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Towards a renewed industrial policy in Europe

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Chapter 1 Industrial policy in the EU[1]

1.1 Introduction and outline[2]

The objective of this chapter is to analyse industrial policy in Europe, shedding light on its achievements and failures, and to outline the main characteristics of an innovative, future-oriented industrial policy, which can successfully improve European competitiveness as an integral part of the Lisbon strategy.

The outline of the chapter is as follows. The next section provides a short introduction describing the size of manufacturing, why it is seen as an engine of growth and competitiveness, and how industry structure and dynamics differ across countries. Section 1.3 surveys the justifications for industrial policy in a market economy, but also the limits for state intervention. It further delineates the development of industrial policy within the European Union since its founding in the 1950s and explains why the interest in industrial policy has increased recently.

Section 1.4 defines industrial policy as an "activity which creates a favourable environment for European business in general, the manufacturing sector and its industries in specific" and reviews instruments of industrial policy. Conflicts and synergies with other policy areas are briefly addressed. We then provide an overview of industrial policy measures across countries, acknowledging that quantitative data will not suffice to enable more than limited insight into the complex patterns of industrial policy.

Section 1.5 therefore provides case studies on industrial policy in Japan, the USA, France, Finland and in new EU member countries, and also analyses the Airbus case as well as the textile industry. These case studies provide an in-depth review of policies which goes beyond the statistics provided in the previous section. Japan and the US were chosen because the industrial policies practised in these countries differ somewhat from the European approach; Finland was selected because the transformation in industry structure which has taken place there over the past decade has been dramatic, and progress towards a knowledge based society compatible with the Lisbon strategy has been impressive. Industrial policy in the new member countries changed during the nineties and catching up with the old member countries is now dominating policy priorities. Airbus is an example of successful project-oriented industrial policy, at least insofar as Europe's market shares in the airline industry have increased dramatically. Following the end of

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[1] The report benefited from two workshops at WIFO (jointly with the European Commission) on the progress of the report and a special workshop on the Future of Industrial Policy organised by Karl Aiginger, Hannes Leo, and Susanne Sieber in March 2005 at WIFO. The authors further wish to express their gratitude to Julia Bock-Schappelwein, Elie Cohen, Heinz Handler, Heinz Hollenstein, Werner Hölzl, Gernot Hutschenreiter, Ian Kerr, Peter Mayerhofer, Lluis Navarro, Michael Stolpe, Roman Stöllinger and Gunther Tichy for helpful comments and suggestions, as well as to Dagmar Guttmann, Traude Novak and Sonja Patsios for their valuable support throughout the project.

the Multi Fibre Agreement, the textile industry provides an example of decade-long restructuring now entering a new phase.

Section 1.6 concludes and develops principles for an industrial policy aiming to improve European competitiveness.

1.2 The role of manufacturing in the knowledge-based industry

The size of manufacturing

The – narrowly defined[3] –share of manufacturing in GDP is below 20 % in the EU-15. Measured in nominal terms it amounted to 17 % in 2002. In the new member countries, the share is approximately 3 percentage points larger.

The share of manufacturing in value added is declining over time. It was 25.5 % in 1980 and then 22.4 % in 1990. There has been no sign of a significant acceleration in the downward trend over the past ten years. The decline did accelerate between 1986 and 1993 (the last year was one of recession), but later flattened slightly. Taking the decades as rather artificial boundaries, we find a decline in percentage points of 3.1 between 1980 and 1990, and 4.4 points between 1990 and 2000 (see Table 1.1).

Table 1.1: The share of manufacturing in the total economy

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004 [1]	2005 [1]	2006 [1]
EU 15	25.5	24.6	24.0	23.5	23.4	23.2	23.3	22.8	22.5	22.7	22.4	21.4	20.6	19.5	19.4	19.5	19.1	18.8	18.6	18.2	18.0	17.6	16.9	16.9	16.9	17.1	17.1
Japan	30.0	29.6	29.2	28.5	29.0	28.6	27.4	26.9	26.8	26.7	26.8	26.7	25.6	24.2	23.1	23.1	23.0	22.9	22.1	21.9	21.9	20.8	20.5	20.5	20.5	20.5	20.5
USA	20.5	20.2	19.1	18.5	18.5	17.5	17.1	17.2	17.6	17.1	16.4	16.1	15.9	15.7	16.0	16.1	15.7	15.7	15.5	15.0	14.6	13.4	12.9	13.2	13.2	13.2	13.2
Germany	21.7	21.2	22.3	23.1	23.4	24.2	25.6	25.5	25.6	25.3	25.2	24.6	23.5	22.4	22.0	22.2	21.4	20.9	21.0	20.6	20.8	20.8	20.7	20.5	21.1	21.6	21.6
Czech Republic														20.7	21.5	21.7	24.0	24.6	22.8	24.4	24.2	23.0	23.7	24.3	24.4	24.4	24.4
Hungary														19.4	19.4	19.8	19.7	21.2	21.1	20.6	21.0	20.0	19.4	20.0	20.1	20.1	20.1
Poland														23.7	18.1	19.3	18.3	18.3	17.6	17.4	17.2	15.5	15.3	16.2	17.1	18.1	19.0
CZ, HU, PL (unweighted average)														21.3	19.7	20.3	20.7	21.4	20.5	20.8	20.8	19.5	19.5	20.2	20.5	20.8	21.1

