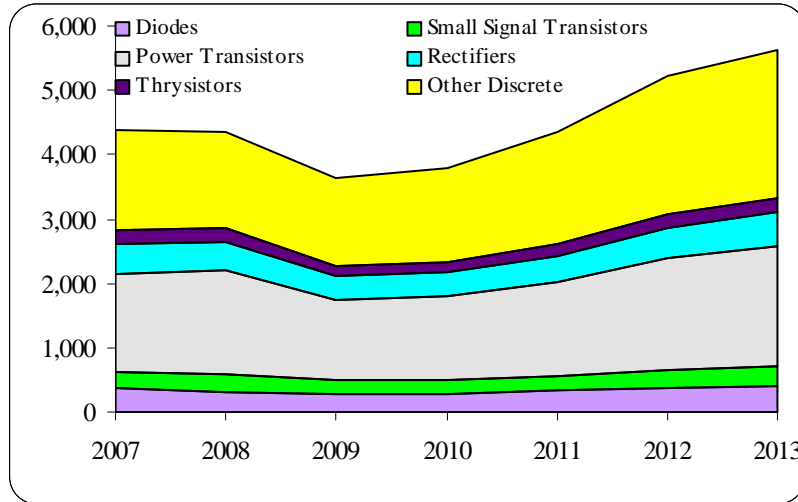


Source: WSTS/Future Horizons

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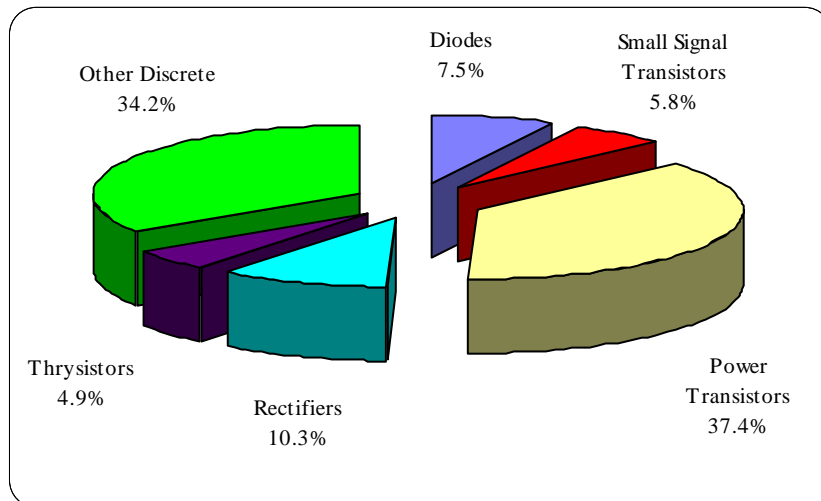
Chapter 4 - Market By Product

Figure 4.78 - Discrete Cumulative Market, 2007-2013
(Millions of US\$)



Source: WSTS/Future Horizons

Figure 4.79 - Discrete Market By Segment, 2008
(Percent Of US\$)



Source: Future Horizons

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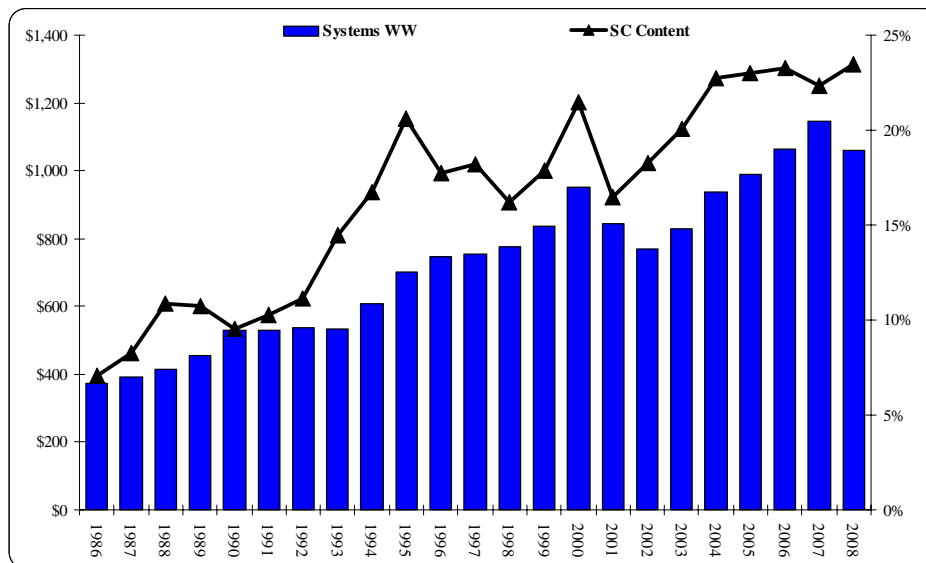
Chapter 6 - Market By Application

