

EuP Preparatory Studies
“Imaging Equipment” (Lot 4)

Final Report on Task 2
“Economic and Market Analysis”

Compiled by Öko-Institut and Fraunhofer IZM

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Introduction

This is the **final report** on Task 2 “economic and market analysis” for the EuP Preparatory Studies on Imaging Equipment (Lot 4). The findings presented in this report are reflecting the research conducted by the IZM consortium as well as important feedback by industry and other stakeholders. The statements and recommendations presented in the final report however are not to be perceived as the opinion of the European Commission.

We like to acknowledge the fruitful collaboration and trustful working relationship with various industry partners, non-industry stakeholders and the European Commission throughout the study. We like to thank all stakeholders for their contribution and critical reviews of our reports.

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2. Economic and Market Analysis

2.1. Generic Economic Data

2.1.1. Task and Procedure

To place the product category imaging equipment within the total of EU industry and trade policy the following generic economic data were obtained:

- EU Production
- Extra-EU Trade
- Intra-EU Trade
- Apparent EU-consumption

The following analysis refers to the actual scope of the study as defined in Figure 2 of Task 1 which contains “office imaging equipment” with printers, copiers, scanner, facsimile machines and multifunctional devices, both for consumers and business. For scanners no generic economic data could be derived as official statistics subsume them in an overall product group “input and output devices” which also subsumes various other input and output devices like pointing devices (e.g. computer mouse, track- or roller ball, joystick, and touch screen), gaming devices, image / video input devices (image scanner, 3D scanner, digital camera / camcorder, webcam), audio input devices or speakers¹. Additionally, the European Commission asked the contractors of Lot 4 to include also the product groups mailing machines and digital duplicators into the scope of the study in order to be coherent with the scope of the current Energy Star Program for Imaging Equipment. As these two kinds of products were not originally specified by the EuP tender, a short summary of relevant generic economic data is provided in Chapter 2.1.2.5.

To be coherent with official data used in EU industry and trade policy, information for Subtask 2.1 is derived from official EU statistics. Eurostat is the Statistical Office of the European Communities. Production and trade data for more than 7,000 product groups can be extracted from Eurostat’s External Trade database *Prodcom*. Extra- and Intra-EU trade data can be found in Eurostat’s trade statistic (*EU25 Trade Since 1995*). Those product groups, being in the primarily scope of the EuP preparatory study imaging equipment, are: copiers, faxes, printers, scanners and MFDs. They are distributed in different Prodcom categories, see Table 1 below: 30.01.21 includes copiers, 30.02.14 and 30.02.16 include printers (and indirectly scanners, see above), and 32.20.20

¹ http://en.wikipedia.org/wiki/Input_device and http://en.wikipedia.org/wiki/Output_device

includes fax machines. The product groups “mailing machines” and “digital duplicators” are covered by Prodcom categories 30.01.13 and 30.01.23. The superior product categories 30.01 (manufacture of office machinery) and 30.02 (manufacture of computers and other information processing equipment) more or less address imaging devices. Faxes, however, are assigned to the superior category “manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy” (32.20), thus not being directly categorized as imaging equipment in Prodcom.

Table 1: Prodcom classification applicable to imaging equipment

30.01.21	Photo-copying apparatus incorporating an optical system or of the contact type and thermo-copying apparatus
30.01.21.70	Electrostatic photocopiers
30.01.21.83	Blueprinters, diazocopiers and other photocopying apparatus of the contact type
30.01.21.85	Photocopiers incorporating an optical system, thermocopiers (excluding electrostatic photocopiers and thermo-printers)
30.02.16	Input or output units, whether or not containing storage units in the same housing
30.02.16.30	Printers
32.20.20	Electrical apparatus for line telephony or line telegraphy
32.20.20.75	Fax machines
30.01.13	Calculating and accounting machines, cash registers, and Postage-franking machines, ticket-issuing machines and similar machines incorporating a calculating device
30.01.13.70	Postage-franking machines, ticket-issuing machines and similar machines incorporating a calculating device
30.01.23	Duplicating machines, addressing machines and address plate embossing machines, coin sorting or counting machines, other offices machines
30.01.23.30	Hectograph or stencil duplicating machines

In addition to Prodcom Eurostat provides another trade statistic (*EU25 Trade Since 1995*) whose classification is based on the Combined Nomenclature (CN). The following Table 2 shows the nomenclatures corresponding to imaging equipment. Especially for the copiers, trade statistic provides more detailed data as product categories are split up into further sub-categories.

Table 2: Classification of EU trade statistic applicable to imaging equipment

9009	Photocopying apparatus incorporating an optical system or of the contact type and thermo-copying apparatus
Electrostatic photocopying apparatus	
9009.11.00	Operating by reproducing the original image directly onto the copy (direct process)
9009.12.00	Operating by reproducing the original image via an intermediate onto the copy (indirect process)
Other photocopying apparatus	
9009.21.00	Incorporating an optical system (excluding electrostatic)
9009.22.00	Of the contact type
9009.22.10	Blueprinters and diazo-copiers
9009.22.90	Photocopying apparatus, of the contact type (excl. blueprinters and diazo-copiers)
9009.30.00	Thermo-copying apparatus (excl. thermo-printers)
8471.60	Input or output units for digital automatic data processing machines, whether or not containing storage units in the same housing
8471.60.40	Printers for digital automatic data processing machines, whether or not containing storage units in the same housing (excl. for use in civil aircraft of subheading 8471.60.10)
8517	Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones
8517.21.00	Fax machines
8470	Calculating and accounting machines, cash registers, and postage-franking machines, ticket-issuing machines and similar machines incorporating a calculating device
8470.90.00	Postage-franking machines, ticket-issuing machines and similar machines, incorporating a calculating device (excl. accounting machines, cash registers and automatic vending machines)
8472	Duplicating machines, addressing machines and address plate embossing machines, coin sorting or counting machines, other offices machines
8472.10.00	Duplicating machines "hectograph or stencil" (excl. printing machines and photocopying or thermo-copying machines)

The following Table 3 summarizes those product categories with their corresponding Prodcod and CN-codes for which further analysis of generic economic data is provided. Prodcod and trade statistic provide no explicit data for scanners, which are also in the scope of this EuP study.

Table 3: Prodcod classification and corresponding CN-Codes applicable to imaging equipment

Prodcod-Code	Description of Prodcod-Codes	Corresponding CN-Code
30.01.21.70	Electrostatic photocopiers	9009.11.00 9009.12.00
30.01.21.83	Blueprinters, diazocopiers and other photocopying apparatus of the contact type	9009.22.00 9009.22.10 9009.22.90
30.01.21.85	Photocopiers incorporating an optical system, thermocopiers (excluding electrostatic photocopiers and thermo-printers)	9009.21.00 9009.30.00
30.02.16.30	Printers	8471.60.40
32.30.20.85	Fax machines	8517.21.00
30.01.13.70	Postage-franking machines, ticket-issuing machines and similar machines incorporating a calculating device	8470.90.00
30.01.23.30	Hectograph or stencil duplicating machines	8472.10.00

2.1.2. Results

2.1.2.1. EU-Production

The following Table 4 gives a first overview on the domestic production of imaging equipment in EU25 countries, based on Prodcom statistics. In four countries there is no production of imaging equipment at all, in eleven countries it has not been reported or data is unavailable. Most production data were provided for printers (Prodcom 30.02.16.30), followed by electrostatic photocopiers (Prodcom 30.01.21.70) and fax machines (Prodcom 32.20.20.75). For copiers of the contact type (Blueprinters, diazocopiers or others, Prodcom 30.01.21.83) and copiers incorporating an optical system or thermocopiers (Prodcom 30.01.21.85), there is no production respectively no production data available in EU25 countries.

Table 4: Domestic production of imaging equipment in EU25-countries, 1995-2004

No.	Declarant	Production					No production / (not reported)
		30.01.21.70	30.01.21.83	30.01.21.85	30.02.16.30	32.20.20.75	
1	France	X	:/0	:	X	:	
3	Netherlands	:/0	:/0	:/0	:/0	:/0	(X)
4	Germany	X	:	:/0	X	X (1995-96)	
5	Italy	:/0	:/0	:	X	X	
6	United Kingdom	:/0	:/0	:	X	X	
7	Ireland	0	:/0	:/0	X (1997-98)	0	
8	Denmark	X (1995-01)	:/0	:/0	X	0	
9	Greece	0	:/0	:/0	:/0	0	(X)
10	Portugal	0	:/0	:/0	:/0	0	(X)
11	Spain	0	:/0	:/0	X	:/0	
17	Belgium	0	:/0	:/0	:	:/0	(X)
18	Luxemburg	0	:/0	:/0	0	0	(X)
30	Sweden	0	X (1996-98)	:/0	X (1996-00)	X (1996-00)	
32	Finland	:/0	:/0	:/0	:/0	:/0	(X)
38	Austria	0	:/0	:/0	:/0	:	(X)
46	Malta	0	0	0	0	0	X
53	Estonia	0	0	0	0	0	X
54	Latvia	0	0	0	0	0	X
55	Lituania	0	0	:/0	:/0	0	(X)
60	Poland	0	0	:/0	X (2002)	0	
61	Czech Republic	0	:/0	:/0	:/0	:/0	(X)
63	Slovakia	:/0	:/0	:/0	:/0	:/0	(X)
64	Hungary	0	0	0	X (2002)	:	
91	Slovenia	0	0	0	:/0	0	(X)
600	Cyprus	0	0	0	0	0	X

Note: “:” means that the production has not been reported by the country and is unavailable; “:/0” means that in some years the production volume was 0, in other years data were not reported.

The following table shows the most recent available production data (2004) of electrostatic photocopiers, printers and fax machines of EU25-countries, differentiated by country, technology, volume and value. Only France, Germany, Italy, United Kingdom and Denmark provided

production data for printers, France also for electrostatic photocopiers. In general, recent production of imaging equipment seems to be on a rather small scale level in EU25 countries.

Table 5: Domestic production of copiers, printers and fax machines in 2004

		Electrostatic photocopiers ²		Printers ³		Fax machines ⁴	
		000 units	Mio Euro	000 units	Mio Euro	000 units	Mio Euro
1	France	217	218	74	77	:	:
3	Netherlands	0	0	0	0	0	0
4	Germany	:	:	100	193	0	0
5	Italy	0	0	544	77	:	:
6	UK	0	0	153	43	:	:
7	Ireland	0	0	:	:	0	0
8	Denmark	0	0	0.3	2	0	0
9	Greece	0	0	0	0	0	0
10	Portugal	0	0	0	0	0	0
11	Spain	0	0	:	:	:	:
17	Belgium	0	0	:	:	0	0
18	Luxemburg	0	0	0	0	0	0
30	Sweden	0	0	:	:	0	0
32	Finland	0	0	0	0	0	0
38	Austria	0	0	0	0	:	:
46	Malta	0	0	0	0	0	0
53	Estonia	0	0	0	0	0	0
54	Latvia	0	0	0	0	0	0
55	Lituania	0	0	:	:	0	0
60	Poland	0	0	:	:	0	0
61	Czech Republic	0	0	:	:	0	0
63	Slovakia	0	0	:	:	0	0
64	Hungary	0	0	:	:	:	:
91	Slovenia	0	0	:	:	0	0
600	Cyprus	0	0	0	0	0	0
	EU15 Totals	:	:	908	:	:	:
	EU25 Totals	:	:	:	776	3,555 (e)	321 (e)

Note: “:” means that the production has not been reported by the country and is unavailable.
(e) = estimated

The office imaging equipment market is clearly dominated by Japanese and US companies as the following table illustrates. The production of imaging equipment is continuously shifting to Asia, with only small manufacturing capacity remaining in Europe, for example Olivetti or CPG International in Italy, CAB, Triumph-Adler and Utax in Germany or Philips or Océ in Netherlands. In the latter case, Prodcum and the following table diverge because Prodcum states no domestic production in the Netherlands.

² Prodcum-Code 30.01.21.70

³ Prodcum-Code 30.02.16.30

⁴ Prodcum-Code 32.20.20.75

Table 6: Image Equipment Manufacturer by Region and Product

Manufacturer		Product category												
Name	Nationality	Printers			Copiers	Scanners	Faxes				MFD			
		Laser	Inkjet	others			Thermal transfer	Thermal paper	Laser	Inkjet	Inkjet	Laser	Thermal transfer	
AMT Datasouth	USA			x										
Brother	JPN	x						x	x			x	x	
cab GmbH	Germany		x	x										
Canon	JPN	x	x	x	x	x	x	x	x	x	x	x	x	
Copystar	USA	x			x					x			x	
CPG International	Italy			x										
Datamax	USA			x		x								
Dell	USA	x	x	x								x	x	
Eastman Kodak	USA		x	x		x								
Epson	JPN	x	x	x		x						x	x	
Fuji Xerox	USA/JPN	x			x	x				x			x	
Fujifilm	JPN			x										
Fujitsu	JPN	x		x		x								
Hewlett-Packard	USA	x	x									x		
Hitachi	JPN	x		x									x	
IBM	USA	x		x										
Konica Minolta	JPN	x			x	x		x	x				x	
Kyocera Mita	JPN	x			x								x	
Lanier (Ricoh)	USA (JPN)	x			x	x							x	
Lexmark	USA	x	x									x		
NEC	JPN	x		x		x	x							
Nikon	JPN					x								
NRG (Ricoh)	UK (JPN)	x			x	x				x			x	
Océ	NL	x	x			x							x	
Oki	JPN	x		x										
Olivetti	Italy	x	x		x						x			
Panasonic	JPN						x	x						
Philips	NL											x	x	x
Pitney Bowers	USA	x	x	x										
Printronix	USA	x		x										
Ricoh	JPN	x	x		x	x	x	x	x				x	
Samsung	Korea	x								x			x	
Sanyo	JPN						x	x						
Sharp	JPN	x			x	x	x					x	x	
Tally Genicom	USA	x	x	x										
TA Triumph-Adler	Germany	x			x					x			x	
Toshiba	JPN						x	x				x	x	
Toshiba TEC	JPN			x										
UTAX	Germany	x			x					x			x	
Xerox	USA	x		x	x	x							x	

Source: Manufacturers' homepages

The following Figure 1 illustrates the shrinking production volume and the corresponding value of printers (Prodcom 30.02.16.30) in Germany and United Kingdom between 1996 and 2004. It shows after a peak in 1997 a rapid decline of British production after 2001 whereas the German production has been quite constant during those years. In both countries the production value made a downturn in the past years.

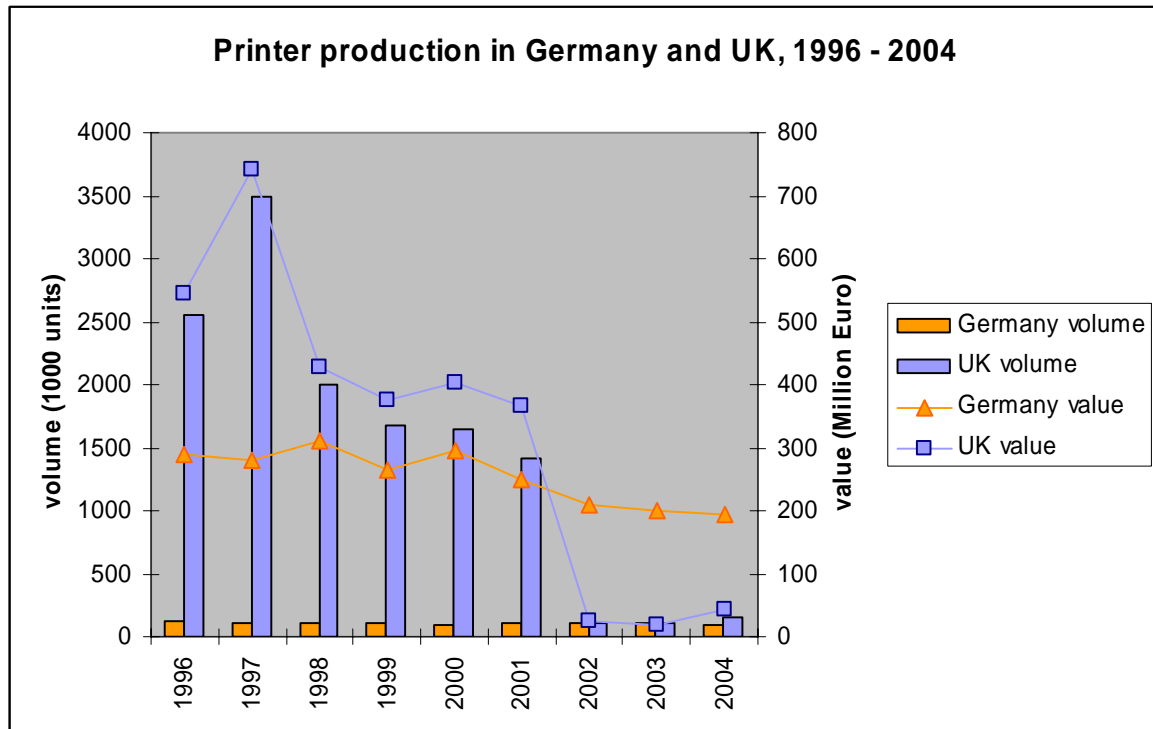


Figure 1: Germany's and UK's production of printers (Prodcom 3002630), 1996-2004

2.1.2.2. Extra-EU trade

The following table provides Extra-EU trade data of EU25 countries in 2003 and 2004, i.e. import and export data differentiated by technology, volume, value and average price. The most important role, both for exports and imports play printers whereas on the other side the number of blueprinters and diazocopiers – already being on a very low level – further declined, especially for imports. The average price of electrostatic photocopiers is approximately ten times as high as for printers. Generally, more imaging devices are imported by EU25 countries than exported.

Table 7: Extra-EU trade of EU25 totals, 2003 and 2004 (Trade statistic)

Product categories ⁵	volume (1000 units)				value (Million Euro)				average price (Euro)			
	Export		Import		Export		Import		Export		Import	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Electrostatic copiers	313	267	860	978	300	296	1,045	1,227	961	1,107	1,216	1,254
Blueprint/diazocopiers	9	7	6	0,2	6	5	1	0,2	718	718	190	1,087
Copiers, optical/thermo	437	519	1.335	1.844	98	102	215	235	224	197	161	128
Printers	7,916	8,279	29,165	33,194	1,355	1,379	3,912	3,909	171	167	134	118
Fax machines	238	399	2.398	3.329	48	74	386	429	203	186	161	129

⁵ Electrostatic copiers: CN-codes 9009.11.00/12.00; Blueprint/diazocopiers: 9009.22.00/10/90; Copiers optical/thermo: 9009.21.00/9009.30.00; Printers: 8471.60.40; Fax machines: 8517.21.00

In contrast to the EU25 trade statistic, Prodcom statistic provides no differentiation between Intra- and Extra-EU trades, i.e. you cannot identify if e.g. exports of printers go to Extra- or Intra-EU countries. Therefore, trade data of Prodcom are higher than trade statistic data (see next table) because Prodcom also contains trades of EU25 totals that go to Intra-EU trade again.

Table 8: Trade (imports and exports) of EU25 totals, 2003 and 2004 (Prodcom statistic)

Code	volume (1000 units)				value (Million Euro)				average price (Euro)			
	Export		Import		Export		Import		Export		Import	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
30012170	345	369	888	1,026	326	367	1,082	1,286	946	994	1,219	1,253
30012183	9	8	7	0,2	7	5	1	0,3	755	690	193	1,024
30012185	619	963	1,990	2.782	128	136	331	355	207	141	166	128
30021630	10,415	10,230	35,182	38,529	1,673	1,609	4,346	4,317	161	157	124	112
32202075	351	505	3.294	4,169	66	89	481	502	189	177	146	121

The following Table 9 and Table 10 as well as Figure 2 and 10 show the Extra-EU trade of EU25 countries with printers, electrostatic copiers and fax machines (export, import and average price).

Table 9: Extra-EU trade of EU25 totals with printers, 1996-2005

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
volume (1000 units)	import	9669	11452	15425	20008	19142	23417	27429	29165	33194	30854
	export	1302	2369	2974	3170	4709	5111	5894	7916	8279	8955
value (Mio Euro)	import	2345	2358	2672	2673	2994	3499	3662	3912	3909	3524
	export	650	906	1070	1119	1490	1515	1314	1355	1379	1484
average price (Euro)	import	243	206	173	134	156	149	133	134	118	114
	export	500	383	360	353	316	296	223	171	167	166

Table 10: Extra-EU trade of EU25 totals with electrostatic copiers, 1996-2005

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
volume (1000 units)	import	337	359	678	966	1071	1118	1574	860	978	1256
	export	134	187	168	151	165	179	282	313	267	281
value (Mio Euro)	import	438	560	816	1226	1375	1368	1178	1045	1227	1280
	export	254	258	244	273	308	245	240	300	296	228
average price (Euro)	import	1300	1559	1204	1268	1283	1224	748	1216	1254	1019
	export	1903	1375	1451	1804	1867	1368	851	961	1107	812

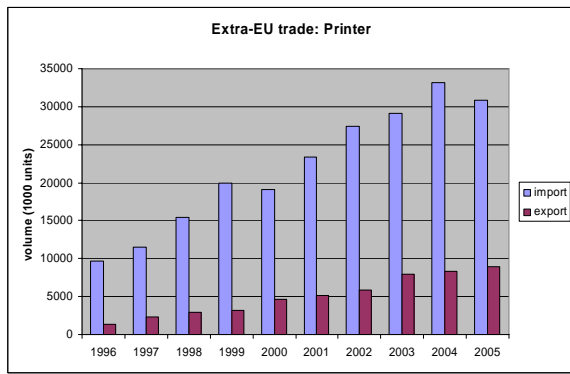


Figure 2: Extra-EU trade, printers

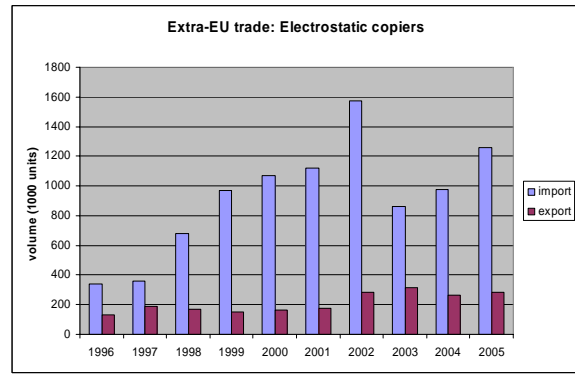


Figure 3: Extra-EU trade, electrostatic copiers

Extra-EU trade of printers, both exports and imports, has been continuously rising since 1996 with a slightly decline in 2005. Import numbers are around four times higher than export numbers. The average price of printers has been falling ever since 1996 with export prices always having been higher than those of imported printers. Today's price has fallen to half of its value compared to 1997. The number of traded electrostatic photocopiers is much lower than that of printers. At the same time, the average price of imported electrostatic copiers is about ten times higher than that of imported printers. Different from printers, in some years the average price of exported copiers is lower than that of imported devices. Except a peak with a following decline in 2002 there has been an overall increase of import numbers for electrostatic copiers since 1996.