Note: nominal value added relative to nominal GDP.[1]) Estimated using real data.

Source: WIFO calculations using AMECO.

[2] Prepared by Karl Aiginger, Susanne Sieber

[3] These shares are based on WIFO calculations from AMECO. Manufacturing is defined as NACE 15 to 36. Wide definitions of manufacturing include construction, energy and mining; this raises the share by about 7 percentage points. According to OECD figures (STAN database) the share of manufacturing in GDP amounts to 19 %.

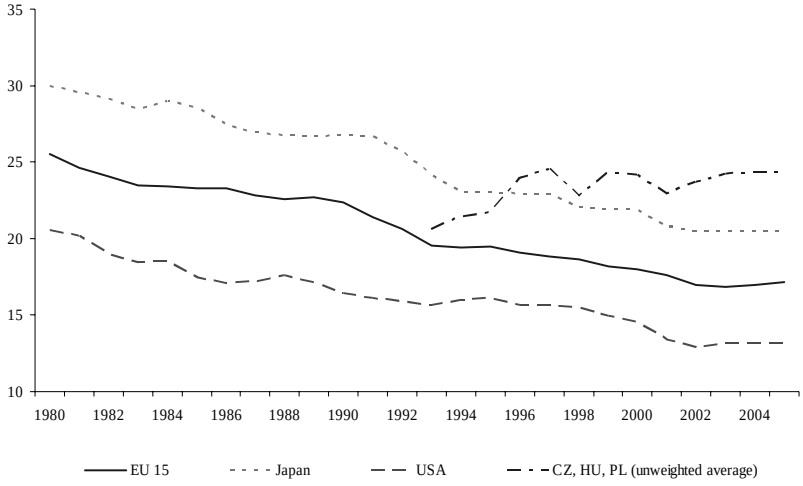
Country differences

Industry size in the EU is approximately three percentage points smaller than in Japan. This difference was present as early as 1980; the subsequent downward trend at the start of the nineties was stronger in Europe, resulting in a differential of five percentage points. Slower growth in Japan during the course of the nineties restored the differential the 1980 level. Relative to the US, where today manufacturing is responsible for only for 13 % of GDP[4], both Europe and Japan have much larger manufacturing sectors.

Among the European countries, Ireland has the highest share, followed by Finland and Germany (see Table 1.2). Germany and Finland have traditionally had large industrial sectors, while Ireland is the only member of the EU-15 which increased the relative size of its industrial sector in the nineties. The dynamics of foreign direct investment in the Irish economy enabled this expansion. Other countries with relatively large industrial sectors are Sweden, Austria and Italy. The first two experienced very moderate declines, while in Italy the share dropped by more than 10 percentage points. Extremely large declines were registered in the other southern peripheral countries; the share of manufacturing in each of these countries is now below the EU average. In Greece, the decline amounted to 14 percentage points and in Spain to 10 percentage points (resulting in shares of 10 % and 15 % respectively). The decrease was less dramatic in Portugal, where the share was lower from the very beginning. In the new member countries, the trends are quite different. In the Czech Republic, the share of industry in GDP has increased by 3 percentage points to 24 %, currently the highest of all member countries. In Hungary, the size of the industrial sector is also above the Western European average, with a slight increase from 1993 to 2002. The share of industry in Poland fell from 24 % to 15 %. De-industrialisation is therefore a significant trend in both southern Europe and in Poland.

[4] The US has traditionally had a very small and very efficient manufacturing sector and a rather strong service sector. The high deficit in merchandise trade and the surplus in services and intangibles is a late consequence of these trends. Europe and Japan both have a surplus in merchandise trade.

Graph 1.1: The share of manufacturing in the total economy



Note: nominal value added relative to nominal GDP. 2003/2004 estimated by using real data.

Source: WIFO calculations using AMECO.