6.1 European Electronic Equipment Production

Worldwide and European semiconductor market growth is dependent on the strength of the worldwide and European electronic end equipment market which it serves, the value of the semiconductor content in systems, and the regional production mix.

Figure 6.1 shows the historic and forecast worldwide electronic equipment production value for 1986 through 2013 inclusive together with the percentage value of the semiconductor content. Europe accounted for 17.6 percent of the worldwide total in 2008, and this is expected to fall to 16.8 percent by 2013, in line with the global trends to move production to lower cost regions, such as Eastern Europe and Mainland China.. Figures 6.2 and 6.3 show the semiconductor content by application segment for 2008 and 2013 respectively.

Figure 6.1 - Worldwide Electronic Equipment Production, 1986-2013
(Millions of US\$)

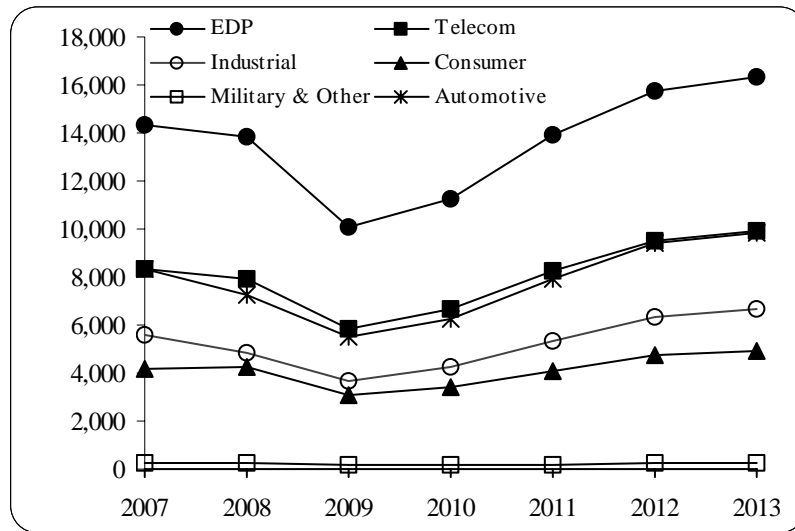


Source: WSTS/Future Horizons

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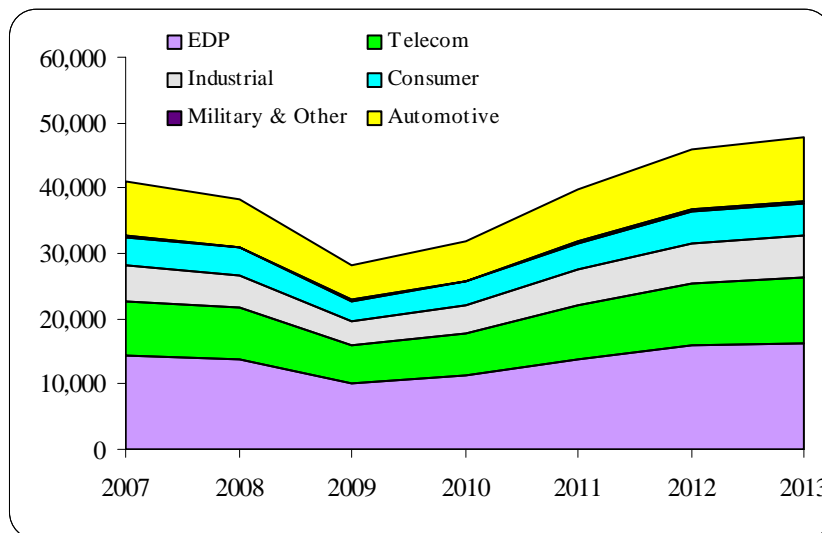
Chapter 6 - Market By Application

Figure 6.6 - Semiconductor Application Market Forecast, 2007-2013
(Millions of US\$)