Table 11: Extra-EU trade of EU25 totals with fax machines, 1996-2005

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
volume (1000 units)	import	2352	2333	2056	2493	3437	2555	2494	2398	3329	3760
	export	60	228	134	139	235	234	223	238	399	583
value (Mio Euro)	import	683	626	498	594	837	637	513	386	429	408
	export	42	46	45	36	44	50	55	48	74	114
average price (Euro)	import	290	268	242	238	243	249	206	161	129	109
	export	687	203	332	261	187	214	245	203	186	195

No clear trend is visible in the trade of fax machines. After a peak in 2000, followed by a short decline, import numbers have been rising again since 2003, even exceeding the imports of 2000. Today's average price of fax machines is about one third compared to 1996.

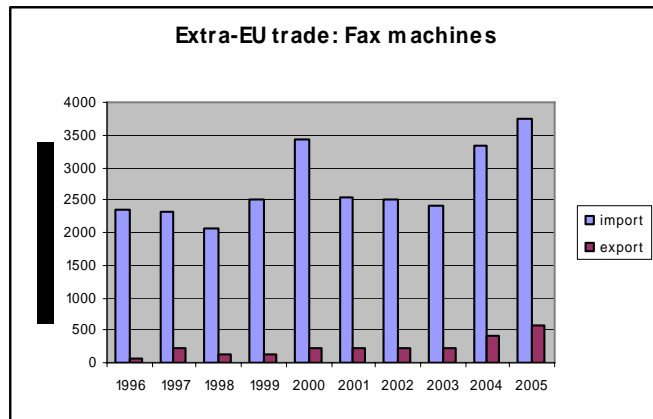


Figure 4: Extra-EU trade, fax machines

Table 12 and Table 13 present Extra-EU imports and exports of copiers, printers and fax machines in 1996, 2000 and 2005. The highest import and export numbers are within printers (CN-code 8471.60.40), but also the import numbers of copiers and fax machines rose significantly between 2000 and 2005. Minor roles play blueprinters and diazocopiers. In this period the average prices of imported and exported copiers, printers and fax machines declined in most of the product categories.

Table 12: Extra-EU trade: Imports of EU25 totals in 1996, 2000 and 2005

		volume (1000 units)			value (Million Euro)			average price (Euro)		
		1996	2000	2005	1996	2000	2005	1996	2000	2005
Electrostatic copiers	9009.11.00	56	68	10	5	21	2	96	309	239
	9009.12.00	282	1004	1245	433	1354	1277	1538	1349	1026
Blueprinters/diazocopiers	9009.22.00	:	:	0,1	:	:	0,1	-	-	1946
	9009.22.10	0	4	:	0,1	0,4	:	4453	92	-
	9009.22.90	0,6	4	:	4	4	:	5905	981	-
Copiers, optical/thermo	9009.21.00	110	58	2956	183	46	221	1658	784	75
	9009.30.00	6	8	17	4	7	0,9	624	835	52
Printers	8471.60.40	9669	19142	30854	2345	2994	3524	243	156	114
Fax machines	8517.21.00	2352	3437	3760	683	837	408	290	243	109

Table 13: Extra-EU trade: Exports of EU25 totals in 1996, 2000 and 2005

		volume (1000 units)			value (Million Euro)			average price (Euro)		
		1996	2000	2005	1996	2000	2005	1996	2000	2005
Electrostatic copiers	9009.11.00	45	65	122	22	36	26	487	558	213
	9009.12.00	89	100	159	233	272	202	2617	2712	1271
Blueprinters/diazocopiers	9009.22.00	:	:	8	:	:	4	-	-	526
	9009.22.10	1	0,5	:	2	0,7	:	2104	1427	-
	9009.22.90	4	19	:	18	13	:	4206	693	-
Copiers, optical/thermo	9009.21.00	35	55	588	39	36	68	1128	664	116
	9009.30.00	5	3	17	3	2	3	728	629	165
Printers	8471.60.40	1302	4709	8955	650	1490	1484	500	316	166
Fax machines	8517.21.00	60	235	583	42	44	114	687	187	195

2.1.2.3. Intra-EU trade

The following table provides Intra- and Extra-EU trade data of EU25 countries in 2004. “Intra-EU imports” mean products that are imported by EU countries from other European countries, whereas “Intra-EU exports” are products which are exported by EU countries again to other European countries. Except for blueprinters and diazocopiers, 70 to 90 percent of 2004 exports of printers, copiers (electrostatic/thermo) and fax machines were Intra-EU trade, i.e. were exported again to European countries, only 10 to 30 percent were exported to Extra-EU countries. Imports of printers and fax machines came in almost equal shares from Intra- and Extra-EU countries. Around 60 to 70 percent of electrostatic and thermal copiers were imported by Intra-EU countries, around 30 to 40 percent of imports came from other, non European countries. Printers head the table in every case whereas trade with blueprinters and diazocopiers don not seem to play a role any more.

Table 14: Intra- and Extra-EU trade of EU25 countries, 2004 (Trade statistic)

	Electrostatic copiers		Blueprinters/diazocopiers		Copiers, optical/thermo		Printers		Fax machines	
	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.
	1000 units		1000 units		1000 units		1000 units		1000 units	
Intra-EU trade	2309	2607	4	3	3240	2289	30546	27962	3971	3172
Extra-EU trade	978	267	0	7	1844	519	33194	8279	3329	399
<i>EU25 totals: calculated sum Intra-/Extra-EU trade</i>	3288	2875	5	10	5084	2808	63740	36240	7300	3571

In contrast to the EU25 trade statistic, Prodcom statistic provides more detailed data regarding single countries, but on the other hand no differentiation between Intra- and Extra-EU trades, i.e. you cannot identify if e.g. exports of printers go to Extra- or Intra-EU countries. Therefore, trade data of Prodcom are generally higher than trade statistic data (see next table) because Prodcom also contains trades of EU25 totals that go to Extra-EU trade again.

Table 15: Imports and exports of EU25 countries, 2004 (Prodcom statistic)

		Electrostatic copiers		Blueprinters/diazocopiers		Copiers, optical/thermo		Printers		Fax machines	
		Imp.	Exp.	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.
		1000 units		1000 units		1000 units		1000 units		1000 units	
1	France	217	211	0	2	829	135	9973	6639	1619	1182
3	Netherlands	514	2213	0	1	450	612	14804	8913	451	246
4	Germany	478	176	0	0	2510	1394	12089	11109	1305	456
5	Italy	368	28	3	1	189	31	4127	522	954	368
6	United Kingdom	929	97	0	0	339	497	5661	1612	822	244
7	Ireland	9	0	0	0	2	1	257	210	31	3
8	Denmark	13	5	0	0	53	4	605	54	75	10
9	Greece	14	1	0	0	71	1	4208	8	97	1
10	Portugal	8	1	0	0	64	3	539	33	57	3
11	Spain	296	30	0	0	139	9	2960	400	465	32
17	Belgium	49	39	0	5	79	40	2062	1399	170	34

Table 24 (continuation): Imports and exports of EU25 countries, 2004 (Prodcom statistic)

		Electrostatic copiers		Blueprinters/diazocopiers		Copiers, optical/thermo		Printers		Fax machines	
		Imp.	Exp.	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.
		1000 units		1000 units		1000 units		1000 units		1000 units	
18	Luxemburg	23	1	0	0	2	1	58	25	11	0
30	Sweden	49	29	0	0	100	45	1067	328	166	45
32	Finland	138	7	0	0	32	2	454	109	39	8
38	Austria	68	30	1	0	51	23	779	342	751	0
46	Malta	8	0	0	0	1	0	42	1	2	0
53	Estonia	1	0	0	0	2	0	51	9	5	0
54	Latvia	3	0	0	0	4	0	57	2	8	0
55	Lituania	5	0	0	0	2	0	138	32	17	2
60	Poland	51	1	0	0	62	1	1560	67	109	3
61	Czech Republic	17	5	0	0	51	4	872	413	59	28
63	Slovakia	9	0	0	0	6	1	231	72	11	0
64	Hungary	14	0	0	0	38	1	983	3926	57	905
91	Slovenia	3	0	0	0	2	2	127	13	11	0
600	Cyprus	4	0	0	0	5	0	38	0	8	0
EU25 totals (calculated)		3288	2875	5	10	5084	2807	63740	36240	7300	3571

The following tables and figures show the Intra-EU trade of EU25 countries with electrostatic and optical/thermo copiers (export, import and average price).

Table 16: Intra-EU trade of EU25 totals with electrostatic copiers (9009.11.00 & 9009.12.00)

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
volume (1000 units)	import	850	833	754	863	1373	887	1005	1200	2309	2624
	export	718	938	1178	1002	1004	1185	1747	1713	2607	3149
value (Mio Euro)	import	1192	1242	1204	1244	1360	1308	1293	1210	1359	1686
	export	1378	1404	1623	1660	1737	1643	1695	1692	1700	1924
average price (Euro)	import	1403	1491	1596	1441	991	1475	1287	1009	589	643
	export	1919	1497	1378	1657	1729	1387	970	988	652	611

Table 17: Intra-EU trade of EU25 totals with optical/thermo copiers (9009.21.00/9009.30.00)

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
volume (1000 units)	import	604	578	403	293	300	4860	1802	2820	3240	3923
	export	614	643	364	227	266	200	1188	2370	2289	2117
value (Mio Euro)	import	956	905	624	464	527	376	553	580	595	447
	export	690	803	431	310	289	171	368	342	301	265
average price (Euro)	import	1581	1565	1549	1584	1757	77	307	206	184	114
	export	1123	1249	1186	1365	1087	853	310	144	131	125

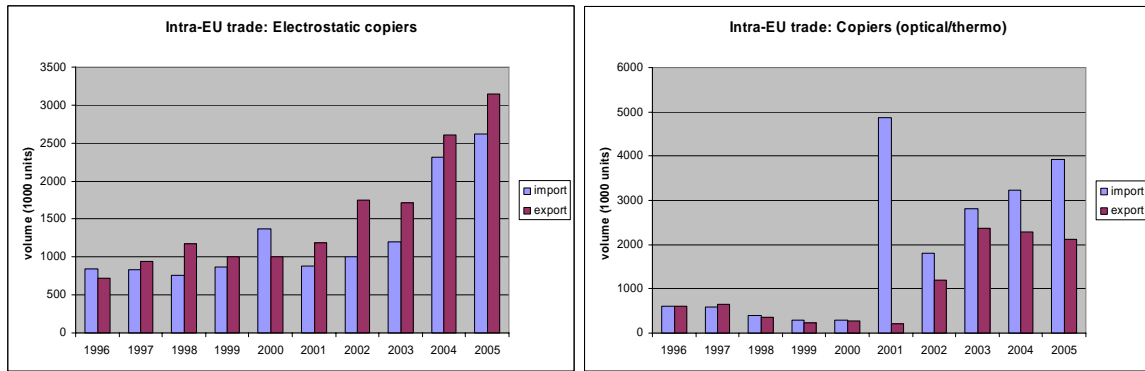


Figure 5: Intra-EU trade: Electrostatic copiers

Figure 6: Intra-EU trade: optical/thermo copiers

Extra-EU trade of *electrostatic copiers*, both exports and imports, has been continuously rising since 1996. The average price has been falling ever since 1996, today being less than half of its value compared to 1996. For *optical and thermocopiers* the price decline is even worse, starting from 1,100 to 1,500 Euro in 1996 and being around 100 Euro today. Indefinably is the peak of import numbers in 2001 which derives from Luxemburg's declarations (see following Table 18).

Table 18: Luxemburg's declaration of Intra-EU trade with optical / thermocopiers, 2000-2002

			2000	2001	2002
EU trade statistic (Code 9009.21.00)	volume (units)	import	3089	4628816	1261
		export	278	242	84
Prodcom statistic (Code 3001.21.85)	volume (units)	import	:	4628880	1270
		export	:	242	87

The following tables and figures show the Intra-EU trade of EU25 countries with printers and fax machines (export, import and average price).

Table 19: Intra-EU trade of EU25 totals with printers (8471.60.40)

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
volume (1000 units)	import	16268	14072	21082	27257	34371	30720	24653	26654	30546	37389
	export	15170	14573	19682	25218	34471	31141	25695	34609	27962	27527
value (Mio Euro)	import	3770	3603	4786	5235	6022	5682	4544	4092	4200	4193
	export	4071	4049	4778	5218	6011	5715	4559	5337	4833	4187
average price (Euro)	import	232	256	227	192	175	185	184	154	137	112
	export	268	278	243	207	174	184	177	154	173	152

Table 20: Intra-EU trade of EU25 totals with fax machines (8517.21.00)

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
volume (1000 units)	import	1280	1611	3080	2780	5435	4651	3681	3961	3971	4121
	export	701	1168	1853	2044	4835	4241	3371	3056	3172	3576
value (Mio Euro)	import	365	388	549	683	783	808	551	524	483	526
	export	314	347	494	472	684	702	522	405	367	490
average price (Euro)	import	285	241	178	246	144	174	150	132	122	128
	export	448	297	267	231	142	166	155	132	116	137

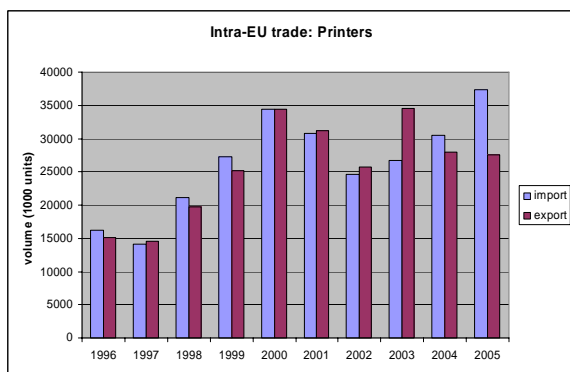


Figure 7: Intra-EU trade: Printers

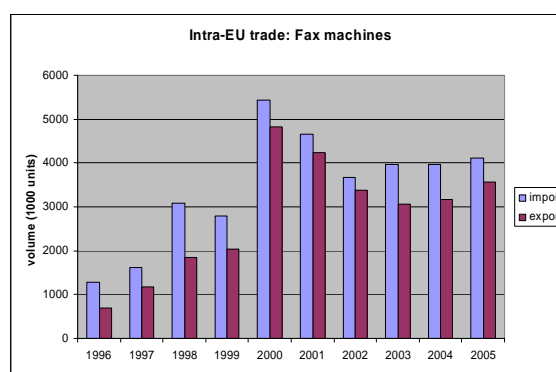


Figure 8: Intra-EU trade: Fax machines

The number of traded *printers* is much higher than that of copiers. Except a peak with a following decline in 2000-02 there has been an overall increase of import numbers for printers since 1996.

Except a peak with a following decline in 2000 there has been an overall increase of export and import numbers for *fax machines* since 1996. In both product groups, average prices have been falling to nearly half of their value in 1996.

The following Table 21 presents the Intra-EU trade of EU25 totals in 2005, i.e. imports and exports within European countries, split up by technology, volume and value, as well as the calculated average price per product category.

Table 21: Intra-EU trade of EU25 totals in 2005 (Trade statistic)

		Import			Export		
		volume (1000 units)	value (Million Euro)	Average price (Euro)	volume (1000 units)	value (Million Euro)	average price (Euro)
Electrostatic copiers	90091100	667	197	295	2067	176	85
	90091200	1956	1489	761	1082	1748	1616
Diazocopiers/blueprinters	90092200	4	3	569	2	1	654
Copiers (thermo/ optical)	90092100	3789	442	117	2043	264	129
	90093000	133	5	38	74	1	15
Printers	84714060	37389	4193	112	27527	4187	152
Fax machines	85281300	4121	526	128	3576	490	137

2.1.2.4. Apparent EU-consumption

Apparent EU-consumption is calculated from production plus imports minus exports. As there are quite a number of difficulties, it might be quite a challenge to interpret those calculations and take them as basis for further proceedings.

- The figure for apparent consumption can only be calculated if production, import and export data are all available. There are several gaps, especially for production data, which becomes obvious in the next table below.

- There are temporal delays between the various operations taken into account: production, sale and export. Storage explains a part of these delays which are reduced or even disappear when the data are considered over several years.
- The value of exports cannot always be compared directly with the values of sold production.

Due of these facts and other problems, described in [Williams 2003], in certain cases the product markets may appear negative. Table 22 shows the apparent EU-consumption for Electrostatic copiers, Diazocopiers and Blueprinters, Copiers (thermo and optical), Printers and Fax machines in 1995, 2000 and 2004, calculated from Prodcom data. Table 23 is an extract of those countries providing a nearly complete data set for electrostatic photocopiers between 1995 and 2004.

Table 22: Apparent EU-consumption (1000 units) of imaging equipment in 1995, 2000, 2004

		Electrostatic copiers			Diazocopiers/blueprinters			Copiers (thermo/ optical)			Printers			Fax machines		
		1995	2000	2004	1995	2000	2004	1995	2000	2004	1995	2000	2004	1995	2000	2004
1	France	-1		223			-2						3408	-213		
3	Netherlands			1699			-1						5891		176	206
4	Germany	172	351						1116			8130	1081	1288		849
5	Italy			340								4404	4149		717	
6	United Kingdom			831			-0,2					4738	4201	55	1123	
7	Ireland	59	17	9					2					21	28	28
8	Denmark	17	0,3	8			-0,2		49		496	551	66	102	65	
9	Greece	4	11	13					70			4199	30	95	96	
10	Portugal	0,3	2	7			-0,3		61		385	506	30	66	54	
11	Spain	13	39	266			-0,1		130		2124					
17	Belgium	18	22	10			-4		39						145	136
18	Luxemburg		1	22					2		34	33		10	11	
30	Sweden		452	20					55		664			226	121	
32	Finland		18	132			-0,1		30		312	345		43	31	
38	Austria	24	30	39			0,7		29		144	437				
46	Malta			8					0,5			41				2
53	Estonia		1	1			0,1		2		34	42		4	5	
54	Latvia			3					4			55				8
55	Lituania		2	5			0,3				46			5	15	
60	Poland			50					61							106
61	Czech Republic			12			0,1		47							30
63	Slovakia			9					5							11
64	Hungary			14					38							
91	Slovenia			3					-0,5							10
600	Cyprus			4			0		5			37				8
EU15 Totals												27134				
EU25 Totals									2066							7219

Table 23: Apparent EU-consumption of Electrostatic photocopiers (30.01.21.70), 1995-2004

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Ireland	59460	6247	4365	9033	11848	16602	11117	15694	15232	8741
Denmark	16679	12039	1316	14666	18191	339	-7133	14390	5580	7590
Greece	3809	7886	6688	22297	19616	11021	13250		17745	13465
Portugal	290	4912	1036	1766	2391	1515	1733	5321	5326	6708
Spain	12865	35170	22515	36801	37403	38977	40293	49073	108088	266148
Belgium	17547	10655	25015	3198	20193	22303	29090	14368	6368	9618
Luxemburg					769	1210	1774	5696	21335	21764
Sweden		29369	30525	26667	79055	452063	-71367	43295	16168	20039
Finland			14537	10939	17225	18235	16595	15355	53587	131510
Austria	23934	18327	17839	26748	24673	30160	20109	28763	31518	38669

Table 24 presents apparent consumption data for printers between 1996 and 2004.

Table 24: Apparent EU-consumption (1000 units) of Printers (30.02.16.30), 1996-2004

	1996	1997	1998	1999	2000	2001	2002	2003	2004
France	2438						2835	2887	3408
Netherlands									5891
Germany	6903	2424	6910	8866	8130	7838	7758	124	1081
Italy	1010	2148	2921	3734	4404	4029	3321	3722	4149
United Kingdom	3034	3346	3649	8223	4738	5718	3864	4561	4201
Ireland		156	124						
Denmark	242				496	374	452	513	551
Greece						327		362	4199
Portugal	226	266	323		385	469	422	422	506
Spain		1675	1440	2068	2124	6351	2375	2527	
Belgium									
Luxemburg				42	34	42	47	48	33
Sweden	438	471	1013		664				
Finland		160	242	280	312			281	345
Austria		311	388	479	144	437			437
Malta								21	41
Estonia					34	32	35	40	42
Latvia						41	47	51	55
Lithuania					46	62			
Poland							963	1027	
Czech Republic						393			
Slovakia							157	178	
Hungary							450		
Slovenia									
Cyprus								41	37

Finally, the next table compares Prodcom statistical data of printers (30.02.16.30) with actual market data of placements in the total printer market provided by InfoTrends. The comparison shows that there are some major deviations between statistical and market data (marked red), whereas other Prodcom data are quite consistent with the market data provided by Infotrends.

Table 25: Comparison of Prodcom statistical data for Apparent EU-consumption with placements data from InfoTrends (1000 units)

	Printers			
	2003		2004	
	Prodcom	InfoTrends	Prodcom	InfoTrends
France	2887	3547	3408	3763
Netherlands	---	1031	5891	1136
Germany	124	6572	1081	6607
Italy	3722	2787	4149	2980
United Kingdom	4561	5077	4201	4939
Ireland	---	205	---	188
Denmark	513	463	551	525
Greece	362	305	4199	321
Portugal	422	480	506	512
Spain	2527	1867	---	1661
Belgium	---	597	---	743
Luxemburg	48	---	33	---
Sweden	---	495	---	635
Finland	281	276	345	262
Austria	---	477	437	459

2.1.2.5. Relevant Prodcom data for mailing machines and digital duplicators

The current Energy Star Program for Imaging Equipment also covers mailing machines and digital duplicators (see Chapter 1.1.2.2.2). Although these two kinds of products were not originally specified by the EuP tender, the European Commission asked the contractors of Lot 4 to include them in the scope of the study in order to be coherent with the scope of the Energy Star Program. At this point, for both product groups a summary of Prodcom data is provided to draw conclusions for the further analysis.