The share of manufacturing is well known to fluctuate according to a humped-shaped pattern. It rises during industrialization and then decreases once countries attain very high income levels. The share of industry in GDP is therefore greatest in medium income countries (see Clark, 1957, Fourastier, 1954). The basic force behind the decline of manufacturing in rich countries is that services have a higher income elasticity (consumption increases proportionately more than income) and technical progress is faster in manufacturing than in services (leading to lower price increases for industrial products and thus a smaller share in GDP). Consequently, the decline in manufacturing is stronger for nominal data than for real data and stronger when measured in terms of employment than when measured in terms of production.

Table 1.2: The share of manufacturing in the total economy 1990/2002

	1990	2002	Absolute difference 2002-1990
Belgium	19.9	16.9	-3.0
Denmark	15.6	13.8	-1.7
Germany	25.2	20.7	-4.6
Greece	24.5	10.4	-14.1
Spain	25.9	15.3	-10.6
France	17.8	16.3	-1.5
Ireland	26.0	28.8	2.8
Italy	28.6	18.2	-10.4
The Netherlands	16.9	13.6	-3.3
Austria	18.2	17.9	-0.2
Portugal	21.1	15.8	-5.3
Finland	24.6	20.8	-3.8
Sweden	18.7	18.1	-0.6
United Kingdom	20.8	14.1	-6.6
EU15	20.7	17.0	-3.7
Czech Republic	20.7	23.0	2.3
Hungary	19.4	19.4	0.0
Poland	23.7	15.3	-8.4
Japan	26.8	20.5	-6.2
USA	16.4	12.9	-3.5

Portugal 2001; Czech Republic 1993, 2001; Hungary and Poland 1993.

Source: WIFO calculations using AMECO.

The importance of manufacturing

Despite the decline of manufacturing, this sector is unanimously assumed to be a sector of vital importance to the dynamics and competitiveness of an economy. A collection of statements supporting the claim that manufacturing is the engine or backbone of every economy is presented in Box 1.1; see also Section 1.3.4 on the renewed interest in industrial policy.

The greater relative importance of manufacturing to GDP can be attributed to the following factors:

The share of manufactured products in trade is larger than that of services. The trade balance and - to a lesser degree - the balance of current accounts is dominated by manufactured goods. The ability of an economy to achieve balanced trade and to pay for energy and the import of other basic resources depends on manufacturing exports.

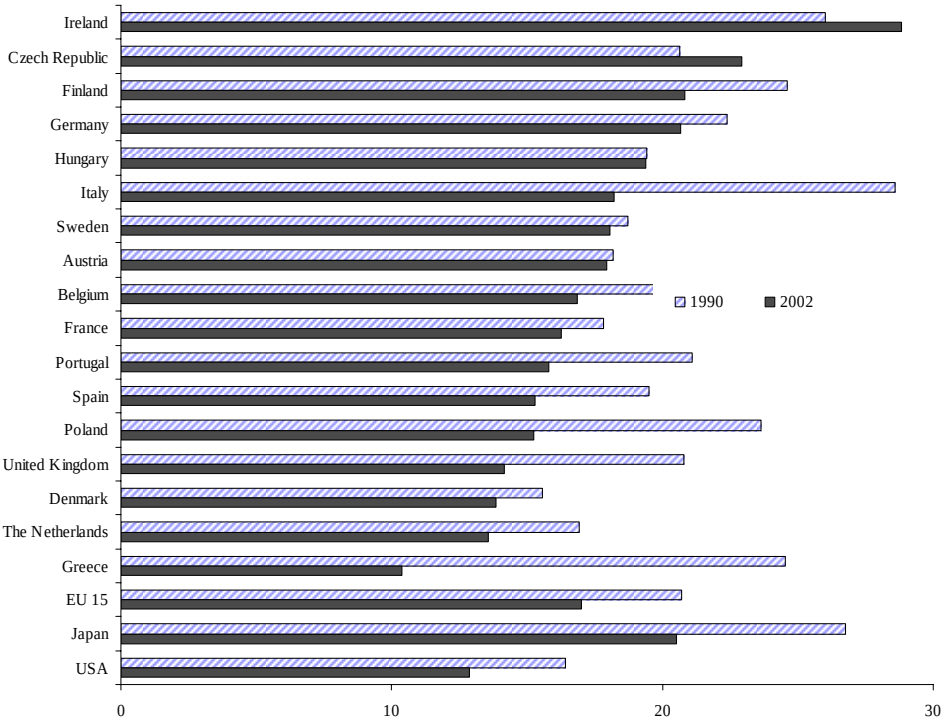
The manufacturing sector makes intensive use of inputs from other sectors. Input-output tables show that in Germany, value added accounts for approximately one third of manufacturing sales, while two thirds

are inputs. Approximately thirty percent of the inputs to German manufacturing are services (Gornig, Stille, 2002).