Source: Future Horizons

Figure 6.7 - Semiconductor Application Cumulative Market, 2007-2013
(Millions of US\$)

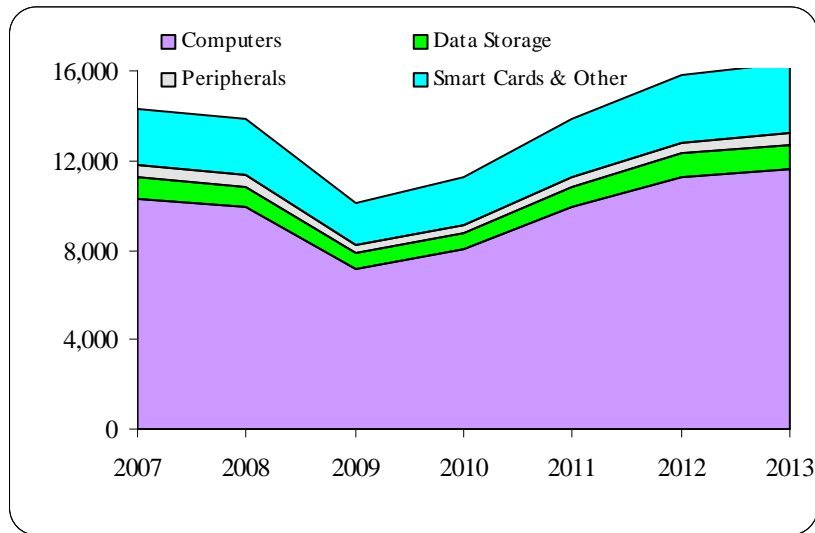


Source: Future Horizons

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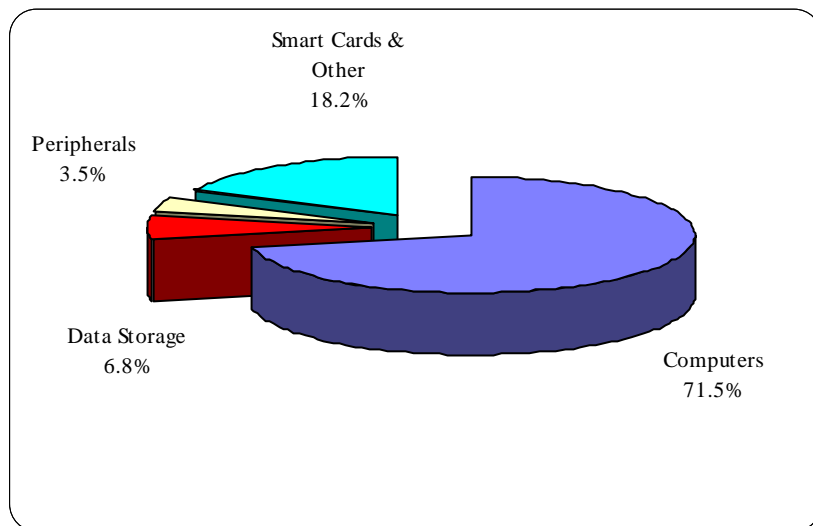
Chapter 6 - Market By Application

Figure 6.14 - EDP Cumulative Market, 2006-2012
(Millions of US\$)



Source: Future Horizons

Figure 6.15 - EDP Market By Segment, 2008
(Percent Of US\$)