Table 26: Relevant Prodcom data (imports and exports) for mailing machines and digital duplicators

		2003	2004	2005
30.01.13.70	import	4,013,577	2,613,999	2,022,102
	export	117,221	384,897	207,370
30.01.23.30	import	17,993	39,817	21,981
	export	42,237	34,106	15,695

Table 35 shows for duplicating machines (30.01.23.30), that the trade volume has been quite low in the past years with a further declining trend. For mailing machines, Prodcom statistic is not detailed enough to come to a clear decision how to proceed because the product category 30.01.13.70 subsumes not only postage-franking machines but also ticket-issuing machines and similar machines incorporating a calculating device.

2.1.3. Conclusions

2.1.3.1. Conclusions regarding data quality

In Section 2.1 generic economic data have been derived from official EU statistics to place the product categories defined in Section 1.1 within the total of EU industry and trade policy. In doing so several general difficulties of statistical data have to be taken into account:

- Official EU statistics don not provide data prior to 1995.
- Reliable and complete data sets for EU25 countries are not available until 2003, being the joining date of ten EU countries. Some statistical data before 2003 match EU15 data, whereas other data sets already integrate reported numbers of single candidate countries.
- Data can be derived from two separate statistics: Prodcom and trade statistic. Both vary in the grade of differentiation of product categories as well as in nomenclature.
- For Intra- and Extra-EU trade data, trade statistic delivers more precise results. Prodcom statistic provides no differentiation between Intra- and Extra-EU trades i.e. you cannot identify if e.g. exports go to Intra- or Extra-EU countries.
- There occur several data gaps, especially for production data. Several data has not been reported by various countries.
- Due to quite a number of difficulties in calculating apparent consumption data (see Section 2.1.2.4); it might be a challenge to take them as basis for further proceedings.

In this context, generic economic data derived from official European statistics rather can serve for a general comparison with 'real' market data than as a precise basis for further calculations of life cycle costs or environmental impacts planned in Task 5.

2.1.3.2. Conclusions regarding the scope of the study

Within Task 1 of the study, a first definition of an extended scope for the EuP study on imaging equipment has been derived, e.g. from existing classifications (by Prodcom and trade statistic, by market research institutes or labeling schemes). This scope has been further narrowed down to the actual scope of Office Imaging Equipment with the product groups printers, copiers, scanners, facsimile machines, multifunctional devices, mailing machines and digital duplicators. Those product groups have been the basis for further analysis of generic economic data.

Market relevance of analyzed product groups

According to article 15.2a of Directive 2005/32/EC the EuP shall represent a significant volume of sales and trade, indicatively more than 200,000 units a year within the Community according to most recently available figures.

- Official statistics show that printers, copiers (both electrostatic and optical/thermo) and facsimile machines have a significant volume of Extra- and Intra-EU trade. The trade with printers (EU25 in 2005: 31 million imports, 9 million exports) is approximately ten times as high as for copiers (4 million imports, 1 million exports) or facsimile machines (4 million imports and 0.6 million exports). The relevance of copiers and facsimile machines is in a similar dimension.
- A very low trade volume can be found for older “blueprinters/diazocopiers” and for “digital duplicators”. Furthermore, the latter are mostly used in production-like environments as being comparable to larger EP copier or EP printer based digital printing (press) systems. We therefore suggest that those two product groups are not relevant for the further proceedings of the study in terms of Directive 2005/32/EC.
- For mailing machines, Prodcom statistic is not detailed enough to come to a clear decision how to proceed because the product category additionally subsumes ticket-issuing machines and similar machines incorporating a calculating device.
- From official statistics, no generic sales or trade data could be derived for the product group “scanner” because in Prodcom and trade statistic they are subsumed under the category “input and output devices” that covers several other product groups as well, e.g. mouses, joysticks, touch screens, gaming devices, digital cameras, camcorders or webcams, computer displays or speakers. Further research on market data has to be done, see Chapter 2.2.

Main technologies and performance parameters of Imaging Equipment

The Task 1 report provides a further subdivision of office imaging equipment regarding different marking technologies (e.g. EP, IJ, TT) and performance parameters (monochrome and colour, single and multifunctional, image speed classes). Unfortunately, Prodcom and trade statistic are not providing any assistance in this process because of a too rough classification:

- For copiers, you find a differentiation between electrostatic and thermo/optical devices, but there is only one single category for printers without any differentiation of marking technologies. In general, official statistic provides no market data or distinction between monochrome/colour, single/multifunctional devices, the application environment (personal vs. business) or the imaging speed of the devices.

2.2. Current Market and Stock Data

2.2.1. Task and Approach

The objective of the following market analysis is to compile economic data for main office imaging equipment segments as a common basis for further impact assessments in the course of the study. This basic economic data set will include past and expected future market developments. The reference years are 1995 and 2005 for determining the current status. In view of EuP implementation measures, a market forecast of the year 2010 is a second reference point. In order to assess or estimate long-term developments the year 2020 is the third reference year. In order to structure the economic data according to products the following office equipment market segments are defined:

- EP-Copier SFD/MFD monochrome
- EP-Copier SFD/MFD colour
- EP-Printer SFD/MFD monochrome
- EP-Printer SFD/MFD colour
- IJ-Printer SFD/MFD personal
- IJ-Printer SFD/MFD workgroup
- Facsimile Machine SFD/MFD
- Flatbed Scanner (optional)
- Digital Duplicators (optional)
- Mailing Machines (optional)

This segmentation should be viewed as working theses which has the purpose of structuring the complex office imaging equipment market. During the study more detailed data for specific market segments will be provided if available. The market analysis is focusing on unit data in the framework of the European Union (EU-25). This includes the following parameter:

- Installed base or stock of products in total EU-25
- Annual sales and growth rates indicating product trends
- Average product life and typical replacement cycles

The available market data derive mostly from InfoTrends. These data are not covering EU-25 (as required for the study) but Western Europe. InfoTrends covers under the term Western Europe (WE) the EU-15 countries excluding Luxemburg but including Turkey, Norway, Switzerland. This discrepancy in market scope between EU-25 and WE is however not so critical due to the fact that the population and market characteristics (consumer spending) is almost identical. The following

Table 27 shows the comparison of the EU-25 population with the InfoTrends definition of Western Europe which clearly indicates that both data sets are basically comparable. Regarding the consumer spending (purchasing power) it seems feasible to assume that the situation of Turkey (71 million inhabitants) is somewhat comparable to the new EU nation of Eastern Europe. In conclusion, InfoTrends data are adequate for providing a common economic base for EU-25.

Table 27: Comparison of EU-25 population with InfoTrends Western Europe

		Nation	Europop 2004	
			Population (in 1000)	Households (in 1000)
1	AT	Austria	8.114	3.339
2	BE	Belgium	10.396	4.402
3	CY	Cyprus	730	223
4	CZ	Czech	10.211	4.216
5	DE	Germany	82.532	39.200
6	DK	Denmark	5.398	2.498
7	EE	Estonia	1.351	485
8	EL	Greece	11.041	3.664
9	ES	Spain	42.345	14.831
10	FI	Finland	5.220	2.386
11	FR	France	59.901	25.439
12	HU	Hungary	10.117	3.863
13	IE	Ireland	4.028	1.288
14	IT	Italy	57.888	22.811
15	LT	Lithuania	3.446	1.357
16	LU	Luxembourg	452	172
17	LV	Latvia	2.319	526
18	MT	Malta	400	128
19	NL	Netherlands	16.258	7.052
20	PL	Poland	38.191	13.855
21	PT	Portugal	10.475	3.505
22	SE	Sweden	8.976	4.449
23	SI	Slovenia	1.996	685
24	SK	Slovakia	5.380	1.900
25	UK	United Kingdom	59.652	25.479
		EU-15	372.035	
		EU-25	456.817	187.753
		Western Europe (InfoTrends)	454.782	
26		Bulgaria	7.801	
27		Romania	21.711	
WE		Turkey	71.254	
WE		Norway	4.577	
WE		Switzerland	7.368	
		InfoTrends (Western Europe) EU-15 excl. Luxemburg and incl. Turkey, Norway, Switzerland		

For the past data available literature sources were used, whereas for the forecasts some considerations from our market and trend analysis were introduced. At some places in the subsequent shown data there are slight differences in single figures due to rounding errors and different statistical sources. Table 28 provides an overview on terminology and data deduction.

Table 28: Terminology and Data Deduction

Parameter	Explanation
Sales [units/year]	Sales data from different sources. EU-25 data were not available. Against this background it was necessary to go back to deducted data. The term “placements” used by InfoTrends refers to estimates for the total number of new incremental units placed in the user’s environment during the calendar year. Remanufactured or refurbished units are not included. Shipments from factory to warehouse or from warehouse to reseller are also excluded.
Annual sales growth rate	Difference of sales volume from one indicated year to another.
New sales [units]	New sales were calculated by multiplying the annual sales growth with the number of units sold in the specific year, assuming that sales growth indicate new sales.
Replacement sales [units]	Replacement sales were derived from the overall sales volume minus the volume of new sales. The differentiation between new sales and replacements was only made for 1995. For the later years this assignment seemed too speculative. For example it is impossible to decide whether a sold colour copier substitutes for a monochrome one (replacement sale) or is bought as first copier at all (new sale). It could even be that a new colour copier substitutes for a printer.
Average Installed Base	Estimate of the time-averaged number of units in use during the calendar year (definition by InfoTrends). For its calculation InfoTrends uses certain the following assumptions on product life time (details see Chapter 2.2.2.2).
Stock [units]	Calculated from sales data, based on the assumed lifetime of imaging equipment of 6 years. The same method was used e.g. in Roth et al. 2002.
Penetration rate [units per household]	Calculated from units in stock and data on household numbers in EU. The following data were available: 1995: EU15. Population: 147 million households (source: EU 2003) 2005: Western Europe = EU15 excl. Luxembourg but plus Norway, Switzerland and Turkey (source: InfoTrends). Number of households: 196 million households; calculated from a population of 465 million and an average household size of 2.37 persons per household (source EU 2003). Population size is about 1.8% higher than population size of EU25. 2010: Western Europe = EU15 excl. Luxembourg but plus Norway, Switzerland and Turkey (source: InfoTrends). Number of households: 202 million households. As no future projections were available as an approximation household number was calculated from population size of 2005 but with the average household size of 2.3 persons per household expected for 2010 (source: EU 2003). Data on Eastern European countries mostly were not available, but the data for 2005 and 2010 cover the western European countries with a population being in the same range as EU25 population.

2.2.2. Economic data for reference year 1995

Table 29 shows the required economic data for printers and copiers in the frame of EU-15⁶. Data on EU-25 were not available. For 1995 and the preceding years, sales or shipment data were only available on printers and copiers, not on facsimile machines, scanners and multifunctional devices. Furthermore the shipment data available on printers and copiers were not differentiated by fields of application (personal, workgroup, etc.), technologies (EP, IJ, etc.) or speed classes. A product life of six years was assumed. In comparison to the stock data on copiers calculated in VHK (2005) the data seem to reflect a reasonable dimension. Nevertheless it has to be mentioned that – probably due to a different product definition – InfoTrends has identified a somehow smaller placement of copiers in Western Europe (602,531 actual placements for copiers for 1995).

Table 29: 1995 economic data on printer and copier for EU15

Retrospect 1995 EU-15	Printers*	Copiers**
Shipments in 1995 (units/year)	12,293,816	1,793,812
Annual Growth of Shipments 1994/1995	17.0%	1.4%
Replacement Sales (units/year)	10,199,705	1,767,832
New Sales (units/year)	2,094,111	25,980
Stock (units)***	56,049,964	10,846,280
Penetration rate (units/household)	0.38	0.07

[Source: own calculations on the bases of EITO (1995).]

- * Printers: include models designed to be attached to PC's, not sold with the system. These include dot matrix printers, thermal / thermal transfer printers, non impact page printers, inkjet printers and colour printers.
- ** Copiers: personal, digital and colour copiers
- *** As no data were available on the shipments of 1990 and 1991, for the calculation of the stock, data from 1992 were taken for both years as an approximation. For copiers the discrepancy is assumed to be small, for printers it is likely that stock data might be slightly lower than indicated above.

For the time after 1995, EITO (1996) noticed a growing use of scanners as normal office accessory due to decreasing prices. Driver of the market in 1995 seemed to be the development of cheaper inkjet printers. In 1995 the copier market was already a saturated market.

⁶ EU-15 was assumed to have 147 million households in 1995 (EU 2003)

2.2.3. Economic data for reference year 2005

2.2.3.1. EP-Copiers

EITO (2005) provides only more general data for copiers (defined as personal, digital and colour copiers) whereas data from InfoTrends differentiate between data on monochrome and colour copiers as well as between different speed classes. Therefore we decided to display the data from InfoTrends. The overall sales data on copiers given in EITO (2005) for EU-25 (excl. Cyprus and Malta) are 1,517,559 units in 2005 and that way 31% higher than the data on placements of InfoTrends (see following table). This might be due to different product definition and the different countries covered. In general, it can be noticed that the introduction of digital copiers softened the line between copiers and printers. A second observation is that monochrome copiers decline whereas colour copier experience increased sales figures. This process is expected to continue in the future. In addition multifunctional devices substitute for single function copier.

Table 30: 2005 economic data for EP-Copier

Reference year 2005 (EU-25)	Mono Copier	Colour Copier	Copier total
Placements in 2004	1,019,300	137,100	1,156,400
Share of mono and colour copiers in placements 2004	88.1%	11.9%	100%
Annual placements growth 2003/2004	-2.2%	83.9%	3.5%
Average installed base (units)	5,969,951	380,948	6.350.899
Share of mono and colour copiers in stock	94.00%	6.00%	100.00%
Penetration rate (units/households*)	0.03	0.002	0.032

[Source: Data from InfoTrends; penetration rate: own calculations on the basis of InfoTrends data]

Table 31: Placements (in 1000 units) of colour copiers in Western Europe from 1995 – 2004

Colour Copier	Speed class	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
SFD	3-8 cpm	18.92	18.82	-	15.18	12.42	6.56	0.10	0.88	2.39	0.50
SFD	9-14 cpm	17.80	16.18	-	2.21	3.06	9.83	0.09	1.46	2.65	0.80
SFD	15-23 cpm	-	-	-	-	0.18	0.36	0.74	0.29	2.40	3.10
SFD	24+ cpm	-	0.03	-	1.78	0.77	0.29	0.22	0.01	0.70	1.40
Total SFD		36.72	35.02	-	19.17	16.43	17.03	1.15	2.65	8.14	5.80
MFD	3-8 cpm	3.31	4.99	14.25	15.86	19.98	11.70	15.12	7.53	17.84	41.60
MFD	9-14 cpm	2.32	2.76	4.13	1.16	3.22	12.38	20.47	12.37	14.96	27.60
MFD	15-23 cpm	-	-	-	-	0.06	0.16	6.53	15.08	17.84	23.50
MFD	24+ cpm	-	0.72	1.05	3.01	2.47	1.13	1.71	2.17	15.77	38.60
Total MFD		5.63	8.47	19.42	20.03	25.73	25.37	43.82	37.15	66.40	131.30
Total		42.35	43.49	19.42	39.20	42.16	42.39	44.97	39.79	74.54	137.10

[Source: InfoTrends]

In Table 31 we focus on colour copiers and show how the development of colour copier placements changed from 1995 until 2004. The data are differentiated by speed class, SFD and MFD. Multifunctional copiers are defined as being equipped with the feature “connectivity” and that way being able to be used as a printer in a network. Two main lines of development can be identified: First, more and more devices are sold that belong to high speed classes and devices with lower speed classes decline. Second, a trend towards multifunctional colour copiers with high speed can be noticed.

2.2.3.2. EP-Printers

The EP printer market shows a moderate growth of 2.1% from 2004 to 2005. It is dominated in numbers by monochrome devices. Placements are declining. Colour lasers show a strong growth at a rate of 25%. According to EITO (2006) colour EP-printer will gain market shares over the next years due to falling prices (for devices and per image) as well as improved performance and functionalities, higher speed, and enhanced colour quality. In general the use of the internet and other multimedia applications (e.g. digital cameras) promote the further increase in colour devices. However, the amount of colour images is relatively low and will not exceed more the 25% of total in the long-term. In consequence EP-printers as page printers will produce mainly black & white images providing still a good market for dedicated monochrome printers in the future. Table 32 shows the 2005 main economic data for EP-Printer.

Table 32: 2005 economic data for EP-Printers

Reference year 2005 (EU-25)	EP Printer total	EP Printer - monochrome	EP Printer - colour
Placements in 2005 (units/year)	4,515,968	3,681,913	834,056
Annual Growth of Placements 2004/2005	2.1%	-1.9%	24.7%
Average installed base (units)	16,654,712	14,735,315	1,919,397
Penetration rate (units/household)	0.08	0.07	0.01

[Source: Data from InfoTrends, penetration: own calculations on the basis of InfoTrends data.]

2.2.3.3. IJ-Printers

Inkjet printers are largely common for private use. Table 33 below shows the 2005 economic data on placements, annual growth and stock of inkjet printers based on InfoTrends data for Western Europe. According to this source, an overall growth of 3% of inkjet printer sales in 2005 compared to 2004 is assumed. The number of single function inkjet printers declined by 12% from 2004 to

2005 whereas the placements of multifunctional devices grew by almost 30 percent. As for the installed base (stock), still 76% of inkjet printers are single function devices.

Table 33: 2005 economic data for IJ-Printers

Reference year 2005 (EU-25)	IJ Printer total	IJ Printer SFD	IJ Printer MFD
Placements in 2005 (units/year)	22,437,290	12,329,982	10,107,308
Annual Growth of Placements 2004/2005	2.9%	-11.6%	28.7%
Average installed base (units)	90,172,232	68,412,276	21,759,956
Penetration rate (units/household)	0.46	0.35	0.11

[Source: Data from InfoTrends; penetration: own calculations on the basis of InfoTrends data]

2.2.3.4. Facsimile Machines

Table 34 shows 2005 basic economic data for facsimile machines. According to InfoTrends, single function facsimile machines strongly loose market share whereas printer based multifunctional devices with facsimile function experience a growth of 12 percent compared to 2004. In 2005 the placements of printer based multifunctional devices with facsimile function overtook single function facsimile machines. In the stock the substitution takes some more time; in 2005 still 66 percent of facsimile machines in stock were single function devices.

Table 34: 2005 economic data for facsimile machines

Reference year 2005 (EU-25)	Facsimile machines total	Facsimile machines - single function	Facsimile machines - printer based multi function
Placements in 2005 (units/year)	3,461,035	1,588,607	1,872,429
Annual Growth of Placements 2004/2005	-5.0%	-19.3%	11.8%
Average installed base (units)	20,131,715	13,241,539	6,890,175
Penetration rate (units/household)	0.10	0.07	0.04

[Source: Data from InfoTrends; penetration rate: own calculations on the basis of InfoTrends data]

2.2.3.5. Mailing machines

Research for market and stock data of mailing machines provided no precise information; we had to go back to data published by one producer⁷. According to his estimate, the global market for mailing machines is a stable market and encompassed an installed base of about 2.8 million units in 2003. In 2005 an installed base of 2.9 million units is expected. Another source from the same producer states that 1.5 million mailing machines are installed in the US⁸. Taking these figures into account we did an approximation in order to estimate the annual sales that might be expected in Europe – taking into account a range of possible product life times.

Table 35: 2005 market data on mailing machines (global market without US)

Mailing machines Global market without US	Installed base (units)	Annual sales (units)			
		Life time 3 years	Life time 4 years	Life time 5 years	Life time 6 years
2003	1,300.000	433,333	325,000	260,000	216,667
2005	1,400.000	466,667	350,000	280,000	233,333

[Source: francotyp; own calculations]

2.2.4. Economic data for reference year 2010

2.2.4.1. EP-Copiers

The subsequent table presents data on copiers for 2008. No data were available for the year 2010. It seemed too speculative to project the data from 2008 to the year 2010. However, as it can be noticed from Figure 9 and Figure 10, certain developments are visible. In general the total of copiers' placements and the size of the installed base declines. Copiers with speeds lower than 10 copies per minute (cpm) will almost disappear in 2008. Except for devices with a speed above 70 cpm, all speed classes are affected by the decrease in placements.

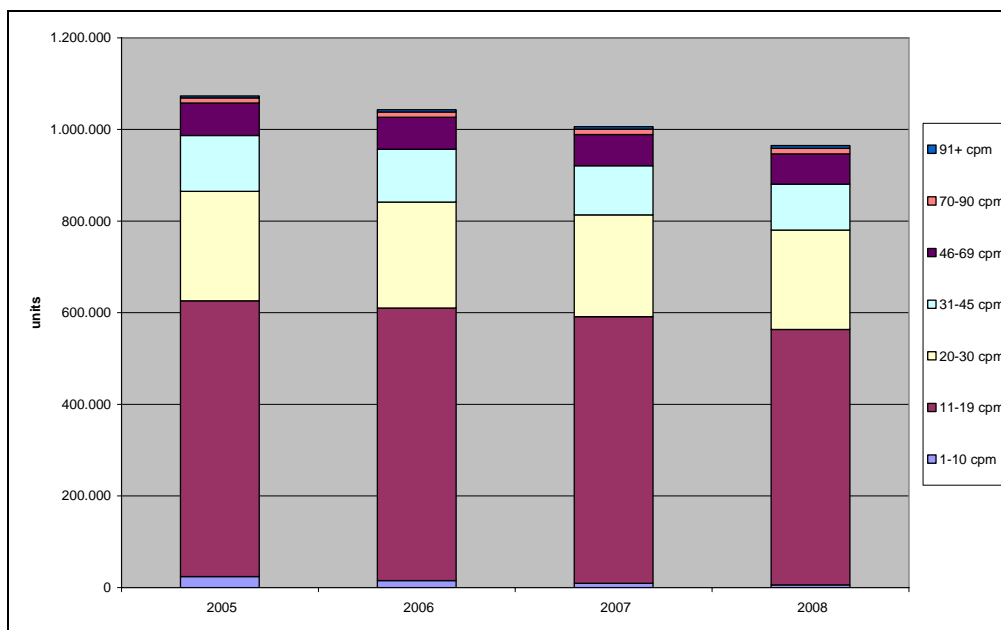
⁷ Source: <http://www.francotyp.com/de/maerkte.php>

⁸ Source: <http://www.semper.org/sirene/people/gerrit/papers/BIKr01b.pdf>

Table 36: 2008 economic data for EP-Copiers

Reference year 2010 (2008)	Copier total	Copier Monochrome	Copier Colour
Placements in 2008 (units/year)	1,143,560	964,560	179,000
Annual Growth of Placements 2007/2008	-3.1%	-4.1%	2.5%
Average installed base (units)	4,812,970	4,121,510	691,460
Share in stock	100.0%	85.6%	14.4%

[Source: Data from InfoTrends]

**Figure 9: Placements of monochrome copiers in Western Europe, 2005 to 2008. [Source: Infotrends]**

For colour copiers an increase of placements of 2.5% from 2007 to 2008 can be noticed. The increase is recognisably stronger for copiers with a speed of 15+ cpm than below 15 cpm, but overall placements of colour copiers will range at about 180,000 units per year in 2008. Nevertheless, from the development of placements in the years 2005 to 2008 it seems to be very probable that in 2010 more than 200,000 units of colour copiers will be sold per year.