The manufacturing sector is an important provider of new technology and new knowledge to the service sector. Technological progress is strongest in this sector and consequently the spillovers from new technology and knowledge are strong in manufacturing.

Business-related services depend directly on the manufacturing sector. Therefore, a competitive manufacturing sector is also crucial to the service sector. Schenk and Theeuwees (2002) estimate a ripple effect from manufacturing to financial and business services, which was three times as high in the late 1990s as in 1970. A country's position in technology is determined largely in the manufacturing sector.

Graph 1.2: Share of manufacturing in the total economy 1990/2002 (ranked according to share in 2002)



Note: Portugal 2001; Czech Republic 1993, 2001; Hungary and Poland 1993.

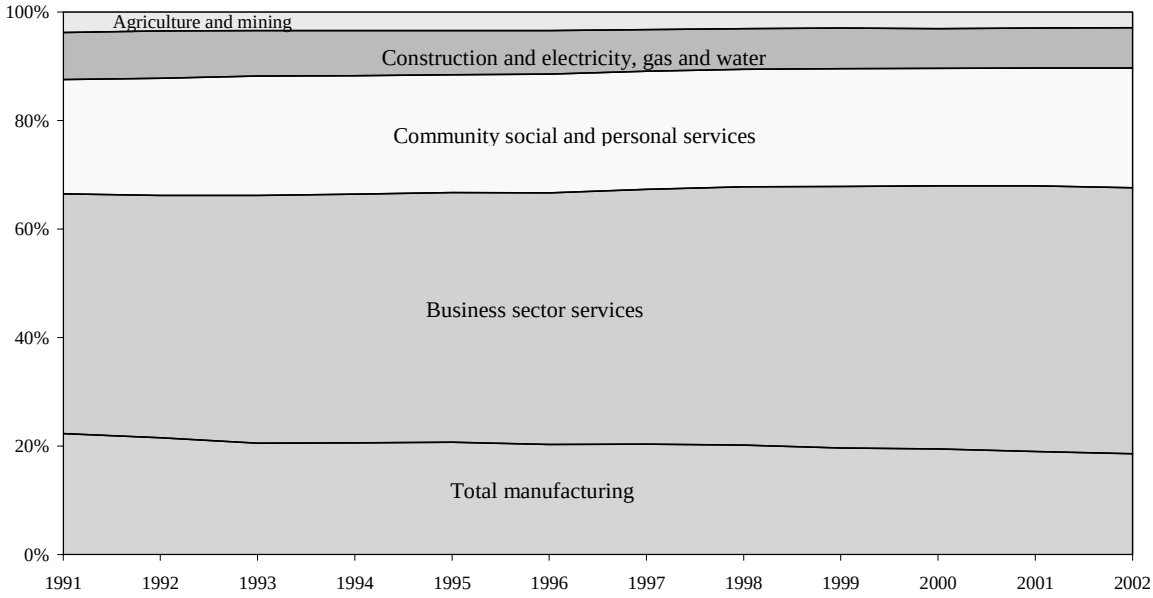
Source: WIFO calculations using AMECO.

The share of so-called hybrid products is increasing wherever services are offered in combination with a manufactured product.

The relocation of industry production abroad is often followed by the relocation of services, such as R&D, thus weakening R&D capacities and therefore the ability to absorb new technologies.

The divide between manufacturing and services is not as rigid as the statistics and the policy discussion suggest. Modern manufacturing needs high levels of services, some of which are provided within the industrial sector, while others are outsourced to separate firms and from a statistical standpoint are thus ascribed to the service sector. Specifically, ICT (Information and Communication Technologies) production and ICT services are heavily interlinked. The lower share of manufacturing in the US economy may in part be the consequence of a more formal vertical separation of production and services.

Graph 1.3: Sectoral composition of GDP in the EU



EU: Belgium, Germany, Denmark, Greece, Spain, Finland, France, Italy, Netherlands, Austria, Sweden, United Kingdom.

Source: WIFO calculations using OECD (STAN database).

Table 1.3: Sectoral composition of GDP in the EU

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Agriculture and mining	3.7	3.5	3.4	3.4	3.4	3.4	3.2	3.0	2.9	3.0	2.9	2.8
Total manufacturing	22.3	21.5	20.5	20.6	20.7	20.3	20.3	20.2	19.7	19.5	19.0	18.6
Construction and electricity, gas and water	8.7	8.7	8.4	8.3	8.2	8.1	7.7	7.5	7.5	7.3	7.4	7.4
Total services	65.3	66.3	67.7	67.7	67.7	68.3	68.7	69.2	69.9	70.2	70.7	71.1
Out of which: Business sector services	44.1	44.7	45.7	45.9	46.0	46.4	47.0	47.6	48.2	48.5	48.9	49.0
Manufacturing and business services	66.5	66.2	66.2	66.5	66.7	66.7	67.3	67.8	67.8	68.0	67.9	67.6

EU: Belgium, Germany, Denmark, Greece, Spain, Finland, France, Italy, the Netherlands, Austria, Sweden, United Kingdom.