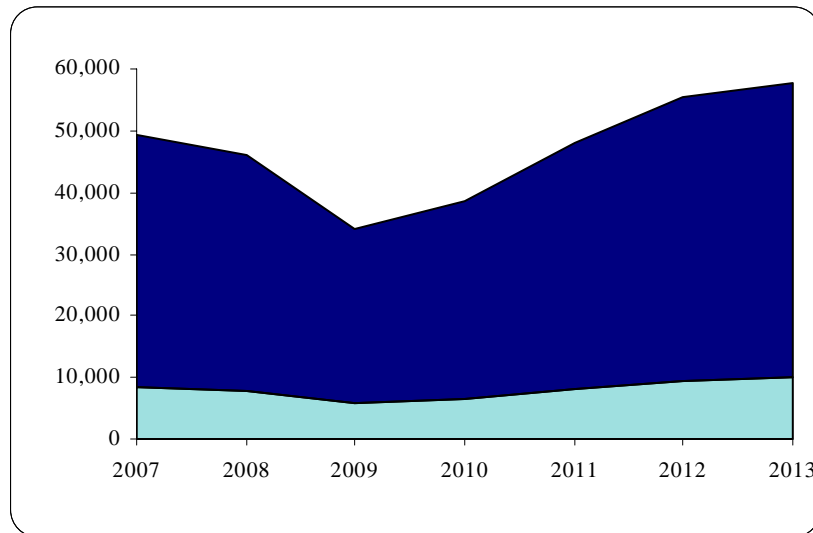


Source: Future Horizons

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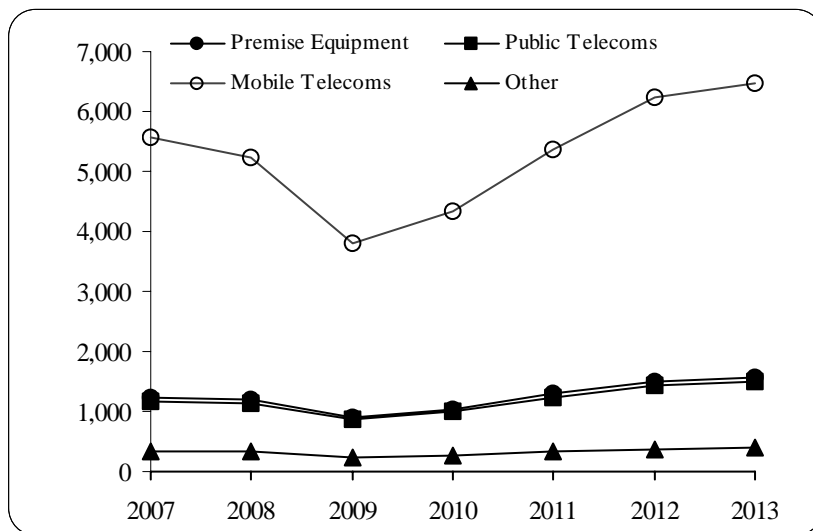
Chapter 6 - Market By Application

Figure 6.19 - Telecom Share Of Total Market, 2007-2013
(Millions of US\$)



Source: Future Horizons

Figure 6.20 - Telecom Market Forecast, 2007-2013
(Millions of US\$)



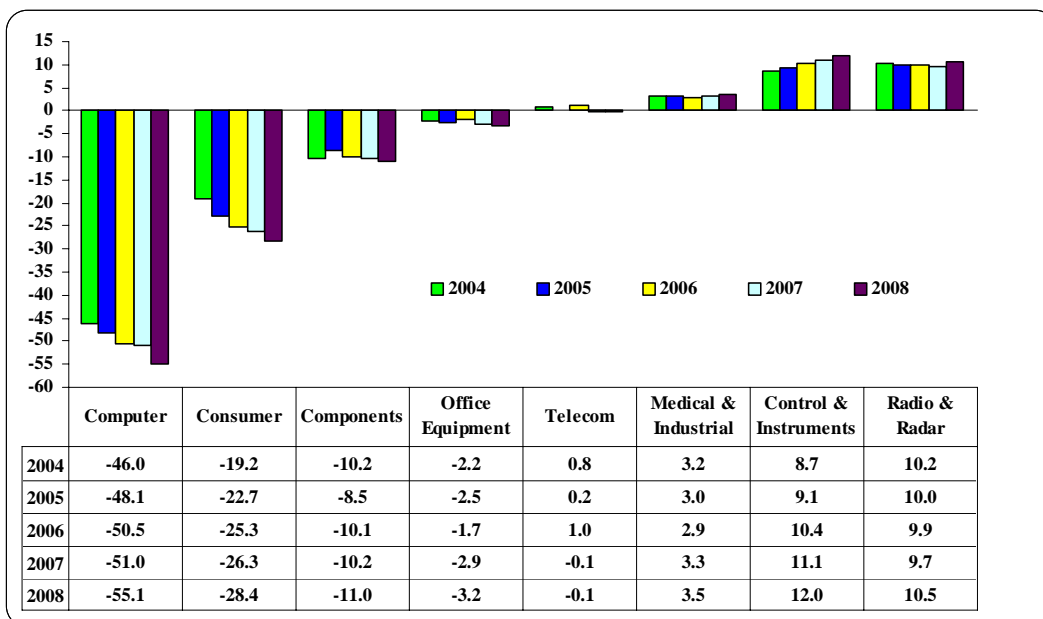
Source: Future Horizons

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Chapter 7 – European Regional Trends & Outlook

The largest difference between European market demand and European production is in the computer, consumer and components markets as is illustrated in Figure 7.8, which also shows the situation worsening. The emerging medical and industrial sectors are currently in positive balance; it however remains to be seen how long this situation will last once these markets develop into big global markets.