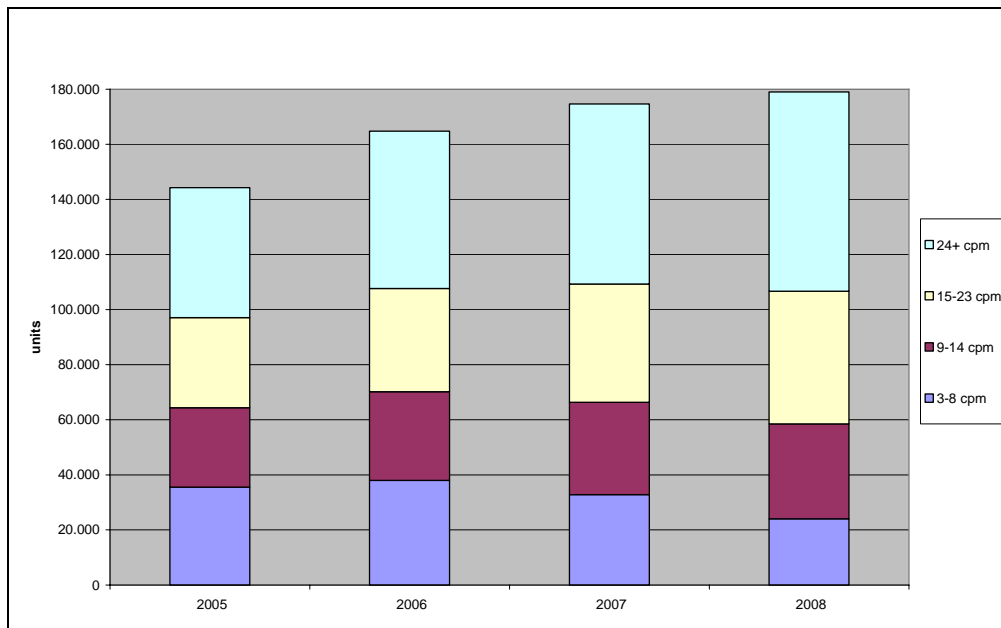


Figure 10: Placements of colour copiers in Western Europe from 2005 to 2008. [Source: Infotrends]

2.2.4.2. EP-Printer

In Table 37 the expected figures for EP-Printers in 2010 are shown. As no data were available for the year 2010, data for 2010 were derived, assuming the same trends for placements, annual growth rate and average installed base as expected for 2008 and 2009.

Table 37: 2010 economic data for EP-Printers

Reference year 2010	EP Printer total	EP Printer monochrome	EP Printer colour
Placements in 2010 (units/year)	4,584,866	3,459,004	1,132,122
Annual Growth of Placements 2008/2009	-1.5%	-3.4%	5.4%
Average installed base (units)	18,475,787	14,306,354	4,197,756
Penetration rate (units/household)	0.09	0.07	0.02

[Source: Data from InfoTrends; penetration rate: own calculations on the basis of InfoTrends data]

Table 38 shows the trends of EP-printer placements concerning single and multi functionality and mono versus colour devices. The overall amount of sales does not change much until 2009. Multifunctional devices will gain one third of the market share. In a similar trend the market for colour devices will increase to one third.

Table 38: Overview on the placements of EP-printers from 2003 to 2009 in Western Europe

Placements [1.000 units]		2003	2004	2005	2006	2007	2008	2009
Total EP Printers	SFD	4,285	3,964	3,988	3,986	3,949	3,862	3,648
	MFD	271	459	528	601	723	866	1,007
	Total	4,557	4,423	4,516	4,587	4,672	4,728	4,656
Mono EP Printers	SFD	3,821	3,372	3,275	3,266	3,196	3,110	2,883
	MFD	266	382	407	448	500	599	699
	Total	4,088	3,754	3,682	3,714	3,695	3,709	3,582
Colour EP Printers	SFD	464	592	713	720	753	751	765
	MFD	5	77	121	153	224	267	308
	Total	469	669	834	873	977	1,019	1,074

[Source: InfoTrends]

Table 39: Placements of mono EP printers by speed class from 2003 to 2009 in Western Europe

Placements of Monochrome EP printer by speed class [1.000 units]		2003	2004	2005	2006	2007	2008	2009
0-6 ppm	SFD	0	0	0	0	0	0	0
	MFD	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0
7 - 12 ppm	SFD	459	204	102	79	51	23	8
	MFD	36	5	9	7	4	2	1
	Total	494	209	110	86	55	25	9
13-24 ppm	SFD	2,633	2,065	1,899	1,882	1,727	1,533	1,316
	MFD	214	354	309	281	235	209	197
	Total	2,847	2,419	2,208	2,163	1,962	1,742	1,513
25-39 ppm	SFD	686	1,011	1,160	1,179	1,283	1,419	1,418
	MFD	7	17	74	138	226	344	448
	Total	694	1,028	1,235	1,318	1,509	1,763	1,866
40-79 ppm	SFD	41	90	111	124	133	132	138
	MFD	10	5	15	22	33	44	54
	Total	50	95	126	146	166	176	192
80 + ppm	SFD	3	2	2	2	2	2	2
	MFD	0	0	0	0	0	0	0
	Total	3	2	2	2	2	2	2

[Source: InfoTrends]

Table 39 presents data on placements of monochrome EP-Printers in Western Europe according to speed classes. Monochrome single-function EP-printers show the strongest sales in speed classes of 25 ipm to 39 ipm whereas devices with lower speed decline. As for multifunctional devices this trend towards higher speed is also visible.

2.2.4.3. IJ-Printers

Table 40 shows the 2010 economic data for inkjet printers. Because no data were available on placements, annual growth rate and installed base for the year 2010, the same trends as from 2008 to 2009 were assumed for 2009 to 2010 as an approximation in order to calculate figures for 2010.

Table 40: 2010 data on placements of inkjet printers, stock, penetration rate for Western Europe

Reference year 2010 (EU-25)	IJ Printer total	IJ Printer SFD	IJ Printer MFD
Placements in 2010 (units/year)	25,056,622	4,292,251	21,193,990
Annual Growth of Placements 2008/2009	3.6%	-18.4%	12.0%
Average installed base (units)	105,614,549	31,322,079	77,775,960
Penetration rate (units/household)	0.52	0.15	0.38

[Source: Data from InfoTrends; penetration rate: own calculations on the basis of InfoTrends data]

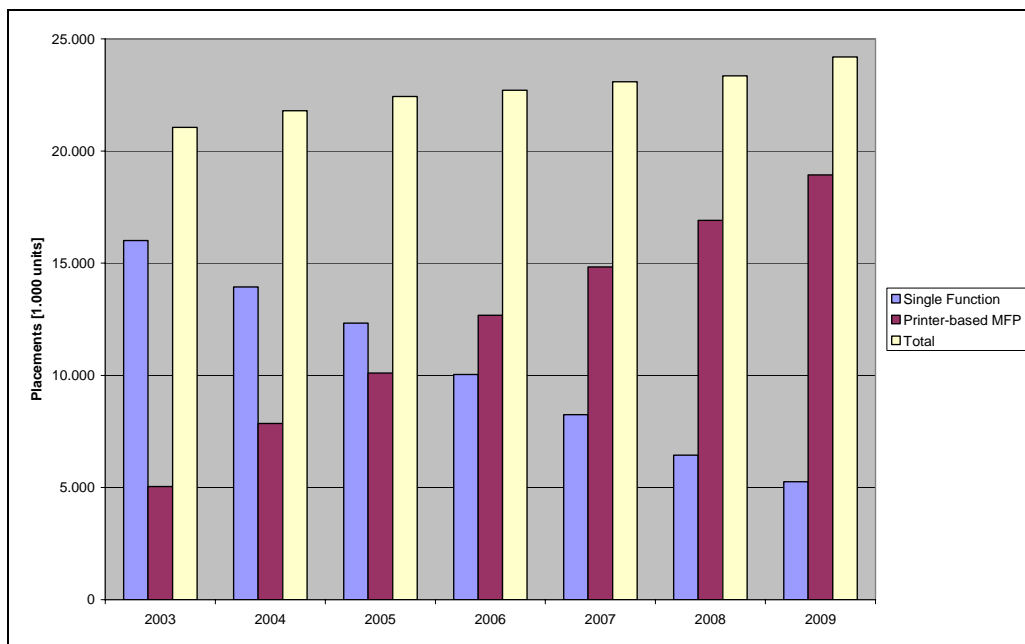


Figure 11: Placements of inkjet printers in Western Europe from 2003– 2009 by functionality

Similar to 2005, the most prominent development seems to be the substitution of single function devices by multifunctional inkjet printers; with a market at the same time still overall growing by almost 4%. Figure 11 above and Table 41 below show a shift from SFD towards MFD in the IJ-printer market.

Table 41: Placements of inkjet printers in Western Europe from 2003– 2009 by SFD and MFD

Placements of IJ Printers [1.000 units]	2003	2004	2005	2006	2007	2008	2009
SFD	16,016	13,947	12,330	10,039	8,249	6,445	5,260
MFD	5,040	7,855	10,107	12,675	14,838	16,911	18,932
Total IJ Printers	21,056	21,802	22,437	22,715	23,087	23,356	24,191

[Comments: Placements in 1.000 units. Source: InfoTrends]

2.2.4.4. Facsimile Machines

Table 42 shows the 2010 economic data for facsimile machines. As no projection for 2010 was available, the trends from 2008 to 2009 (e.g. annual growth rate) were assumed to be the same as from 2009 to 2010.

Table 42: 2010 economic data for facsimile machines

Reference years 2010	Facsimile machines Total	Facsimile Machines SFD	Facsimile machines MFD
Placements in 2010 (units/year)	2,761,185	577,704	2,207,455
Annual Growth of Placements 2008/2009	-3.7%	-17.8%	2.0%
Stock (units)	13,034,180	4,381,920	8,873,673
Penetration rate (units/household)	0.06	0.02	0.04

[Source: Data from InfoTrends and own calculations]

In general it can be noticed that the function “facsimile” is of decreasing importance, resulting in overall falling sales figures. This is probably due to growing relevance of electronic communication (e.g. implicitness of emails, development of encryptions and electronic signatures). Compared to 2005, the placements of multifunctional devices with facsimile function still increased by 18 percent. That way the decrease largely went at the expense of single function devices. In 2010 printer based multifunctional devices with facsimile function make up 80% of the placements and 68% of devices in stock.

2.2.4.5. Scanners (Document Imaging Scanners)

Data were available on scanners for professional use (DIS stands for “document imaging scanner” in opposition to personal scanner use). These scanners are used when large amounts of documents need to be archived e.g. in a law firm. Scanners in a workgroup environment are typically shared resources that individuals use to produce documents on their own. As the subsequent figure shows,

in 2005 shipments of workgroup document imaging scanners has been around 100,000 units. But it is expected that shipments increase strongly in the following years, reaching over 500,000 units per year in 2009.

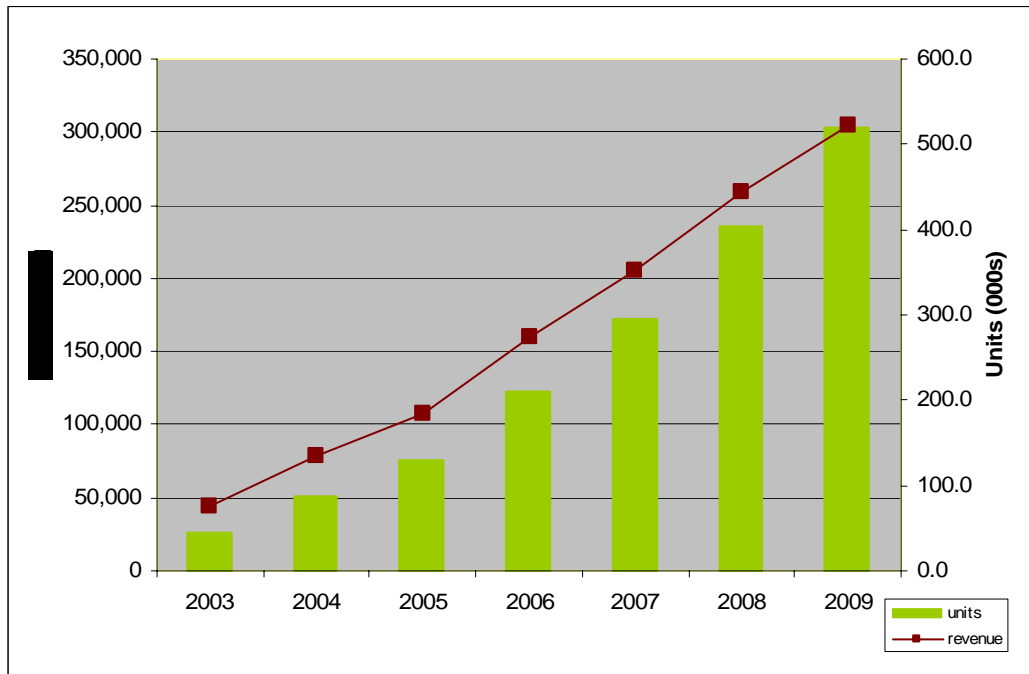


Figure 12: Workgroup DIS Shipments & Revenue Forecast 2004 - 2009 for Western Europe
[Source: InfoTrends]

Information was further available on the following scanner types, shipments for 2005 and 2009 in brackets [Source: InfoTrends]:

- Department DIS (less than 30,000 units in 2005, less than 80,000 units expected for 2009),
- Low volume production document scanner (less than 20,000 units in 2005 and less than 30,000 units expected for 2009),
- Mid volume production scanners (less than 3,000 units in 2005 and about 3,500 units expected in 2009),
- High volume production scanners (about 800 units in 2005 and in 2009).

As the above list shows, very low shipment volumes of the mentioned scanner types.

2.2.5. Economic data for reference year 2020

A foresight until the year 2020 is afflicted with many uncertainties concerning market share of technologies as well as evolving of new product developments and concerning the installed stock and output. The authors had no access to long-term market forecasts. Therefore actual data can not

be presented. Nevertheless, it is feasible to assume that the main trends of the past years continue. Business as well as private users will still make printouts and hardcopies in 2020 to an extent probably not smaller than today. The overall amount of hardware sold and in stock will probably not decrease as well rather slightly increase. Multifunctional devices will substitute single function devices but new devices with new special function will probably add to the sales and the stock. As a recent example photo printers can be mentioned. Photo printers came on the market in 2003 and complement the stock of devices rather than substitute for other printers. An estimate for the main product segments is given in the following summary of basic economic data.

2.2.6. Summary basic economic data

The following Table 43 and subsequent Figure 13 provide a summary of the installed base (stock) for main product segments for the reference years 2005, 2010, and 2020.

Table 43: EU-25 office imaging equipment stock data for 2005, 2010, and 2020

Product Segment	EU-25 Stock in 2005 (in 1000 units)	EU-25 Stock in 2010 (in 1000 units)	EU-25 Stock in 2020 (in 1000 units)
EP-Copier mono	5.970	4.122	1.000
EP-Copier color	381	691	5.000
EP-Printer mono	14.735	14.306	10.000
EP-Printer color	1.919	4.198	10.000
IJ-Printer SFD	68.412	31.322	20.000
IJ-Printer MFD	21.760	77.776	100.000
Facsimile SFD	13.241	4.382	1.000
Facsimile MFD	6.890	8.874	8.000
<i>Total:</i>	<i>133.308</i>	<i>145.671</i>	<i>155.000</i>

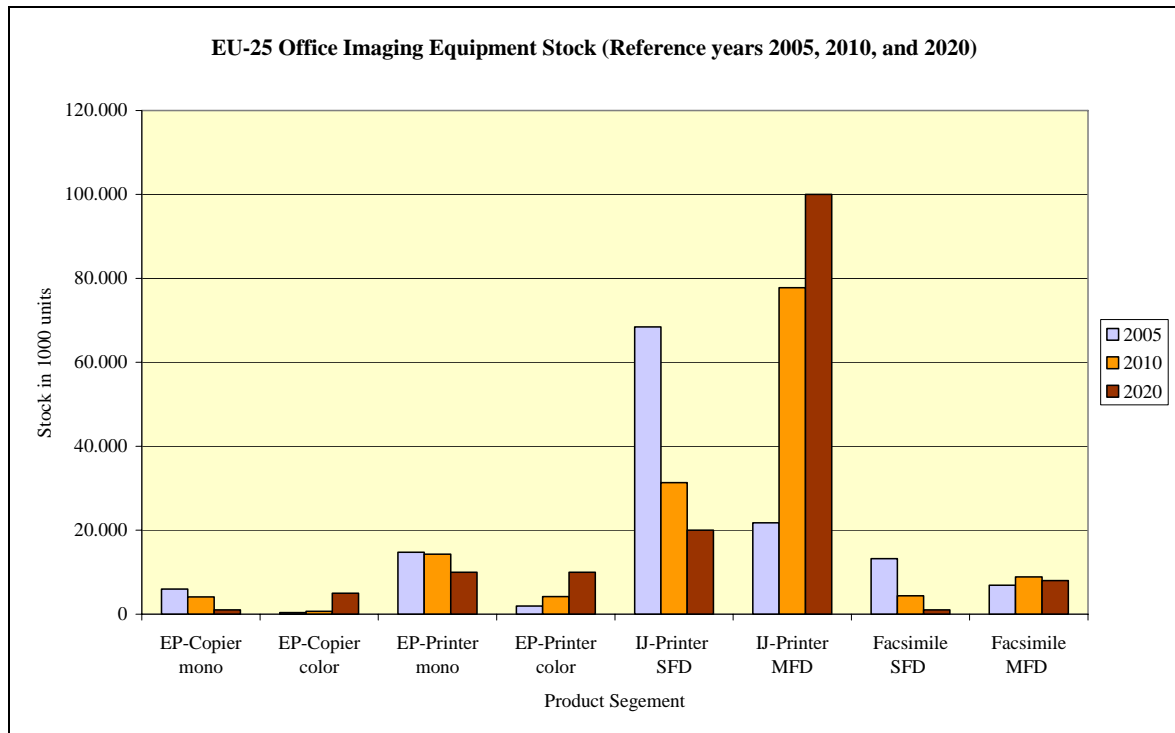


Figure 13: EU-25 office imaging equipment stock data for 2005, 2010, and 2020

2.2.7. Office imaging equipment average product lifetime

Based on literature data, product life of imaging equipment was found to be between four and six years. Only little differentiation was found e.g. on speed classes and technologies, see table below.

Table 44: Overview on literature data on product life time of different imaging equipment

Specification	Product life time [years]	Country	Sources
IJ printer and EP printer	6 (Mean age in stock: 4 years)	Australia	NAEEC 2003a
EP printer	4	US	Roth et al 2004
Printer, scanner	4	US	Roth et al 2002
MFD and scanner	6	Australia	NAEEC 2003b
Copier	6	Australia, US	NAEEC 2003c, Roth et al 2002, Roth et al 2004, Kawamoto et al. 2001
Facsimile machine	5	US	Roth et al 2002
Facsimile machine	6	US	Kawamoto et al. 2001

Compared with the literature data, statements from industry make believe that IJ-Printers for private use have much shorter time in service of only two to three years. Still it is expected that it takes another three to four years until the printer is disposed of, adding up to an overall time of

ownership of about six years. Second hand markets are negligible. In general, the perception from industry is that products for private use are short lived (e.g. two to three years) compared with products for business use (up to 6 years). InfoTrends uses similar assumptions for the calculation of the installed base: They define a retirement rates process, described as follows. InfoTrends' retirement rates matrix is made up of two digits; for example a retirement curve of '23' means:

- 2 life cycle (meaning the product is live for first two years and each shipped unit is counted in the installed base calculation for the first two years of the product's life)
- 3 retirement period (product is calculated as starting it's retirement period over the next 3 years, with 1/3 of the units retired in the 3rd year since installed = first year of retirement).

Table 45: Average life cycle and retirement rates of imaging equipment assumed by InfoTrends

	Life cycle	Retirement period	Matrix
Printer Laser Mono	2-3 years	3-5 years	23 – 35
Printer Laser Colour	2-3 years	4-5 years	24 – 35
Printer Inkjet	2-3 years	3-5 years	23 – 35
Copier Mono	2-4 years	4-5 years	24 – 45
Copier Colour	2-3 years	4 years	24 – 34
Fax	2 years	4 years	24

In conclusion we assume an average product lifetime for EP-Products (Copier and Printer) as well as Facsimile Machines of six years (business use) and IJ-Products of four years.

2.3. Market Trends

2.3.1. Task and Procedure

General trends in technology, design and product performance are the objective of this task. We have already investigated under Section 1.1.2.3 some trends in marking technology and under Section 2.2.2.1 trends regarding performance characteristics like colour capability and multi-functionality. In the following we will shortly outline these market trends again and look at their implications. We intent to cover following topics:

- Volume of image creation
- Trend towards MFD
- Trend towards colour and photo print

The following figures are mainly based on data from InfoTrends which only cover Western Europe = EU15 excl. Luxembourg but plus Norway, Switzerland and Turkey⁹. There were no data on Eastern European countries public available. Nevertheless, the trends described in the following sections are considered by industry to be the same for Eastern European countries.

2.3.2. Volume of image creation

Market data indicate that inkjet printers have the highest sales volume and penetration rate (stock) of office imaging equipment in Western Europe. In the year 2004 roughly 65% of all imaging equipments were inkjet printers. They were usually sold in the consumer market (personal). EP printers and copiers on the other hand are accumulating only to about 17% of the whole market by unit sales. These products are more common in the office environment (workgroup). However, looking from the perspective of produced images (pages) in relation to technology we notice an opposite situation. The following two figures present a trend assessment for image volume creation in the “workgroup” environment and show the situation in the “Personal” environment. The accumulated data indicate that image creation by EP products are considerably larger in comparison to IJ products and that in the midterm image creation by EP products is growing faster than IJ based ones. This high page volume derives from extended use of EP in workgroup environment. The total page output from fax machines will probably decreasing over the next years due to the more extended use of email.