Source: WIFO calculations using OECD (STAN database).

The phenomenon that industry and services are becoming more and more interwoven may even encourage an industry definition embracing not only the production process of goods, but also related services (financial, ICT, logistics and business services, for example)[5]. Graph 1.2 calculates a sector combining manufacturing and business services. This graph shows that the decline in manufacturing (3.7 percentage points between 1991 and 2002) is more than compensated by the increase in business services (4.9 %). The combined share of "extended industry" increased from 66.5 % in 1991 to 67.6 % in 2002 (Table and Graph 1.3, STAN-database; EU-12[6]).

Real growth and sectors

The importance of manufacturing can be highlighted by looking at recent differences in the economic performances of countries and at the sector composition of manufacturing.

Since the mid nineties, the US economy has been experiencing higher growth in output, productivity and employment relative to Europe. This tendency correlates with the fact that industry growth has kept track with GDP growth over the past 10 years in the US, while in Europe it has not only been much slower in relation to US, but also when compared to GDP. Furthermore, the four countries in Europe which have performed best are Ireland (a successful catching up story), Sweden, Finland and Denmark. The three Scandinavian countries have overcome severe crises and witnessed growth nearly as dynamic as that of the US. In Ireland and Finland, industry growth is greater than GDP growth; in Sweden and Denmark growth in manufacturing differs little from macroeconomic growth.[7]

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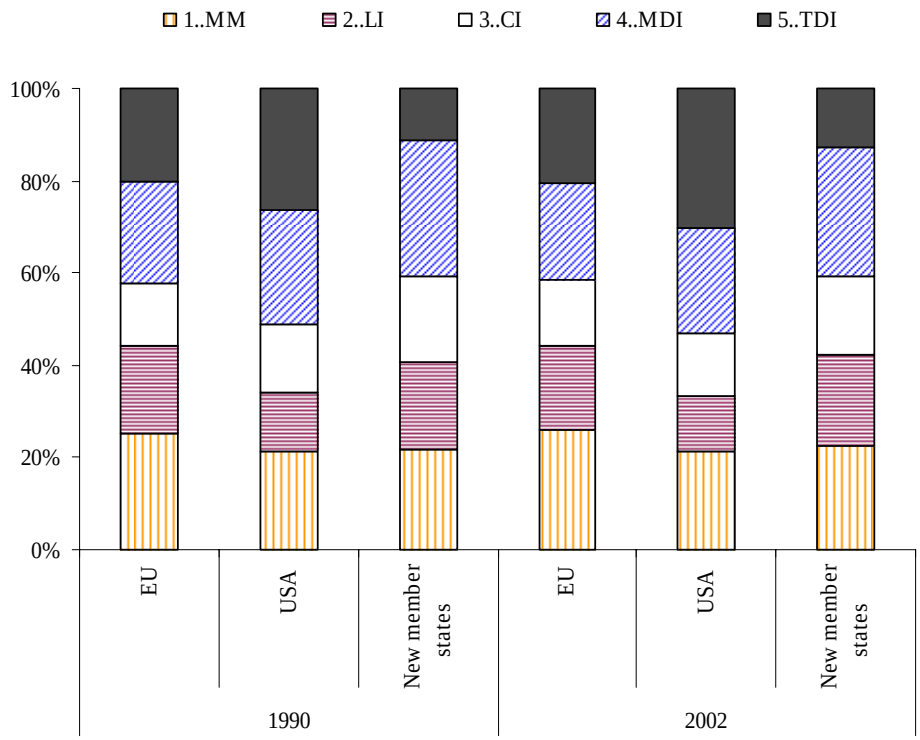
[5] This is done for example in the Netherlands. The Ministry of Economic Affairs cited in its "Industry Memorandum" a study by Schenk and Theeuwees (2002) which states that "the 'ripple effect' of the manufacturing industry on financial and business services in the Netherlands was three times as high in the late 1990s as in the 1970s."

[6] Belgium, Germany, Denmark, Greece, Spain, Finland, France, Italy, the Netherlands, Austria, Sweden, United Kingdom.