Figure 7.8 - European Electronics Trade Imbalance By Sector, 2004-2008



Source: Future Horizons

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Chapter 7 – European Regional Trends & Outlook

there has been a weak construction sector, depressed private consumption and poor export growth.

Agriculture, once the most important sector, is now dwarfed by industry and services. Industry accounts for over 45 percent of GDP, about 80 percent of exports and 30 percent of the labour force. Foreign-owned firms in the high-technology, chemical, mostly generate exports and financial services industries. Like the UK, most of its electronics industry depends on overseas-owned assembly plants, with little product development locally. Currently over 95 percent of Ireland's electronics business is foreign owned.

A number of electronic equipment assembly plants have either closed or been relocated overseas. The computer sector was most affected, causing reduced activity in a very short timescale.

Due to inflation and economic activity, property price have risen rapidly but are starting to fall, as in the UK. Ireland is in danger of losing its competitive position and may also lose its favoured position for EU development funding as new members join the EU.

The Irish Development Agency (IDA) has been very active and its target has been to attract foreign companies, particularly from the US, to locate in Ireland. Because of the close down of some manufacturing plants, a new IDA strategy has emerged with the object of encouraging a generation of smaller spin-off companies from existing industry.

Despite some of the setbacks, Ireland still has a group of computer OEMs such as Apple, Dell, Fujitsu, Hewlett-Packard and IBM, investing in the country. It also has a semiconductor industry that includes Analog Devices and Intel. Intel has built a US\$2 billion second fabrication facility (Fab 24) at its existing Leixlip site. Ireland also has a number of small IC design and fabless companies and was

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Chapter 7 – European Regional Trends & Outlook

however, Turkey is likely to adhere to the three-year IMF stand-by agreement signed in 2005, which envisages, among other things, continued tight fiscal policy, state-bank restructuring and privatisation.

The Turkish economy has expanded particularly strongly, with growth rates of 8.9 percent growth and 7.4 percent for the 2004 and 2005 respectively and slowed to 5.2 percent in 2006 and 5.1 percent in 2007. The growth in Turkey will slow due to a worsening economic climate as well as high inflation and interest rate increases. The GDP growth in 2009 is expected to be the range of between 4 to 5 percent.

The most important industry - and largest exporter - is textiles and clothing, but the country does have locally owned consumer electronic factories. Large companies are Alcatel Teletas, which has a telecommunications factory, Beko Elektronik a local manufacturer of colour TVs and Aselsan manufacturing professional and military electronics.

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Chapter 8 - European Market By Region

microprocessors. On the other hand the mobile phone manufacturers spend 20 to 25 percent of their revenues on semiconductors but are still below the Hewlett-Packard grand total,

It is noticeable that in the top-24 electronics companies there are:

- ❑ Eight headquartered in Japan
- ❑ Seven headquartered in the USA
- ❑ Five headquartered in Europe
- ❑ Two headquartered in South Korea
- ❑ One headquartered in Taiwan
- ❑ One headquartered in Singapore

but none as yet from mainland China, despite it having the highest growth rate for electronic manufacturing and now representing the world's single largest region, Figure 8.1.

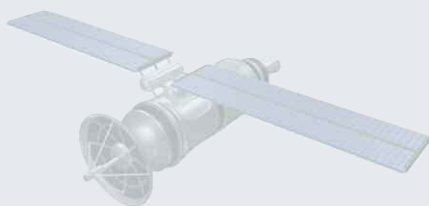
Two of the companies, Hon Hai Precision and Flextronics, are subcontracting companies in the Electronics Manufacturing Services (EMS) sector and win business manufacturing products for other companies in the list.



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Malcolm Penn is the founder and CEO of Future Horizons, with over 45 years experience in the electronics and semiconductor industry. He has worked extensively throughout Europe as well as in the United States, the former USSR, Japan and Korea, and was an early pioneer of pan-European research and product development collaboration in the 1970s during his tenure with ITT Europe. His industrial experience has involved him with all aspects of the management, manufacturing, marketing and use of electronic components, particularly semiconductor devices.

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