⁹ Population of the Western European countries as used by InfoTrends (= EU15 excl. Luxembourg but incl. Switzerland, Norway and Turkey) is in the same range (only 1,8% higher) as EU25 population.

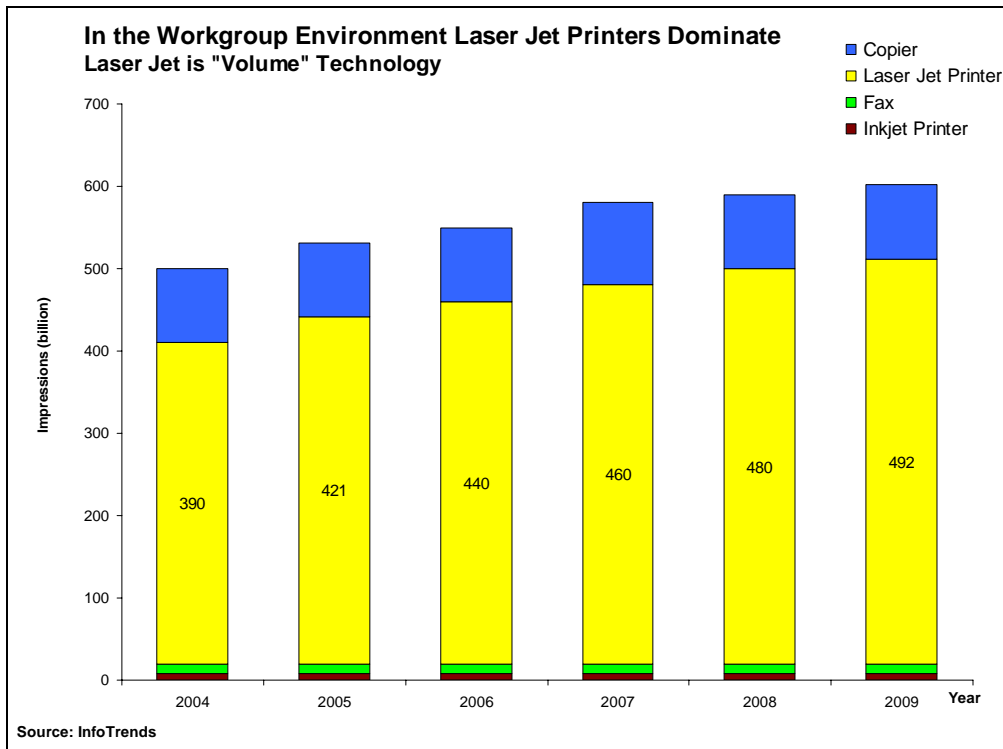


Figure 14: Volume of image creation in Workgroup environment

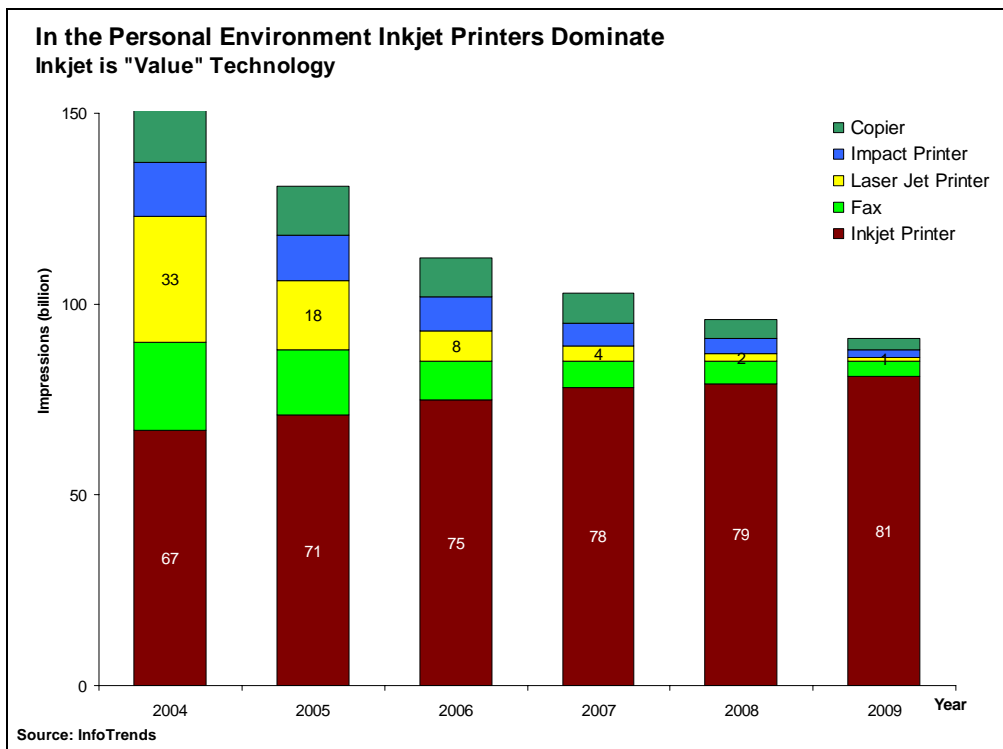


Figure 15: Volume of image creation in Personal environment

The outlined situation of IJ printers dominating the volume of unit sales on the one hand, and EP printers and copiers dominating the volume of produced images on the other gave implications for the structuring of the product groups (cp. Task 5).

2.3.3. Trend towards MFD

The shift to multi-functionality is immanent and one of the major trends in office imaging equipment market. Most forecasts for the European imaging equipment market predict that printer-, copier- and fax-based MFDs will overtake SFDs in volume of sales by 2006. Figure 16 and Figure 17 show some details of this trend¹⁰.

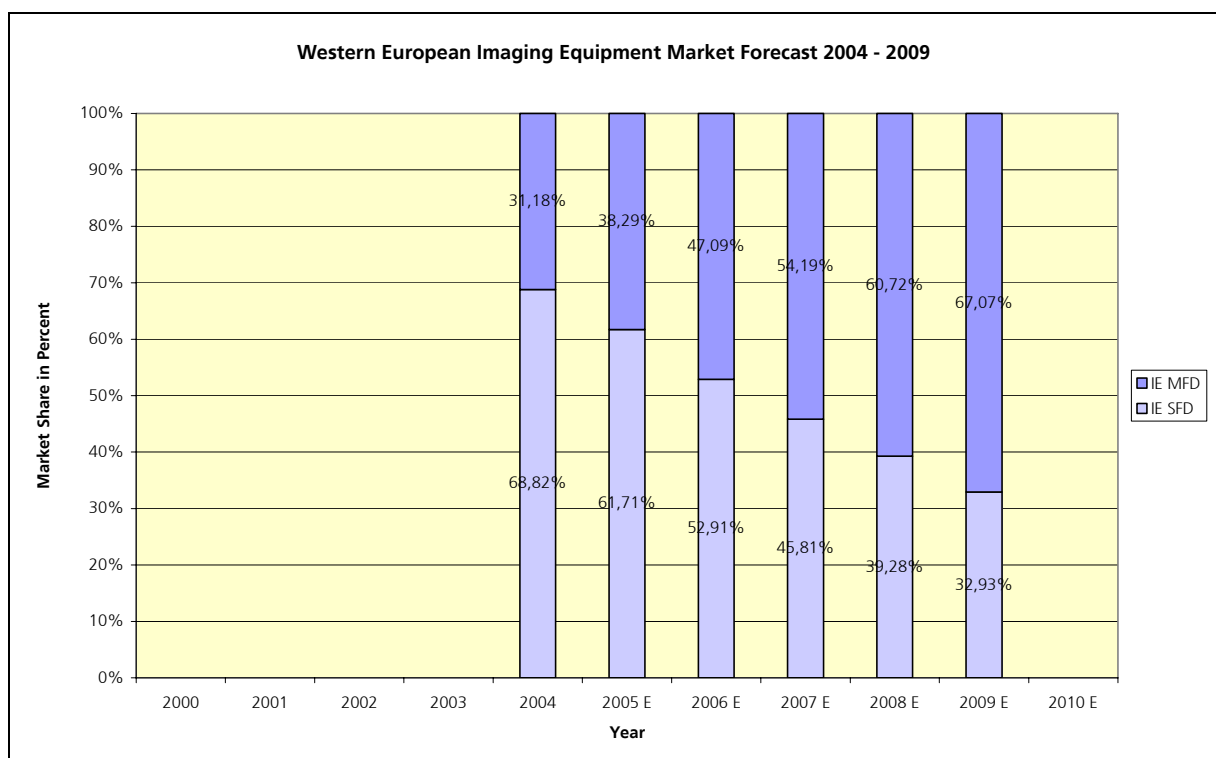


Figure 16: Disposition of SFD and MFD for the Western European Imaging Equipment Market

From 2006 on printer-based MFDs will account for the largest market segment in imaging equipment. The whole printer market is the strongest segment with considerable growth over the next years in comparison to copier, fax machines and scanner. Copier-based MFDs have already entered the market on a large scale. The market share of single function copiers is declining over the next five years while sales of copier-based MFDs will stay more constant. Single function fax machines and scanners are also declining in overall sales. Fax-based MFDs are building a solid market segment with a sales volume of about 2 million units in Western Europe.

¹⁰ Data were compiled from various InfoTrends publications under: <http://www.infotrendsresearch.com>.

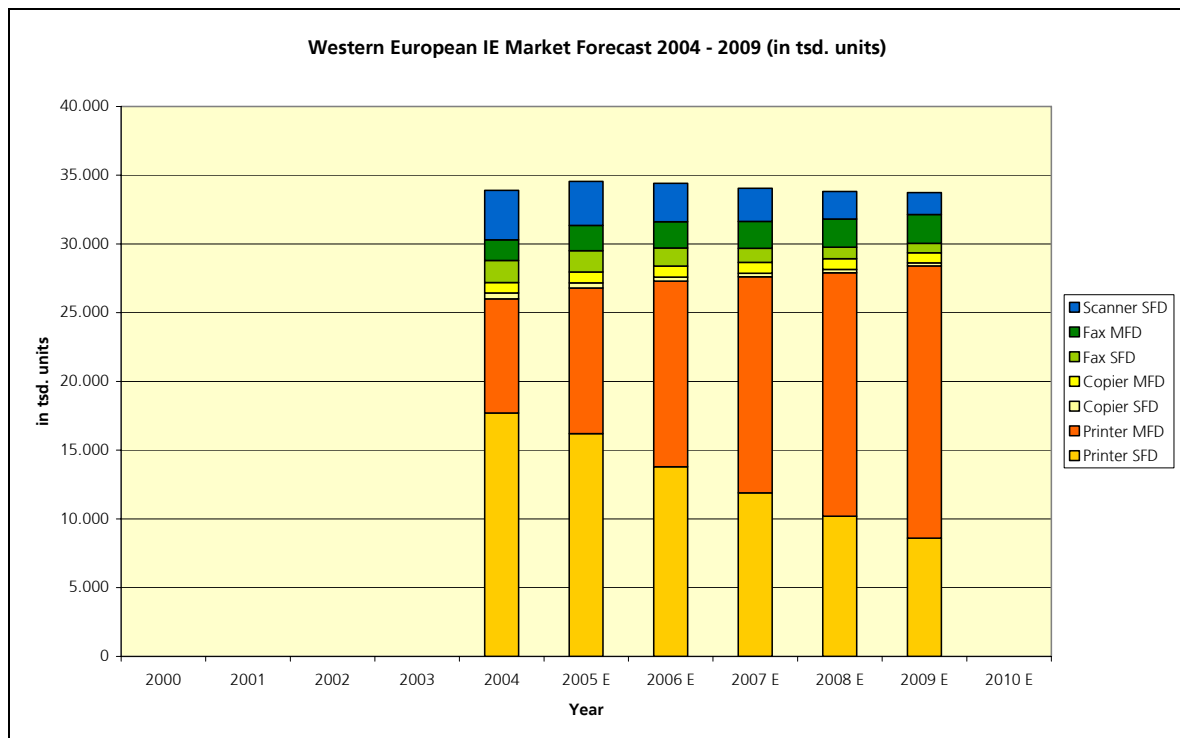


Figure 17: Western European Imaging Equipment Market Forecast 2004 – 2009

In order to evaluate the significance of the shift towards MFD, we looked at the driving forces behind this shift. From a technical point of view the driving force is mainly digitalization and miniaturization in electronics. The economical driving force towards MFD is the affordability of such technology. But the main driving force seems to be the consumer perception of having different functionalities available in a combined device. By considering the shift towards MFD as significant, we have to check if SFD is appropriate for differentiation.

2.3.4. Trend towards Colour and Photo Print

A general market trend towards colour capable imaging equipment as well as an increase of produced colour images is evident. Colour EP printers and MFDs become more main stream due to their improved price ratio and performance. Market figures for overall colour imaging equipment are incoherent ranging from 10% to 30% of total sales in 2004. Forecasts for office equipment are predicting in 2006 a more rapid replacement of monochrome devices in the workgroup environment. It is expected that the increase in colour devices will also increase the overall output of colour images although the volume of monochrome images will still remain substantially larger in comparison. Figure 18 shows the total workgroup impressions monochrome vs. colour in Western Europe based on data from InfoTrends.

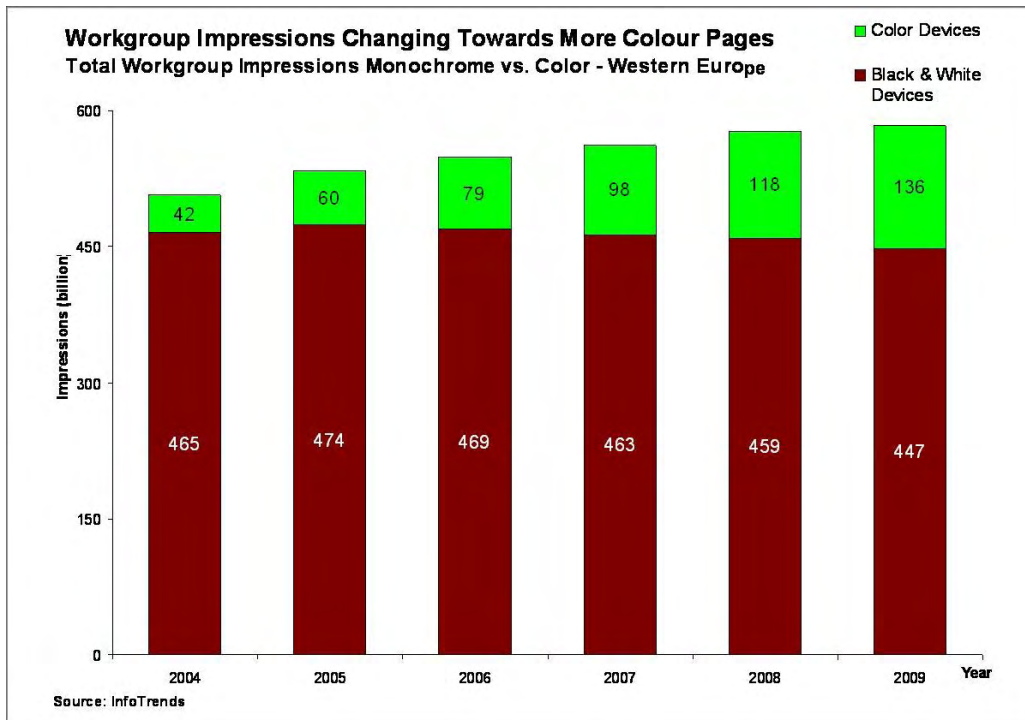


Figure 18: Total Workgroup Impressions Monochrome vs. Colour in Western Europe

What is the correlation between the shift towards more colour imaging equipment and the resulting environmental impacts? At this point of time we are assuming that a correlation exists. In order to create colour images multiple processes including different colorants are necessary. This increases the material, resource and power consumption for a single product in comparison to a monochrome device.

What the trend towards colour is in EP printer and copier market is the trend towards special photo print in the IJ printer market. Small digital photo printer is a fast growing market segment. In order to show the importance of this new segment a forecast for the U.S. photo printer market should serve as a reference (see Figure 19). The new photo printers have some particular characteristics like colour displays, some computing power, multiple memory device slots and network capability, and it uses special photo paper. IJ is not the only marking technology applied for these products. Dye sublimation and solid ink technology are also applied due to their good properties.

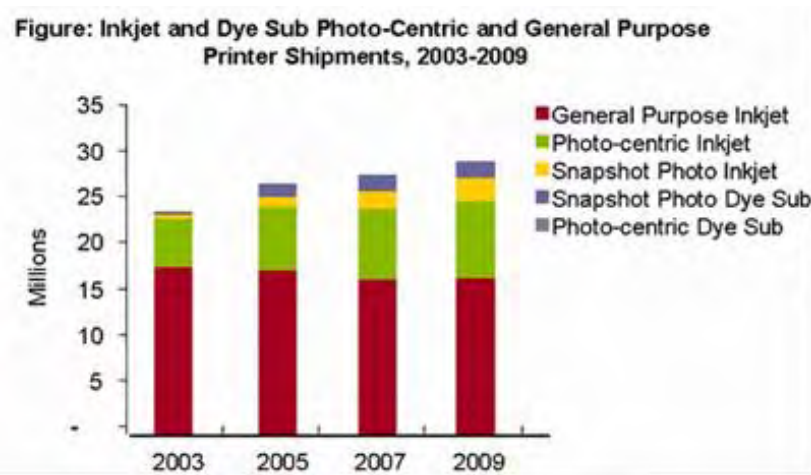


Figure 19: United States Photo Printer Market Forecast 2003-2009 (Source: InfoTrends)

2.3.5. Conclusion

The office imaging equipment market is dominated by two main marking technologies:

Electro Photography (EP)

- 17% market share of EP printers and copiers, but 85% of total image output
- usually higher imaging speed (volume technology)
- power consumption by fusing (thermal image fixing process)

Ink-Jet (IJ)

- 65% market share of Inkjet printers, but only 10% of total image output
- usually lower imaging speed (value technology)

Miniaturization and digitalization leads towards multi functional devices (MFD):

Single Function Devices (SFD)

- Printers are the dominant SFD, followed by scanner and fax
- SFD market shares is declining

Multi Function Devices (MFD)

- MFD become mainstream due to better performance to price ratio
- most Copiers are already MFD
- printer-, copier- and fax-based MFDs will overtake SFDs in volume of sales by 2006

General market trend towards colour capable imaging equipment:

- Colour IJ printers are dominant in overall imaging equipment unit sales

- Colour EP printers and MFDs become more main stream due to improved price performance (speed gap)
- Photo printers (inkjet, dye sublimation) are a growing market segment
- Particular characteristics of today's photo printers: colour displays, increasing computing power, multiple interfaces (slots), network capability, special photo paper needed

However:

- Monochrome still the majority of volume printed
- Black & white is pervasive in all documents
- Monochrome and colour EP printer are declining in price, costs per page for monochrome or colour prints will converge

The following Figure 20 illustrates these main trends.

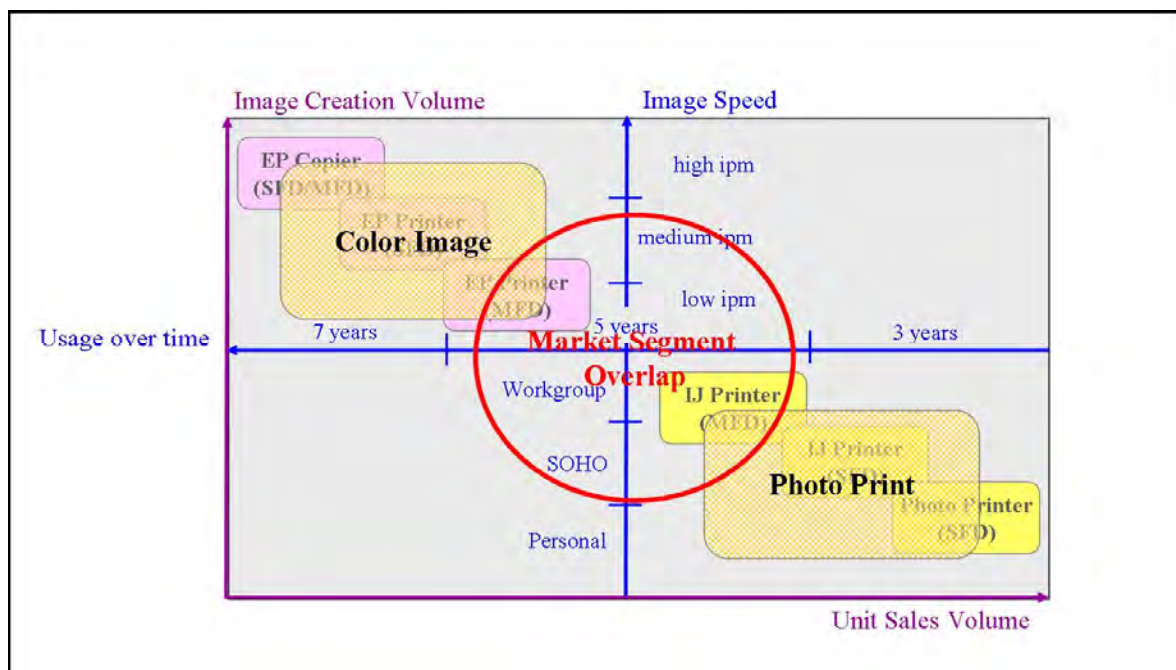


Figure 20: Main Market Trends in Office Imaging Equipment

2.4. Consumer expenditure base data

2.4.1. Task and Procedure

This subtask provides a practical dataset of prices and rates to be used in a Life Cycle Cost (LCC) calculation. Consumer expenditure base data for imaging equipment consists of data on costs a user of imaging equipment has over the life time of the device, i.e.

- Purchase costs
- Running costs for operation (i.e. costs for electricity, paper and toner/ink)
- Running costs for repair and maintenance
- Installation costs (if applicable)
- Costs for disposal
- Costs due to inflation and interest rates (if applicable)

The following section is based on the product scope set in Section 1.1.2.2. Consumer expenditure data has – as far as possible – thus been calculated for office imaging equipment, i.e. printers, copiers, scanners, faxes, and multifunction devices (MFD). For digital duplicators and mailing machines, Chapters 2.1 and 2.2 have already shown that they are out of the scope of further analysis.

It is important to state that the running costs of operation of imaging equipment can only be calculated on the basis of an average time for the different operation modes as well as the average amount of consumables (i.e. paper and toner / ink) needed for the production of the corresponding “imaging output” (e.g. for a colour image with precisely defined parameters). The power consumption is different in each of these modes. The total energy consumption can be calculated by multiplying the assumed time for which one mode is active with its respective power consumption. The resulting electricity consumption in kWh then needs to be multiplied with the electricity costs in order to determine the running costs for operation as regards electricity. In order to calculate the running costs for consumables, the average amount of produced imaging output over a certain period of time needs to be defined¹¹.