[7] In the US, the number of people working in manufacturing decreased from only 18.9 mill. persons (1980) to 17.8 mill. persons (1990) and then to 17.5 mill. persons (2000). In Europe, it decreased from 33.3 mill. persons (1980) to 31.6 mill. persons (1990) and then to 27.8 mill. persons (2000). The decline during the last decade amounts to 11.7 %.

Graph 1.4: Share of sectors in value added



Note: The industry classification is based on Peneder (2001). For the classification see also Appendix 1.2.
1..MM: Mainstream industries; 2..LI: Labour intensive industries; 3..CI: Capital intensive industries;
4..MDI: Marketing driven industries; 5..TDI: Technology driven industries
New Member States: Poland, Slovenia, Slovakia; 1996 instead of 1990. - USA: 1998 instead of 2002

Source: WIFO calculations using EUROSTAT (New Cronos).

This fact demonstrates what the theoretical arguments have suggested about the role of industry. The acceleration of economic growth in the US in the 1990s was paralleled, if not caused, by high growth in manufacturing. Along the same line, in the fast growing European countries, growth in manufacturing has been higher or equal to total growth. For the EU as a whole, both GDP and manufacturing growth have been well below US levels and manufacturing growth has been lower than total growth. A myriad of studies demonstrate how the positive impact of ICT on production and the productivity of the ICT producing sector first spreads to industries using ICT, and then ultimately to services.

Sector shares and growth trends in individual countries

Looking at industry composition reveals the role of technology driven industries (see Graph 1.4). Compared to the US, Europe still has a high share of traditional industries and a low share of technology driven industries. In Europe, the share of labour intensive industries is 6.4 percentage points larger than in the US, the difference in capital intensive industries is 0.5 points, and mainstream industries (including

some of the industries in which Germany is specifically strong) account for 25.8 % of value added in Europe and 21.3 % in the US.[8]

Technology driven industries in general grow faster than GDP. They have a 30 % share in the US, as compared to 21 % in Europe. The share of these industries is large in the better performing European countries, notably Sweden, Ireland and Finland. It is also relatively high in France, where growth in manufacturing is moderate. It is much lower in Southern Europe and in the new member countries (Table 1.4).

The largest European industries are motor vehicles, basic chemicals, food, pharmaceuticals and plastics. Among these industries, pharmaceuticals and plastics enjoy high growth rates. Three of the top 10 industries (measured by share of value added) are slow growth industries, and five are medium growth industries (see Graph 1.5). The 3 largest industries in each country are listed in Table 1.5. Of the high tech industries, pharmaceuticals are the largest industry in Denmark, and telecom ranks first in Finland.

Table 1.4: The share and growth of industrial sectors in member countries

	Share in value added 2002					Growth of manufacturing[1])
	Mainstream industries	Labour intensive industries	Capital intensive industries	Marketing driven industries	Technology driven industries	1991/2002
Belgium	21.9	14.6	20.6	20.3	22.6	2.7
Denmark	32.2	17.6	4.1	29.8	16.2	4.0
Germany	27.8	15.2	14.7	17.3	24.9	1.0
Greece	18.4	14.3	28.5	31.4	7.4	8.5
Spain	23.8	22.7	17.1	25.1	11.3	3.4
France	21.8	17.1	10.6	24.3	26.2	2.2
Ireland	7.5	3.9	35.2	26.6	26.8	11.7
Italy	30.4	27.1	10.3	19.9	12.2	1.9
Netherlands	22.9	15.8	15.7	30.4	15.1	2.9
Austria	27.9	21.4	15.6	20.2	14.9	4.2
Portugal	21.3	29.6	13.8	25.3	10.0	4.3
Finland	21.5	15.7	23.2	14.6	24.9	2.8
Sweden	24.2	14.7	17.8	15.4	27.9	2.4
United Kingdom	22.3	16.6	9.4	29.4	22.3	2.9
EU15	25.0	18.0	13.7	22.5	20.7	2.3
						1991/2002
Czech Republic	27.0	21.6	14.9	22.4	14.1	16.1
Hungary	23.5	15.1	16.4	23.6	21.5	13.2
Poland	20.1	16.8	20.1	33.3	9.6	9.3
Slovenia	28.0	25.3	8.5	21.2	17.1	6.0
Slovakia	29.8	18.9	21.5	19.9	10.0	5.6
EU 5 new members	23.2	18.2	17.7	27.9	13.0	11.2
EU 3 new members	13.1	10.8	11.6	18.9	6.3	18.3

[8] There are large differences across member countries in the share of industry sectors. The share of labour intensive industries varies between 30 % in Portugal and 4 % in Ireland. The share of technology driven industries varies between 28 % in Sweden and 7 % in Greece. Countries with high share of technology-driven industries are growing faster (without suggesting that there is a one way causality between this and the high growth rate).

1) Growth of nominal value added.
Note: The following time periods were examined for the new member countries: Czech Republic - 2001/2002; Hungary: - 1999/2002; Poland: 1997/2002; Slovenia: 1996/2002; Slovakia: 1996/2002; EU 5 new members: 2001/2002; EU 3 new members: 1997/2002. The definition of sectors is based on Peneder (2001). For the classification see also Appendix 1.2.

Source: WIFO calculations using Eurostat (New Cronos).

Table 1.5: The largest industries in the individual member countries (3 digits)

Country		Nace	Name	Share 2002	Growth 1991/2002
Belgium					
	Largest industry	dg241	Manufacture of basic chemicals	7.9	5.0
	2nd largest industry	dg244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	7.2	9.5
	3rd largest industry	dm341	Manufacture of motor vehicles	5.3	0.8
Denmark					
	Largest industry	dg244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	7.7	8.7
	2nd largest industry	da158	Manufacture of other food products	5.1	2.9
	3rd largest industry	dh252	Manufacture of plastic products	5.1	5.3
Germany					
	Largest industry	dm341	Manufacture of motor vehicles	8.9	2.7
	2nd largest industry	dg241	Manufacture of basic chemicals	4.8	0.9
	3rd largest industry	dk295	Manufacture of other special purpose machinery	4.4	2.0
Greece					
	Largest industry	df23	Manufacture of coke, refined petroleum products and nuclear fuel	11.7	28.9
	2nd largest industry	da159	Manufacture of beverages	7.8	12.5
	3rd largest industry	dj274	Manufacture of basic precious and non-ferrous metals	4.7	7.6
Spain					
	Largest industry	dm341	Manufacture of motor vehicles	3.9	1.7
	2nd largest industry	da158	Manufacture of other food products	3.7	2.5
	3rd largest industry	da159	Manufacture of beverages	3.6	2.1
France					
	Largest industry	dh252	Manufacture of plastic products	3.7	5.7
	2nd largest industry	dm353	Manufacture of aircraft and spacecraft	3.1	4.1
	3rd largest industry	dj285	Treatment and coating of metals; general mechanical engineering	3.0	3.1
Ireland					
	Largest industry	dg241	Manufacture of basic chemicals	34.0	23.2
	2nd largest industry	dg244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	8.3	21.0
	3rd largest industry	da158	Manufacture of other food products	7.2	13.4
Italy					
	Largest industry	dk292	Manufacture of other general purpose machinery	4.7	7.6
	2nd largest industry	dj285	Treatment and coating of metals; general mechanical engineering	4.1	7.4
	3rd largest industry	db182	Manufacture of other wearing apparel and accessories	3.8	1.3
Netherlands					
	Largest industry	dg241	Manufacture of basic chemicals	8.6	1.6
	2nd largest industry	da158	Manufacture of other food products	5.9	3.7
	3rd largest industry	de221	Publishing	5.2	7.5
Austria					
	Largest industry	dk295	Manufacture of other special purpose machinery	4.3	4.3
	2nd largest industry	dk292	Manufacture of other general purpose machinery	3.9	13.4
	3rd largest industry	da158	Manufacture of other food products	3.7	3.2
Portugal					
	Largest industry	db182	Manufacture of other wearing apparel and accessories	6.5	1.0
	2nd largest industry	da158	Manufacture of other food products	3.9	5.6
	3rd largest industry	dc193	Manufacture of footwear	3.7	3.0
Finland					
	Largest industry	dl322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	18.9	21.7
	2nd largest industry	de211	Manufacture of pulp, paper and paperboard	14.0	4.4
	3rd largest industry	dk295	Manufacture of other special purpose machinery	4.2	0.8
Sweden					
	Largest industry	dm341	Manufacture of motor vehicles	8.6	6.3
	2nd largest industry	de211	Manufacture of pulp, paper and paperboard	8.4	2.4
	3rd largest industry	dg244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	7.0	13.8
United Kingdom					
	Largest industry	de221	Publishing	5.7	6.1
	2nd largest industry	dm353	Manufacture of aircraft and spacecraft	5.1	5.6
	3rd largest industry	da158	Manufacture of other food products	5.0	5.7
EU15					
	Largest industry	dm341	Manufacture of motor vehicles	4.8	1.5
	2nd largest industry	dg241	Manufacture of basic chemicals	4.3	2.7
	3rd largest industry	da158	Manufacture of other food products	4.2	3.5
Czech Republic					
	Largest industry	dm343	Manufacture of parts, accessories for motor vehicles	6.1	31.6
	2nd largest industry	dm341	Manufacture of motor vehicles	4.5	16.3
	3rd largest industry	dh252	Manufacture of plastic products	3.5	26.4
Hungary					
	Largest industry	df23	Manufacture of coke, refined petroleum products and nuclear fuel	6.1	3.6
	2nd largest industry	dm341	Manufacture of motor vehicles	6.0	7.3
	3rd largest industry	dg244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	5.2	13.0
Poland					
	Largest industry	df23	Manufacture of coke, refined petroleum products and nuclear fuel	10.5	17.3
	2nd largest industry	da159	Manufacture of beverages	6.5	1.8
	3rd largest industry	da16	Manufacture of tobacco products	5.4	8.1
Slovenia					
	Largest industry	dg244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	6.9	11.7
	2nd largest industry	dk297	Manufacture of domestic appliances n.e.c.	4.4	9.3
	3rd largest industry	dn361	Manufacture of furniture	4.0	5.2
Slovakia					
	Largest industry	df23	Manufacture of coke, refined petroleum products and nuclear fuel	6.0	10.9
	2nd largest industry	de211	Manufacture of pulp, paper and paperboard	4.5	1.7
	3rd largest industry	dk291	Manufacture of machinery for the production and use of mechanical power	4.3	18.9
EU 5 new members					
	Largest industry	df23	Manufacture of coke, refined petroleum products and nuclear fuel	6.7	41.9
	2nd largest industry	da159	Manufacture of beverages	4.7	4.9
	3rd largest industry	da158	Manufacture of other food products	4.3	11.6