A first description of these parameters has been done in Task 1 through the setting of an average usage scenario for both EP and inkjet technology. Furthermore daily output volumes have also been defined for both technologies thus setting basic assumptions for further calculations (see

¹¹ The calculation of these specific use-related costs is not done in detail here but will be dealt with further in the process when defining the base case (Task 5).

Sections 1.1.2.3.2 and 1.1.2.3.4 on the environmental impact). This data will be compared to results generated during Task 3 on consumer behavior.

2.4.2. Approach for purchase costs

Two approaches are possible to calculate the costs described in Section 2.4.1 above: top-down or bottom-up. For the first one, purchase costs available from the European statistics can be used while the latter is based on hand data via (online) market surveys. In order to get a better overview and possibilities of comparison both approaches have been used.

2.4.2.1. Top-Down Approach

Generic economic data has been used for the evaluation of average costs. For each of the EU25 Member States the *value* of apparent consumption, calculated by adding the value of production and imports minus the value of exports, was divided by the *volume* of apparent consumption.

2.4.2.2. Bottom-Up Approach

Several organizations gather market data concerning sales (in Euro and in volume) and prices of imaging equipment. On EU level the European Information Technology Observatory (EITO) publishes the EITO Yearbook which provides data for Western Europe. Unfortunately, it was not possible to get access to any other publicly available data on European level. National organisations such as e.g. BITKOM – being the association of the ICT industry in Germany – do not gather any market data beyond the one published in the EITO Yearbook. In Germany, GfU (Gesellschaft für Unterhaltungs- und Kommunikationselektronik) – being an association of actors within the CE and ICT industry – publishes quite a lot of data regarding ICT equipment but only for the German market. In the course of the present study, this data has nevertheless been analyzed and evaluated since it is very up to date. Both, the EITO Yearbook and GfU publications, base their data on market surveys conducted by GfK (Gesellschaft für Konsumforschung), a private market research institute in Germany. GfK has more extensive data than EITO Yearbook but only makes it available at very high purchase price. The market research institute InfoTrends made some of its own internal market research data available for this project. Some detailed market data could thus be evaluated for purchase prices of faxes, scanners, printers and multi-function devices (the source is referred to as “InfoTrends Forecast Reports” in the sections below)¹². Several newspaper or magazine articles contain some market data on costs. Nevertheless these only give a short insight

¹² The prices quoted from InfoTrends are street prices (excl. VAT), i.e. prices of equipment as found in shops or offered by vendors and not prices as fixed by producers.

and do not represent a solid database. Due to the extremely large amount of data available on the internet, it was decided to evaluate the data found on German websites and magazines exemplarily.

2.4.2.3. Approach Other Costs

Costs for maintenance and repair are usually included in service or leasing contracts and could therefore not be identified separately. Statistics do not include such data either. European and national associations and industry groups do not make such data publicly available. A market survey amongst media stores and consumers could possibly be more successful. Carrying out such a survey is nevertheless not feasible within the framework of this project. Some data has been made available by the market research institute InfoTrends. This data has been aggregated and further analyzed with a view to the tasks relevant for this report.

Costs for **installation** of office imaging equipment are generally covered through a service contract which also covers repair & maintenance. In some cases (e.g. for copiers) service contracts may also cover costs for consumables. Therefore, installation costs could not be identified separately. No data could be found that relates directly to installation costs solely.

Electricity rates for the EU25 Member States were gathered from Eurostat data publicly available on the internet. **Electricity costs** can be calculated via base data on daily or yearly operation time of imaging equipment in different operation modes then multiplied with electricity rates in EUR per kWh.

Costs for disposal do not occur for private consumers any more since the EU Directive on waste electrical and electronic equipment (WEEE-Directive) is in force and includes the zero-disposal-cost requirement for private owners of waste electrical and electronic equipment. Costs for disposal of office equipment are usually subject to agreements between producers and customers not disclosed to the general public. Nevertheless, recycling and disposing of an imaging equipment device does certainly generate costs. However, only little data could be found on these costs.

Inflation and interest rates are required within the evaluation of consumer expenditure data. Concerning imaging equipment it needs to be clarified in what context inflation and interest rates are relevant for consumers. A possible scenario can be the purchase of imaging equipment which requires financing on the basis of a credit. Such a credit can be granted by a bank, the store and collaborating financial institutions or via the current account. Since no detailed information is available on the structure of such financing mechanisms for office imaging equipment, only national inflation rates available at the Eurostat website as well as general long-term ECB interest rates have been evaluated. However, it needs to be checked whether for this product group such rates are applicable at all and if so whether product-specific inflation rates for imaging equipment

can be gathered or whether specific interest rates can be granted for the special case of imaging equipment purchase.

2.4.3. Overview top-down approach

This section will give a short overview on the results on cost data generated with the top-down approach. The following table shows the value for costs of apparent consumption (average per unit price calculated on the basis of PRODCOM statistics) in different countries.

Table 46: Overview on costs for apparent consumption [€]

Country	Copiers	Printers	Fax machines
	Prodcom 2004 ¹	Prodcom 2004 ²	Prodcom 2004 ³
France	1,345	98	-
Netherlands	259	12	69
Germany	83	-361	128
Italy	483	126	:
United Kingdom	1,754	167	:
Ireland	1,563	:	156
Denmark	1,771	167	319
Greece	1,301	13	112
Portugal	859	153	179
Spain	338	:	:
Belgium	593	:	:
Luxemburg	396	265	133
Sweden	912	:	151
Finland	236	:	182
Austria	560	223	:
Malta	153	44	:
Estonia	587	157	158
Latvia	471	146	159
Lithuania	470	:	123
Poland	1,088	:	121
Czech Republic	632	:	182
Slovakia	1,947	:	148
Hungary	772	:	:
Slovenia	1,118	:	164
Cyprus	503	226	166
EU15	:	:	:
EU25	440	:	-

¹ Prodcom categories evaluated: 30.01.21.70, 30.01.21.83, 30.01.21.85

² Prodcom category evaluated: 30.02.16.30

³ Prodcom category evaluated: 32.20.20.75

: Data for this item is confidential and has been suppressed

- Data for this item is estimated and has been suppressed / not available

Unfortunately – as can be seen from figures in the table above – PRODCOM data is not always realistic. For example, the average value / unit of a printer in the Netherlands of 12 € cannot be regarded as realistic. The same applies to the average price per printer in Greece of 13 €. Concerning these not plausible figures it has to be pointed out that data is not always available for all imaging equipment categories. For some countries, it was not possible to calculate an average unit price for the individual imaging equipment since either data on production, import and/or export is not available in PRODCOM. For example, a negative value of apparent consumption in Germany leads to a negative average value of a printer as well which again shows the limited reliability of statistical data. Nevertheless, statistical data on printers for Italy, UK, Denmark, Portugal, Estonia and Latvia, for example, seem realistic.

The following table gives an overview on further statistical data belonging to the top-down approach. The average prices resulting from import and export data rather reflect market prices than those resulting from the calculation of the value of apparent consumption in the table above. For example, the average prices for printers of around 130 € and the higher prices of around 600 € for electrostatic copiers are indeed realistic. However, this data is rather imprecise and should only serve as a rough guidance concerning price ranges.

Table 47: Intra-EU trade of EU25 totals in 2005 (Trade statistics)

		Import	Export
		Average price [€]	Average price [€]
Electrostatic copiers	9009.11.00	295	85
	9009.12.00	761	1616
Diazocopiers / blueprinters	9009.22.00	569	654
Copiers (thermo/ optical)	9009.21.00	117	129
	9009.30.00	38	15
Printers	8471.40.60	112	152
Fax machines	8528.13.00	128	137

The table below shows the distribution of average prices, in more detail, for the example of copiers according to calculations based on PRODCOM data. Here, the differentiation is made according to different types of copiers. However, no general trend can be derived from these figures. In some countries such as Belgium, electrostatic printers seem to be much more expensive than the contact type ones. In other countries such as Greece, it seems to be the opposite. The only conclusion that can be drawn from these figures is that even if PRODCOM data differentiates between copier types, no reliable information on consumer expenditure data can be derived.

Table 48: Selected average PRODCOM price per unit for copiers in 2004 [€]

Declarant	Electrostatic photocopiers	Blueprinters, diazocopiers and other photocopying apparatus of the contact type	Photocopiers incorporating an optical system, thermocopiers (excluding electrostatic photocopiers and thermo-printers)
Ireland	1.605	1,170	1,914
Denmark	4.709	425	179
Greece	935	2,624	345
Portugal	1.066	1,165	345
Spain	417	331	266
Belgium	1.130	300	350

Conclusions: The use of statistical data is problematic with a view on the product categories defined under Sub-task 1.1:

- The categories defined in PRODCOM do not differentiate in enough detail between single imaging equipment technologies.
- The categories do not differentiate either between different speed segments of imaging equipment nor do they differentiate between black & white and colour.
- Some base data on production, import and export is simply not available.
- Negative values appear and can not be used for further evaluation.

2.4.4. Overview bottom-up approach

The following section will focus in more detail on the results generated with the bottom-up approach as it reflects market data in a more realistic way. Market data is much more reliable than data generated through the top-down approach. It is mostly up to date and closer to reality since the surveys are done directly at the level of retail and consumers. However, the collection of data requires a very high effort and is thus very costly. This is why market surveys are mostly done by private companies interested in the data for their marketing purposes or by industry associations. Some data is collected by consumer organizations that have the aim to inform the consumer about current costs for certain consumer goods. Only part of the data is publicly available and is not collected in a continuous way. Again, with a view on the product categories defined under Sub-task 1.1, market data might be more accurate and up to date compared to statistical data but on the other hand it does not give a broad well accessible data base for public authorities. Most of the results are based on data from the market research institute InfoTrends. Data is only available for Western Europe (EU-15 excluding Luxembourg but including Switzerland, Turkey and Norway). For its calculation, InfoTrends assumes the same average price per product and market segment for all countries of Western Europe. This has also been confirmed by Lexmark in a personal communication, also stating that prices in the 10 new Member States do not differ from those in

EU15. Furthermore, InfoTrends states that using data for Switzerland, Norway and Turkey leads to the same results on purchase prices as when using data from the 10 new Member States.

2.4.4.1. Purchase costs for printers

Below, Figure 21 shows data on average purchase prices from two different market research sources for Western European countries in 2005. The prices shown in the left graph of Figure 21 reflect a calculated weighted average purchase price per country: depending on the relevance of individual market segments (e.g. inkjet in a certain price category or electrographic printer with a certain image speed), average prices will be higher or lower in one or the other country. I.e. a high average price like it can be found in Austria reflects the fact that market segments with higher prices have a greater impact on the average than in bigger countries like e.g. Germany where the market relevance of lower price products is higher. In general prices within market segments do not vary much across EU countries.

Data in the right graph of Figure 21 are calculated on the basis of total revenue divided by the number of sold units. Thus these are also not “real” average purchase prices but rather a calculated average across all products (this time without being weighted according to market relevance of single market segments). Nevertheless, the total average price for Western Europe is 250 € (left) and 300 € (right). Hence, data seems to be more or less comparable and gives an idea on an average purchase price across all products present on the market. The variations across individual countries only reflect the different situations concerning market relevance of high or low price products.

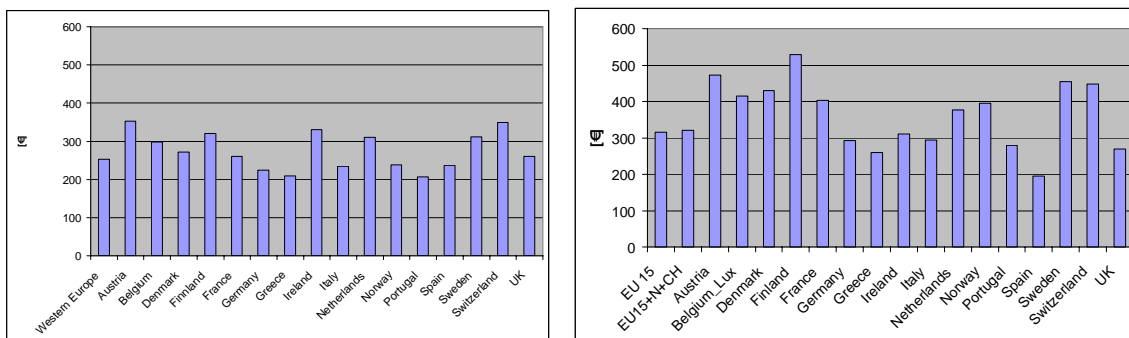


Figure 21: Average purchase price of printers (total market¹³) in 2005 in Western Europe [left: InfoTrends Forecast Reports; right: EITO Yearbook 2006 (printers + MFD); own calculation]

The following figures show the distribution of average prices across different market segments for Western Europe in 2005. It can be seen that colour electrographic printers are the most expensive

¹³ Includes personal and workgroup printers as well as IJ and EP.

ones with around 1,400 €¹⁴. In comparison, the weighted average price of an inkjet printer is of only 100 € approximately. The total weighted average price for printers is approximately 250 €. The variation across the market segments is very large.

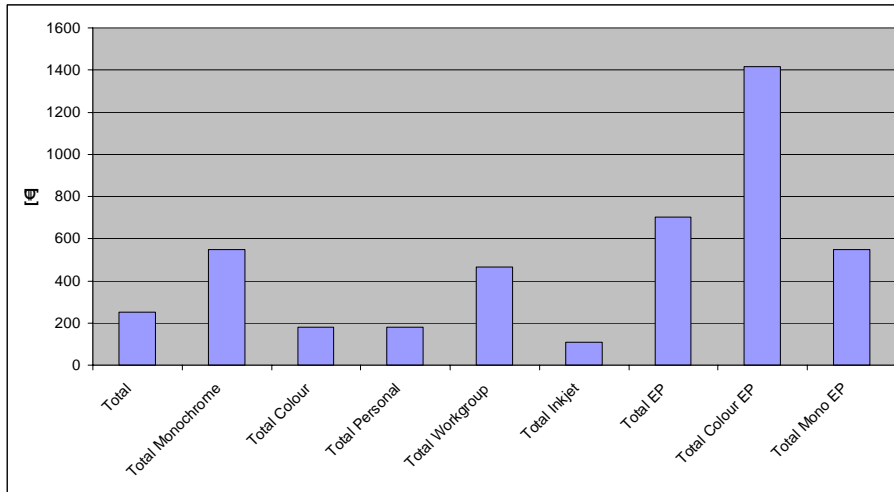


Figure 22: Average purchase price of printers (main segments) in 2005 in Western Europe [InfoTrends Forecast Reports]

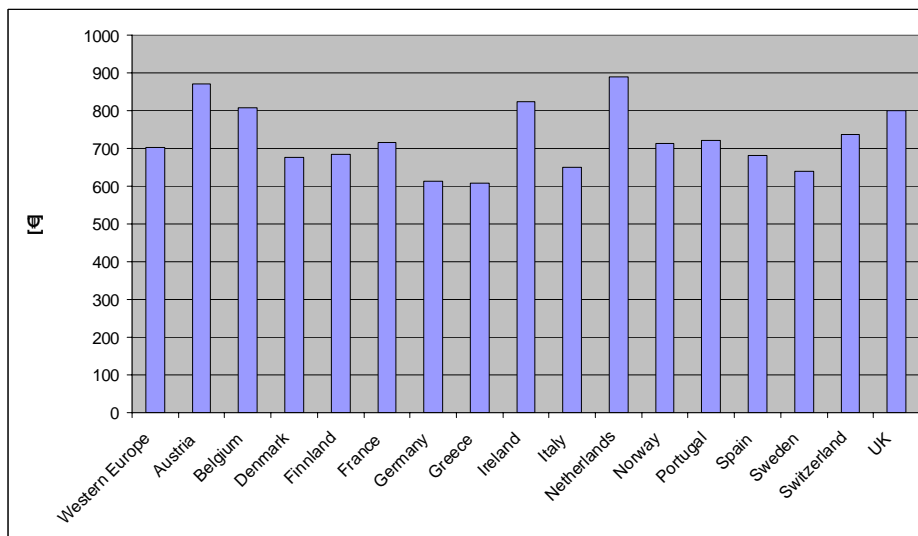


Figure 23: Average purchase price of electrographic printers (total) in 2005 in Western Europe [InfoTrends Forecast Reports]

¹⁴ Note: these prices are also the result of a calculated weighted average across individual market segments summarised into different main segment categories.

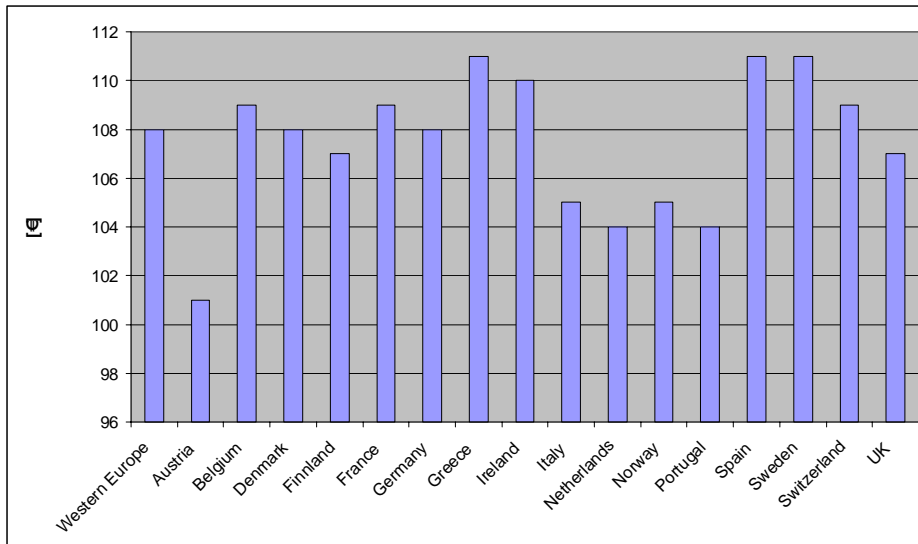


Figure 24: Average purchase price of inkjet printers (total segment) in 2005 in Western Europe [InfoTrends Forecast Reports]

Looking at the purchase prices of electrographic printers and those of inkjet printers in the figures above, one can see the large variation: in Western Europe the average weighted price of an electrographic printer is approximately 700 € while the average weighted price of an inkjet printer is around 110 €. The variation across countries is due to the different weight of the individual market segments (i.e. countries with lower weighted average prices like Italy have a higher market relevance of low price products whereas countries with higher weighted average prices like Ireland have a higher market relevance of high price products).

Information on product segmentation used by InfoTrends

InfoTrends derives its categorisation from market data. For ink jet printers, a differentiation based on price segments is used because according to InfoTrends it is more market relevant than a categorisation of imaging speeds. As regards study of electrophotographic devices and copiers, InfoTrends refers to the industry's standard speed segments. It covers very low-end devices as well as high-end devices, all the way up to 24+ ppm in colour and 80+ ppm in monochrome (see table below).

Electro-photographic Printers (prints per minute, ppm)		Copiers (copies per minute, cpm)	
Monochrome	Color	Monochrome	Color
0-6 (Personal)	1-4 (Workgroup I)	1-10 (Personal)	3-8
7-12 (Personal)	5-8 (Workgroup I)	11-19 (Segment I)	9-14
13-24 (Workgroup I)	9-16 (Workgroup II)	20-30 (Segment II)	15-23
25-39 (Workgroup I)	17+ (Workgroup III)	31-45 (Segment III)	24+
40-79 (Workgroup II)	24+ (Production)	46-69 (Segment IV)	
80+ (Production)		70-90 (Segment V)	
		91+ (Segment VI)	

InfoTrends also follows its own proprietary segment definitions in terms of application (Personal, Workgroup, and Production) which are explained in the table below. The personal application includes inkjet devices with street prices up to \$395 (approximately €315). It also covers electrophotographic printers that produce between 1 and 12 ppm. This environment generally targets consumers and small office/home office (SOHO) markets.

The workgroup application is composed of inkjet printers that are priced above \$395 (above €315) and electrophotographic printers that produce 13-79 ppm in monochrome and 1-23 ppm in colour. This segment predominately targets medium-sized and large corporations. The production application refers to printers that output 80+ ppm in monochrome and 24+ ppm in colour. These devices are generally targeted towards printing environments that require a dedicated operator to produce the work of others as an internal or outsourced service resource. All colour printers covered in these market estimates are full process colour devices, not spot colour devices.

Environment	Description	Typical Number of users
Personal	A personal device is generally designed to support a single individual or a very small group (including families). Users generally take responsibility for care and maintenance of the device on an as-needed basis.	1 – 4 worker
Workgroup	A Workgroup device is a shared resource with which individual users produce their own documents. The device is not usually under the control of a single individual. Workgroup devices are found in organisations of all sizes. They may support an entire small business or several groups within larger businesses. This environment may be further divided into larger and smaller workgroups.	Smaller Workgroups consist of 5 – 24 workers. Larger Workgroups consist of 25 – 100 workers.
Production	Production devices are typically controlled by trained operators that produce documents for others at high speeds, high volumes or both.	The number of users typically includes an entire business enterprise. Devices in print-for-pay and data processing plants are also found in this environment.

Figure 25 below shows the variation of average purchase prices across selected analysed market segments [InfoTrends Forecast Reports] in Germany for 2005¹⁵. In order to have a figure for

¹⁵ The average purchase prices for individual segments like “monochrome EP 7-12 ppm” are assumed as being the same across Western Europe. The average prices for summarised segments like “total EP” are weighted means of some individual segments and thus differ from one country to another.

comparison, the average price over all segments for printers from the GfU in 2005 (please also refer to Section 2.4.2.2) has been added as “Average¹⁶” on the outer right side in the graph (around 100 €). However, this figure is not consistent with the average total printer price (over all market segments) provided by InfoTrends (around 200 €). The graph furthermore shows the very big range of prices across the different market segments. It can be seen that colour electrographic printers and high imaging-speed printers with an imaging speed between 9 and 16 pages per minute are the most expensive ones with over about 800 €. Inkjet printers remain the cheapest ones across all segments.

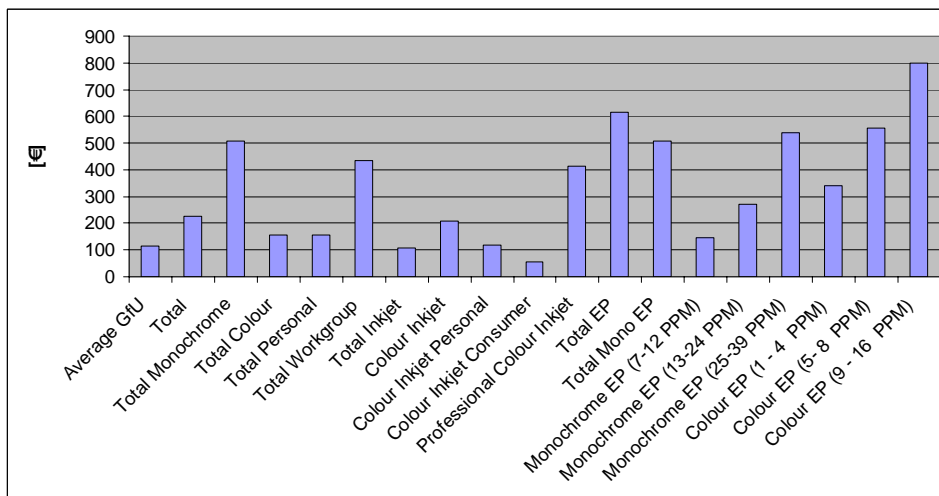


Figure 25: Average purchase price of printers (selected individual segments) in 2005 in Germany [InfoTrends Forecast Reports]

Figure 26 below presents the evolution of weighted average purchase prices of printers for all market segments (InfoTrends Forecast Reports). The weighted average purchase price of printers in Western Europe seems to stabilize at around 220 € for the next years.

¹⁶ This figure is based on the calculation of annual revenue in 2005 divided by the number of sold units in that year.

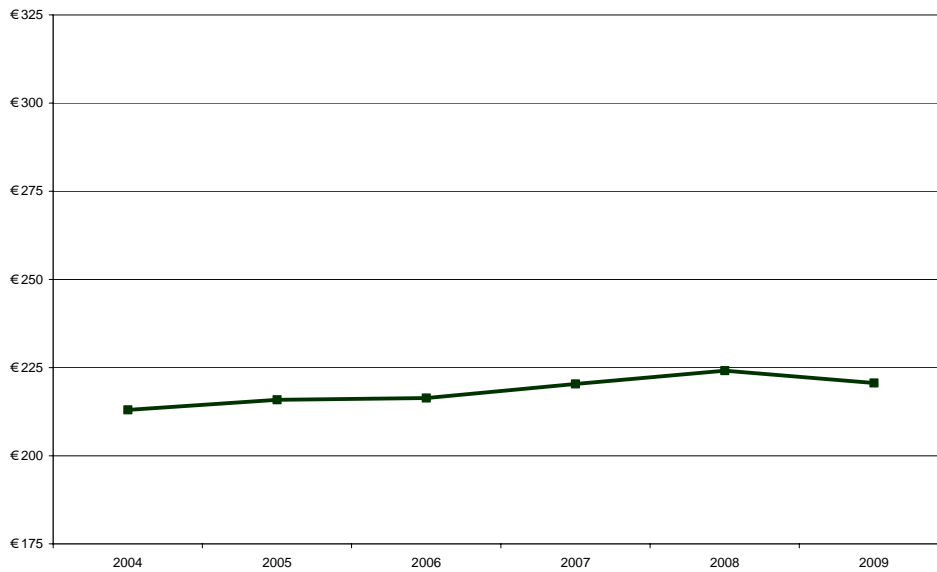


Figure 26: Average purchase price of printers (all segments) in Western Europe 2003-2009 [InfoTrends Forecast Reports]

When distinguishing between the two main printing technologies (EP and inkjet), the evolution of weighted average purchase prices in the years 2004 – 2009 in Western Europe follows opposite trends (see Figure 27). The weighted average purchase price of an EP is increasing since 2004. The average purchase price is projected to rise back to around 850 € by 2009.

The weighted average purchase price of inkjet printers is projected to have a downward trend until 2009 when the average purchase price is to fall down to around 100 € (see Figure 28).

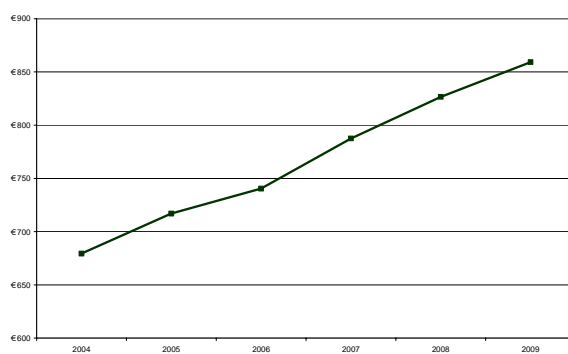


Figure 27: Average purchase price of EPs in Western Europe 2003-2009 [InfoTrends Forecast Reports]

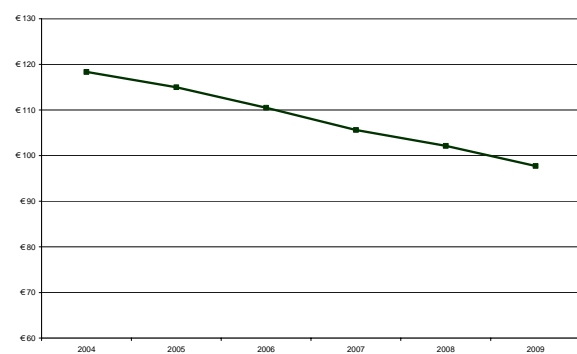


Figure 28: Average purchase price of inkjet printers in Western Europe 2003-2009 [InfoTrends Forecast Reports]

2.4.4.2. Purchase costs for MFDs

Multifunctional devices can be based on a printer or a copier technology. In the following subsection, only costs for multifunctional devices based on printer technology are described since no detailed data is available on costs for copier-based multifunctional devices.

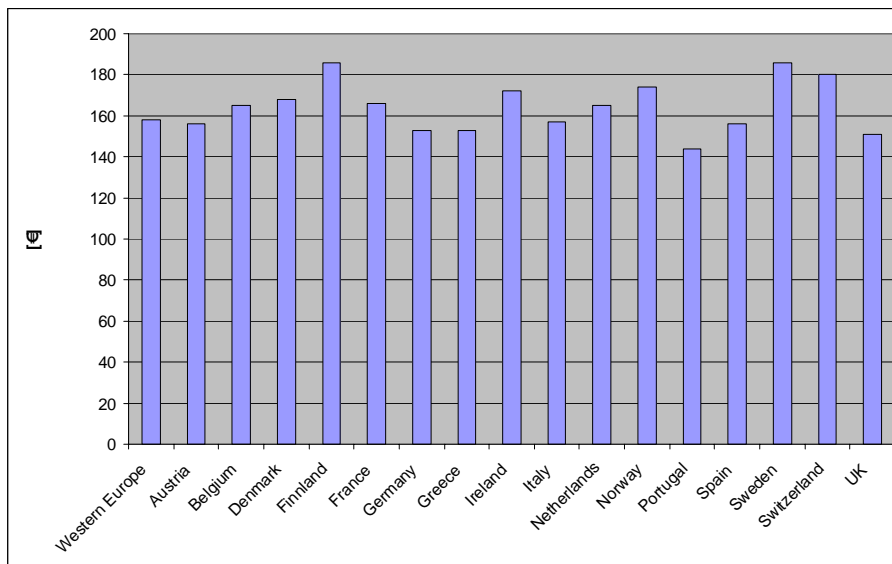


Figure 29: Average purchase price of MFDs (total market) in 2005 in Western Europe
[InfoTrends Forecast Reports]

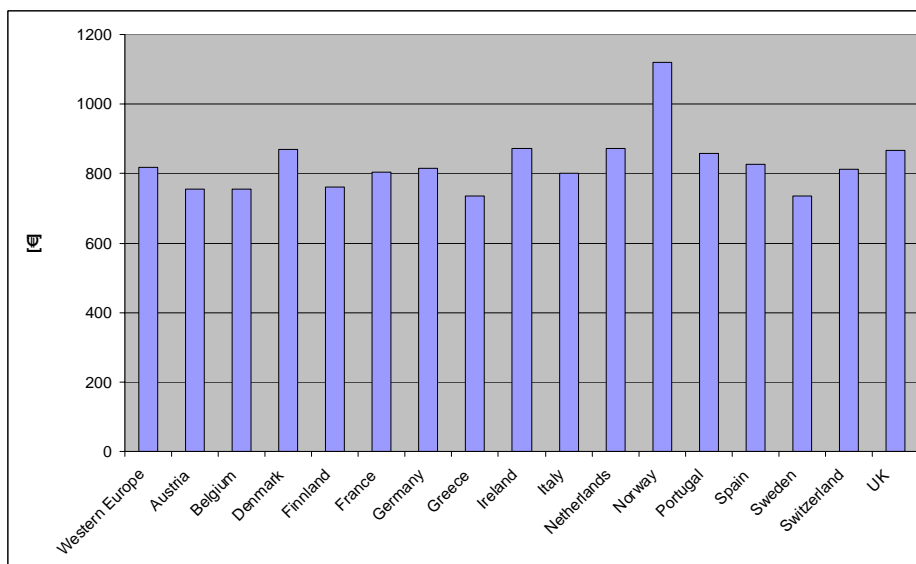


Figure 30: Average purchase price of electrographic MFDs (total segment) in 2005 in Western Europe
[InfoTrends Forecast Reports]

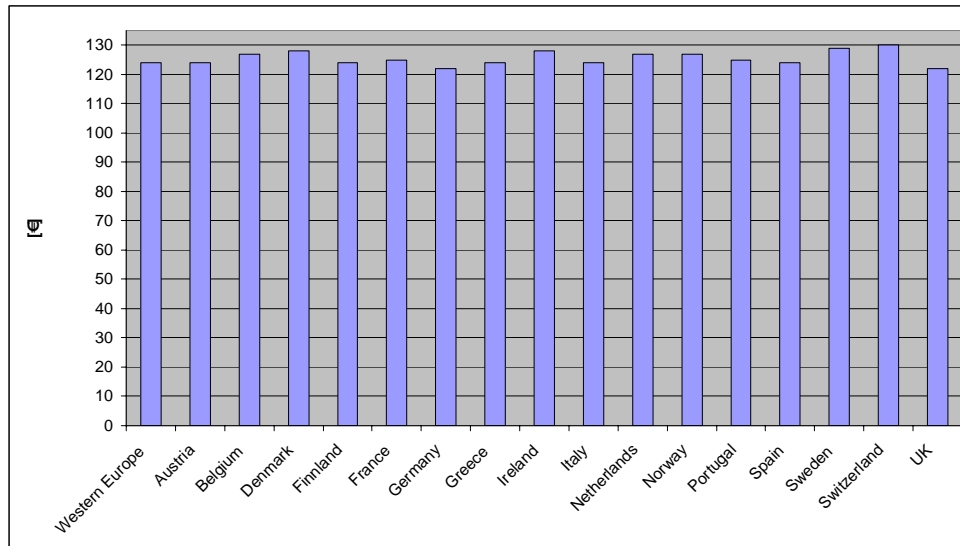


Figure 31: Average purchase price of inkjet MFDs (total segment) in 2005 in Western Europe [InfoTrends Forecast Reports]

In Figure 29, Figure 30, and Figure 31 average purchase prices for printer-based MFDs are shown for the countries of Western Europe. The total weighted average market prices do not vary significantly across individual countries (except for Portugal having the lowest weighted average purchase price at around 140 €). The highest weighted average prices are paid in Sweden and Finland with around 180 €. When looking at the distribution of prices for the two main printing technologies (electrographic and inkjet) the variations of the weighted average purchase price are more diverging. Norway stands out with a particularly high purchase price for electrographic MFDs of about 1,100 €. The average across all other countries lies at about 800 €¹⁷.

The average weighted purchase prices of inkjet printers do not show as great variations as the ones of electrographic MFDs. Switzerland has the highest purchase price with 130 €. The weighted average across all countries is about 120 €.

Figure 32 below shows the distribution of purchase prices for selected MFD segments (including fax-based MFDs) in Western Europe. It can be seen that colour electrographic MFDs and large workgroup fax-based MFDs are the most expensive ones with around 1,000 €. On the other hand, inkjet-based MFDs have very low purchase prices of about 170 €. The very low total printer-based MFD purchase price of about 180 € is due to the fact that the average price is weighted according to market relevance of individual market segments.

¹⁷ Note: here again, variations across countries is due to different impacts of individual market segments within the countries.

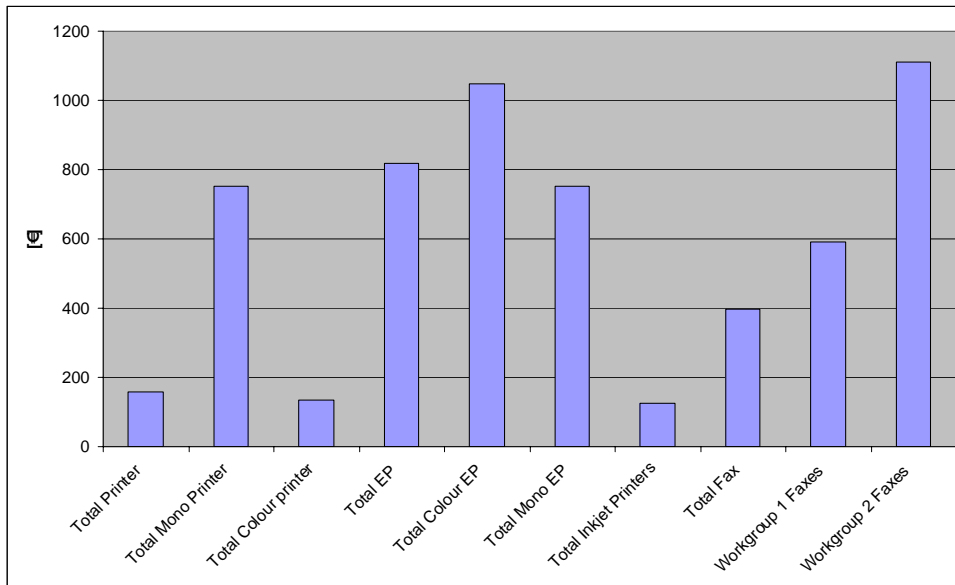


Figure 32: Average purchase price of MFDs (main segments) in 2005 in Western Europe [InfoTrends Forecast Reports]

Figure 33 below gives an overview on average prices across selected individual market segments and summarized segment categories in Western Europe for 2005. The prices for these summarized categories (e.g. “total fax”) are weighted means according to market relevance of individual market segments (e.g. “monochrome EP 25 – 39 pager per minute”). Prices for individual market segments are assumed to be the same across countries of Western Europe while the weighted average prices of summarized categories vary from one country to another. Colour electrographic printer-based MFDs with high imaging speed have a high average unit price of around 2,200 € compared to low price colour inkjet printer-based MFDs that cost around 100 €

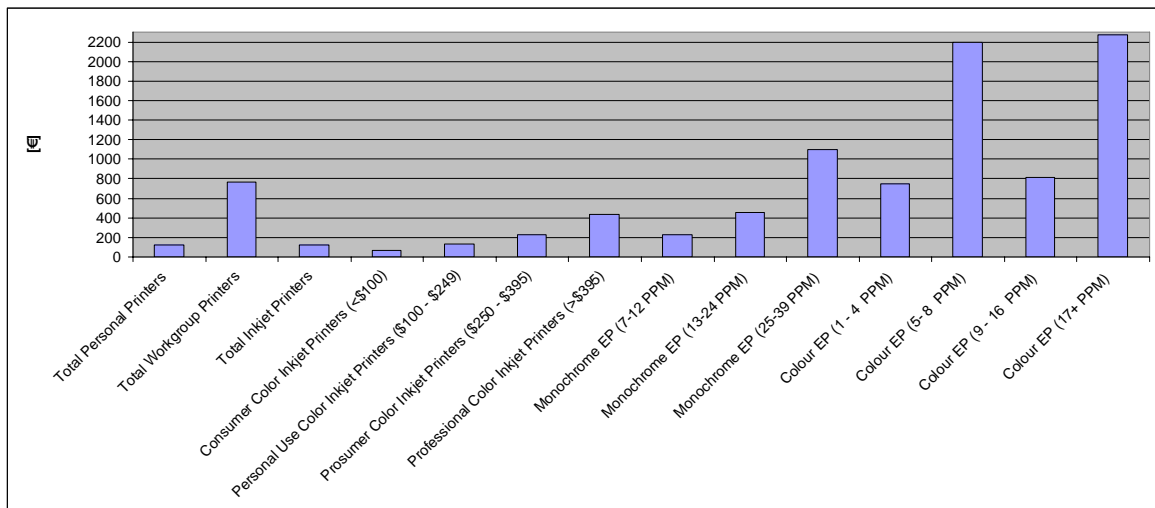


Figure 33: Average purchase price of MFDs (selected individual segments) in 2005 in Western Europe [InfoTrends Forecast Reports]

2.4.4.3. Purchase costs for scanners

Figure 34 below shows the distribution of purchase price of scanners for professional use (DIS stands for “document imaging scanner” in opposition to personal scanner use). These scanners are used when large amounts of documents need to be archived e.g. a law firm. This explains the rather high purchase costs ranging from 1,000 € up to 40,000 € (for high volume production DIS – not shown in figure below). Scanners for personal use are cheaper; as stated by the GfU in 2005, the average price of a scanner was 112 € and in 2006 132 €. This data, however, is generated through a *top-down approach* (revenue divided by sold units).

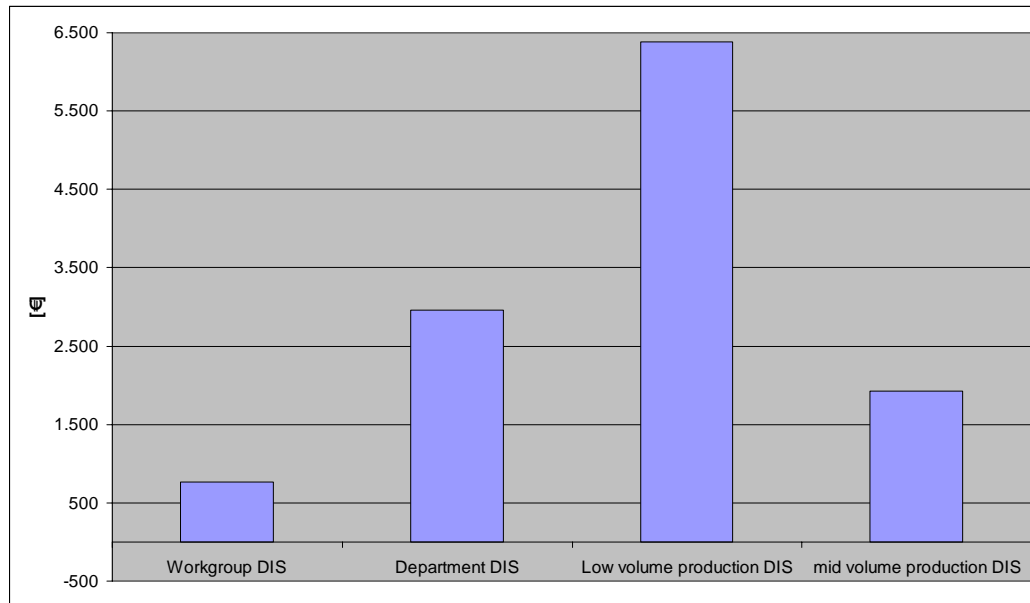


Figure 34: Average purchase price of scanners (main segments) in 2005 in Western Europe [InfoTrends Forecast Reports]

2.4.4.4. Purchase costs for copiers

Copiers are also devices that can be used in many different user environments. However, copiers for personal use appear to be less frequent than copiers for professional use. The two figures below give an overview on average purchase prices for copiers in Western Europe summarised for three segments: personal monochrome, other monochrome and colour copiers¹⁸. The figures from 2005 onwards are projections. A downward trend can clearly be seen over the years. In 2003 copiers (if not personal) cost around 14,000 €. By now, this should already have dropped to around 9,000 €. Personal copiers are a lot cheaper in purchase and only cost around 200 €

¹⁸ The figures for all three summarised segments are average figures that have not been weighted by market relevance of the individual segments.

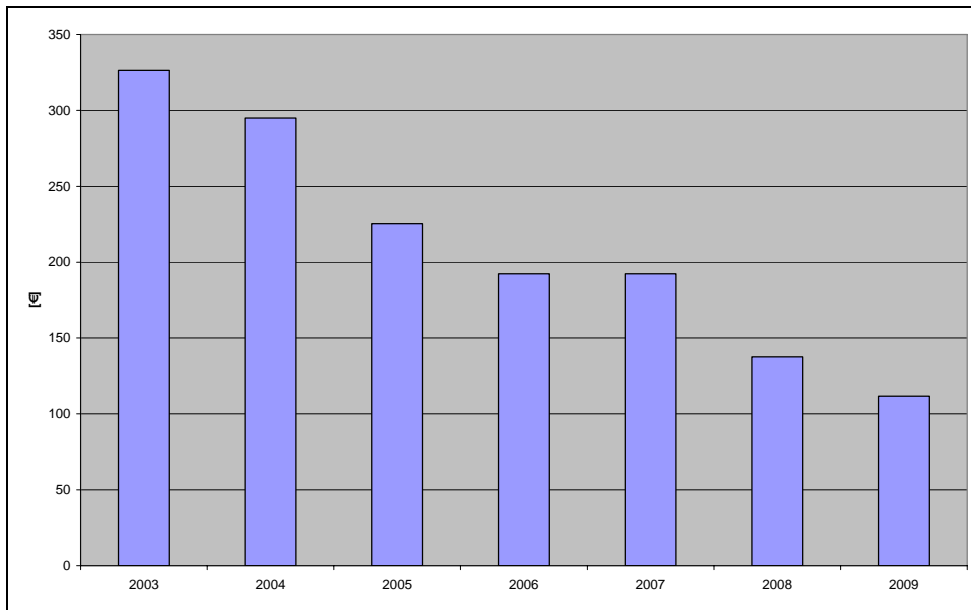


Figure 35: Purchase costs personal monochrome copiers in Western Europe from 2003 – 2009 (summarised segments; projection as from 2005) [InfoTrends Forecast Reports]

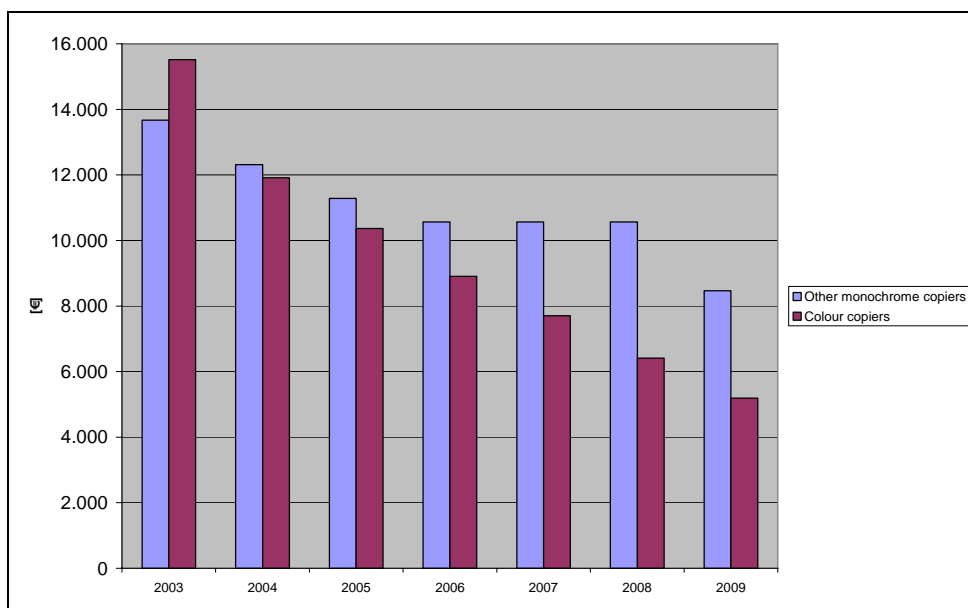


Figure 36: Purchase costs colour and other monochrome copiers in Western Europe from 2003 – 2009 (summarised segments; projection as from 2005) [InfoTrends Forecast Reports]

In Figure 37 below selected market segments are shown for 2004. Difference is made between analogue and digital as well as between single-functional (SF) and multi-functional (MF) devices. The most expensive copiers are SF and MF digital devices with a very high copy speed (+90 copies per minute) costing more than 45,000 € (not shown in the graph). Colour copiers can cost up to 20,000 € when multi-functional and copying speed of 24+ copies per minute. A multifunctional colour copier with a medium copying speed of 9 – 14 copies per minute costs around 13,000 €

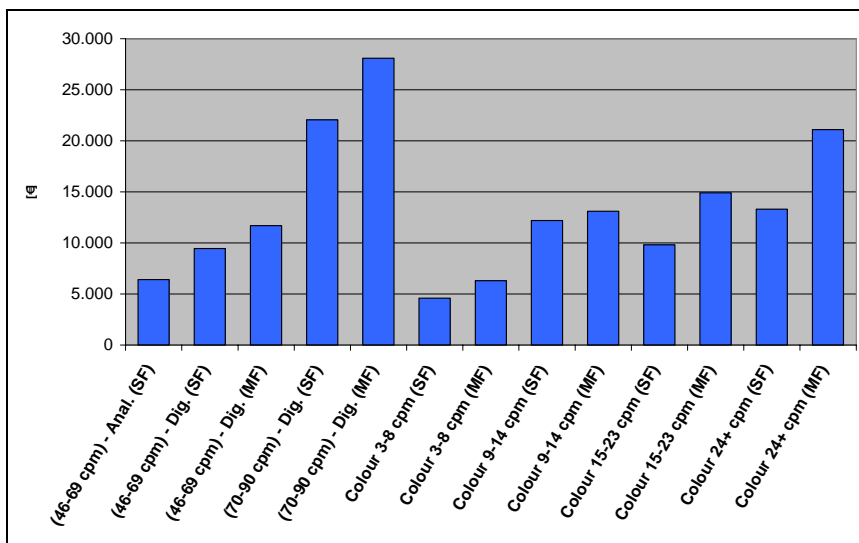


Figure 37: Purchase costs copiers (selected segments) in Western Europe in 2004 [InfoTrends Forecast Reports]

2.4.4.5. Purchase costs for fax machines

Figure 38 below indicates that the weighted average price is around 150 € per device for all market segments. Workgroup fax machines shared among many users in a network are more expensive and cost between 400 € and 950 €. For comparison the average price generated through a *top-down approach* for Germany also leads to a price of around 150 € (revenue divided by sold units) per device in 2005 (source GfU 2005).

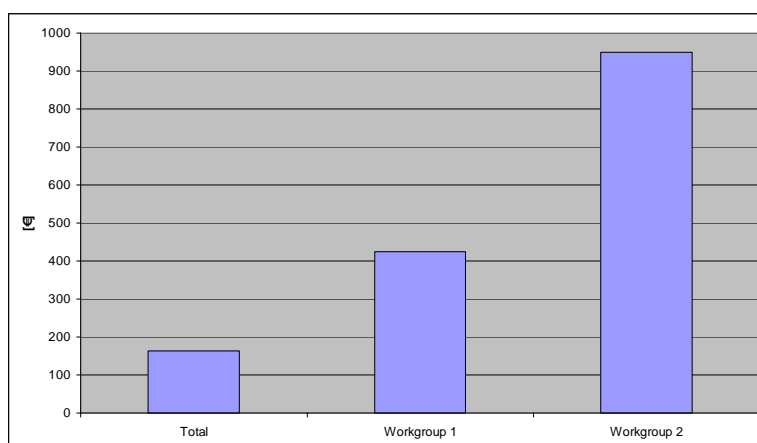


Figure 38: Average purchase price of fax machines (main segments) in 2005 in Western Europe [InfoTrends Forecast Reports]

2.4.5. Costs for operation

The costs for operation of imaging equipment consist of three sub-categories:

- Costs for consumables such as toner and paper
- Costs for repair and maintenance (service)
- Costs for electricity

This section will focus on the costs for consumables and on the costs for service. Electricity costs are not dealt with in detail at this stage since it requires an analysis of operation modes and usage patterns. In this chapter the focus is only set on applicable electricity rates in EU-25.

2.4.5.1. Costs for consumables

Consumables that are most relevant for printing and copying are toner / ink and paper. This is why the focus is set on these two consumables in this section (however, in the following it is only looked at ink costs and not on toner costs). No data is available for other potential consumables e.g. detergent for cleaning the glass surface of copiers or scanners.

Ink and toner costs

Figure 39 below gives an overview on average prices of ink per page for three different types of results. These average prices are the result of a random sample of each 55 (text), 23 (colour graph) and 49 (photo) prices for printouts that were found in magazines and on the internet in 2006¹⁹. The graph shows that producing a black and white text page is very cheap with 4 cents compared with producing a colour photo printout costing 80 cents. Printing a colour graph page costs around 12 cents per page.

¹⁹ Sources: Stiftung Warentest online 8.6.2006 (German consumer information organisation); c't 10/2006 (German ICT magazine); Stiftung Warentest 3/2006

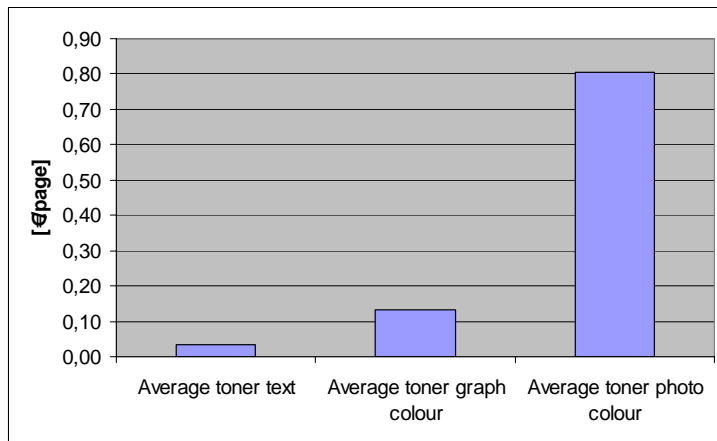


Figure 39: Average ink price per page 2006 [Own calculation]

Prices within these three categories have been calculated for random samples. There is a great variation in prices depending on the manufacturer of the cartridge and on the complexity of the product the ink is to be used in. For example ink price per page of *text* in 2006 varied between one and five cents. Some samples went up to 9 cents. Ink prices per page of *color graph* in 2006 vary much more: some samples lied between 5 and 10 cents while other samples were rather lying between 20 and 25 cents. As concerns ink price per page of an *A4 color photo* in 2006 most samples lied around 50 cents although a few samples could be found at 2.50 €/per page.

Per-unit consumables costs for copiers tend to decline as device speed increases. Faster speed segments generate greater yields and this brings down per-page toner costs [InfoTrends Forecast Reports].

Paper costs

Different types of paper are available depending on the use: “everyday paper” is assumed to be white paper with 80 g/m² which can be used in either laser printers or copiers. Another type of paper is photo-paper which is used in inkjet and laser printers. Figure 40 below shows average prices per page for different types of paper. The results are based on random samples of paper prices found in German magazines and on the internet (10 samples for everyday paper and 34 samples for photo-paper)²⁰.

The graph shows that photo-paper in big packs is less expensive (70 cents per page) than the same paper in small packs (90 cents per page). Compared to other paper types, photo-paper is a lot more expensive (40 cents per page compared to 2 cents per page for everyday paper). Furthermore, the

²⁰ Sources: Kaufhof (German department store) advertisement magazine 09/2006; Stiftung Warentest 11/2003 (German consumer information magazine); c’t 10/2006 (German ICT magazine); www.geizhals.de

price for photo-paper seems to have decreased since 2003, its average cost is 84 cents per page compared to 40 cents in 2006.

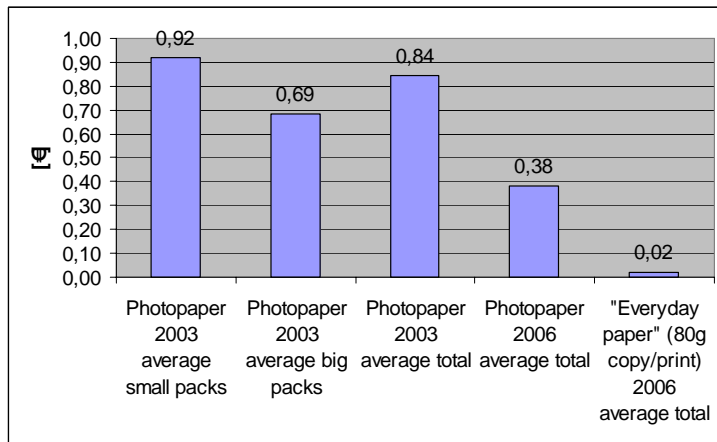


Figure 40: Average prices for print/copy paper [€/page] [own calculation]

According to an own calculation costs for everyday paper (80g copy/print) in 2006 mostly lie between one and two cents per page. Only one out of 10 samples resulted in 6 cents per page. Costs per page of photo-paper in 2006 were higher – between 15 and 35 cents. Two out of 8 samples were higher at 60 cents per page. However, the samples are not very representative and only show a spotlight of the paper market.

2.4.5.2. Costs for service

Devices belonging to the category of “imaging equipment” in professional environments make up a large part of the market. This is why – in this chapter – the description of costs for maintenance and repair is focused on prices occurring in professional environments, where copiers, printers and multifunctional devices are made available for a certain number of networked users. These devices are mostly covered by service contracts additionally to the obligatorily one-year warranty by the manufacturer (EU legislation). Costs for repair and maintenance of devices used for personal use are more difficult to describe as they are not covered by service contracts and are thus more difficult to monitor. Printers, copiers and multifunctional devices have become more and more complex products. They are therefore more expensive to operate and maintain. Estimates suggest that companies spend an average of 2% – 3% of their annual gross revenue on printing and copying [InfoTrends Forecast Reports].

Service costs for printers

In addition to the obligatory one-year warranty, service contracts often include an extended warranty between 2 – 3 years covering labour and parts for repair but not consumables. These extended warranties are higher in price for colour printers than for monochrome devices. This is due to the higher complexity of colour printers including more parts (longer service / repair duration) and thus failure risk. However, experience has shown that service calls for colour printers take place less often than for monochrome printers [InfoTrends Forecast Reports].

In the table below, average annual costs for servicing of printers are shown across main segments. High-end multifunctional monochrome printers are more costly to maintain due to their larger print engines. These devices also offer other functionalities like faxing, scanning, copying and the additional functionalities can be seen as an additional risk thus leading to a higher servicing price. Servicing multifunctional monochrome printers costs 4 – 5 times the price of servicing a single-function printer [InfoTrends Forecast Reports]²¹.

Table 49: Average annual costs for repair & service of printers [InfoTrends Forecast Reports]

	Monochrome		Colour	
Imaging speed	13-39 ppm	40-79 ppm	1-8 ppm	9-16 ppm
Annual service costs	< 50 €	200 €– 250 €	< 50 €	100 €

In general, average per unit price has declined over the years: e.g. in 1995 a 13-24 ppm printer cost 180 €/a; now it only costs 9-41 €/a. However, no further price decline is expected in this segment. Servicing prices for colour page printer lie between 27 € – 350 € (depending on speed and functionality – not shown in the table above). Average annual service prices for colour printers are expected to fall within the next years (faster for single function than multifunction) [InfoTrends Forecast Reports].

²¹ The data presented here is based on information made available by InfoTrends. The results are based on the combination of primary and secondary research with an analysis of market trends in Europe's larger economies (including interviews with vendors and service providers).

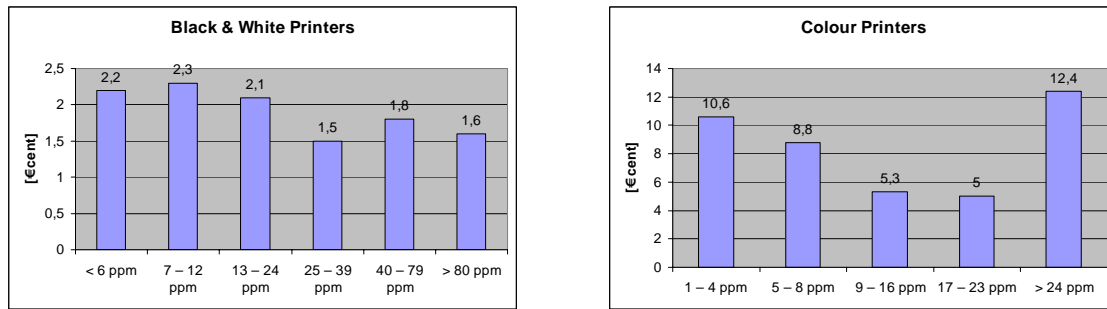


Figure 41: Service & supply costs per page for printers in Western Europe 2005 [InfoTrends Forecast Reports]

Figure 41 above gives an overview on the different prices of prints in black & white as well as in colour printers differentiated according to speed segments. These prices include service costs (equipment service contracts, full service contracts and warranties) and supply costs (consumables such as toner, cartridges, ribbons, developer and photoreceptors, excluding equipment and paper). In general colour prints are more expensive than black & white prints (an average of 8 cents compared to an average of 2 cents per page). While the differences between the segments are not very important for black & white printers, the prices for colour prints decrease with increasing printing speed. Only exception lies with colour prints of equipment having a printing speed of over 24 pages per minute which cost even more than prints of colour copiers with a speed of 1 – 4 ppm (12.4 cents compared to 10.6 cents).

Service costs for copiers

Copiers are also mostly covered by service contracts going beyond the obligatory one-year warranty although there are more different types of contracts than for printers. In the copying segment it is also common to have a service contract not only including repair & maintenance but also consumables and hardware. For example, in so-called cost-per-page contracts 20% – 25% of the costs are allocated to service & maintenance.

In general, copiers need to be serviced and repaired much more frequently than laser printers which thus generate higher costs. Costs per unit of monochrome device are between 170 € up to over 720 € per year. Costs may increase per market segment (according to image speed) as more multifunctional digital devices enter the market (per-unit costs for analogue devices are lower). However, analogue devices tend to be repaired more frequently (parts are generally older) thus yielding more repair and maintenance effort and higher costs.

High-end colour copiers installed in professional environments (e.g. copy shops) can cost almost 7,000 € per year to maintain. Average annual service costs for colour copiers are expected to be

reduced to 830 €– 3,600 €per unit in the next years. Per unit maintenance prices are declining as colour universal copier printers enter the market. As in the case for printers, multifunctional devices cost more to repair and maintain than single-functional devices (greater number of parts and additional functionality). On the other hand per-unit maintenance costs increase as device speed increases (due to increased usage and greater complexity) [InfoTrends Forecast Reports].

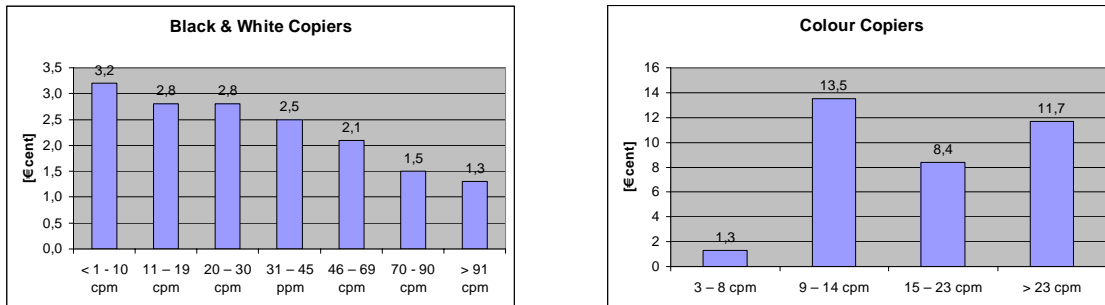


Figure 42: Service & supply costs per copy for copiers in Western Europe 2005 [InfoTrends Forecast Reports]

Figure 42 above gives an overview on the different prices of copies in black & white as well as in colour copiers differentiated according to speed segments. These prices include service costs (equipment service contracts, full service contracts and warranties) and supply costs (costs for consumables such as toner, cartridges, ribbons, developer and photoreceptors; excluding equipment and paper). In general colour copies are more expensive than black & white copies (an average of 12 cents compared to an average of 2 cents per page). The prices for black & white copies decrease with increasing printing speed (from about 3 cents for the slowest segment with 1 – 10 copies per minute to about 1 cent for the fastest segment with over 91 cpm). As regards costs for colour copies they do not vary much between the individual speed segments except for the segment 15 – 23 cpm where the price of about 8 cents per copy is a lot lower than the average with 12 cents.

2.4.6. Electricity rates

The following table shows the electricity rates for the EU25 as from 1 July 2005 and published by Eurostat. The calculation of electricity costs for different imaging equipment devices based on different usage scenarios (calculation of life cycle costs) will be given in Task 5.

Table 50: Electricity rates for EU25 July 2005

Country	Electricity rates [€100 kWh] ⁽¹⁾
BE	14.3
CZ	8.2
DK	23.3
DE	18.0
EE	7.1
EL	6.9
ES	11.0
FR	11.9
IE	14.4
IT	20.1
CY	12.1
LV	8.6
LT	7.2
LU	15.0
HU	1.1
MT	7.7
NL	19.6
AT	13.9
PL	8.5
PT	13.8
SI	10.3
SK	12.9
FI	10.4
SE	13.8
UK	9.4
EU 25	13.6

⁽¹⁾ Source: Eurostat electricity rates for households type Dc (yearly consumption 3.500 kWh incl. 1.300 kWh night electricity part), July 2005 incl. all taxes

It can be seen that Denmark has the highest rate with approximately EUR 23 for 100 kWh. In comparison Hungary has the lowest electricity rate with EUR 1 per 100 kWh. The average for the EU25 is of nearly EUR 14 per 100 kWh. Belgium, Ireland, Luxemburg, Austria, Portugal, Slovakia and Sweden are all close to that average.

2.4.6.1. Costs for disposal

As already mentioned in Chapter 2.4.2.3, data on costs that occur due to the disposal of printers, copiers, scanners, faxes and MFDs are not well accessible. The only information that could be gathered is a rough estimation of costs for the disposal of printers in selected Western European States which is shown in Figure 43 below. The costs vary between less than 10 cents per kilogram in Austria and around 50 cents per kilogram in the Netherlands with an average of about 25 cents per kilogram of waste.

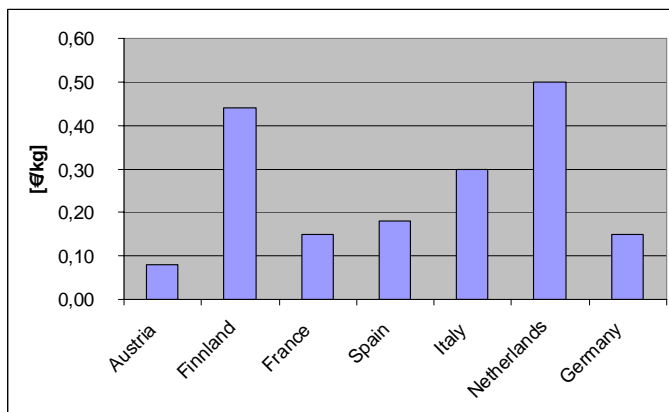


Figure 43: Costs for disposal of printers in selected Western European States
[Pers. Comm. Lexmark 2006]

2.4.6.2. Interest and inflation rates

The following Table 51 shows inflation and interest rates for the EU25 as published by Eurostat and the ECB.

Table 51: Interest and inflation rates for EU25

Country	Inflation rates [%] ⁽¹⁾	Interest rates [%] ⁽²⁾
BE	2.8	3.4
CZ	1.9	:
DK	2.2	3.4
DE	2.1	3.4
EE	3.6	-
EL	3.5	3.6
ES	3.7	3.4
FR	1.8	3.4
IE	2.2	3.3
IT	2.1	3.6

CY	1.4	5.2
LV	7.1	3.5
LT	3.0	3.7
LU	3.4	:
HU	3.3	6.6
MT	3.4	4.6
NL	2.1	3.4
AT	1.6	3.4
PL	0.8	5.2
PT	2.5	3.4
SI	2.4	3.8
SK	3.9	3.5
FI	1.1	3.4
SE	1.3	3.4
UK	2.0	4.5
EU 15	2.2 ⁽³⁾	3.42 ⁽³⁾
EU 25	2.1	3.9

⁽¹⁾ Annual Inflation (%) in Dec 2005 Eurostat "Euro-Indicators", 7/2006 - 19 January 2006

⁽²⁾ Source: ECB long-term interest rates; 10-year government bond yields, secondary market. Annual average (%), 2005

⁽³⁾ Euro-zone

Both data categories only reflect national rates and are not product-specific (please refer to Section 2.4.2.3).

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