Source: WIFO calculations using Eurostat (New Cronos).

Box 1.1: Recently published statements on the importance of manufacturing

(Translated:) "Industry is still of central importance to the German economy."	http://www.bmwa.bund.de/Navigation/Wirtschaft/industrie.html (Website of the German Federal Ministry of Economics and Labour)
"… it is vital that Europe retains a strong industrial and manufacturing base as a crucial component of a balanced approach to economic growth."	Kok Report, "Facing the Challenge, The Lisbon Strategy for Growth and Employment", Report from the High Level Group chaired by Wim Kok, November 2004
"Our investigations reveal the ongoing and vital importance of the manufacturing sector to the German economy as a whole."	Kalmbach, P., Franke, R., Knottenbauer, K., Krämer, H., Schaefer, H., "The Significance of Competitive Manufacturing Industries for the Development of the Service Sector", Institut für Konjunktur- und Strukturforschung, December 2003
"Manufacturing matters. It is a vital part of the UK economy."	DTI (UK Department of Trade & Industry), Review of the Government's 'Manufacturing Strategy, 2004
"Industry is the backbone of our economy: It is crucial to the ability of the Netherlands to grow. Economic growth is impossible without industry and related services."	(Netherlands) Ministry of Economic Affairs, "Industry Memorandum, Heart for Industry", 2004
"Strengthening American manufacturing is a top priority for the President. … Manufacturing is the backbone of our economy and the muscle behind our national security."	US Secretary of Commerce, "Manufacturing in America, A Comprehensive Strategy to Address the Challenges to U.S. Manufacturers", U.S. Department of Commerce, Washington, D.C., January 2004

1.3 The economic rationale and the framework for industrial policy

1.3.1 Introduction

Industrial policy has always been a topic on which the opinions of researchers as well as political agents have differed. Its scope, relevance, shape, and the instruments used change over time and differ across countries. Industrial policy has been a subject of controversy since the beginning of the European integration process. No widely accepted definition of industrial policy is available, nor is there a consensus as to the goals and the instruments of industrial policy at the EU level or at the national level of member countries.

At the beginning of the nineties, it looked as if industrial policy had matured: a consensus emerged according to which industrial policy was interpreted as a horizontal policy[9], and the main goal was to increase European competitiveness, while focusing on innovation and the information society. Most

recently, starting perhaps in 2000, industrial policy re-emerged as a topic at the national as well as Community levels. The horizontal approach was maintained, but the possibility was acknowledged that the impact of horizontal measures might differ in certain sectors. Additional measures to foster competitiveness might also differ across industries.[10] Slow growth in Europe and the new approach to industrial policy initiated a fresh debate on an innovative, future-oriented industrial policy that would be more than a mere copy of past concepts. Following a period of abstention, many countries now favour an (active) industrial policy at the community level, and some have developed concepts at the national level (e.g. France, the Netherlands, and the United Kingdom).

The next section gives an overview of the rationale behind industrial policy in a market economy. Some of the arguments are accepted by the majority of the research community, while others are contested; some are standard textbook arguments and are also relevant to policy fields beyond the realm of industrial policy. Technological development and the increasing importance of knowledge production and transfer lead to rationales for industrial policy specific to technology and knowledge-intensive industries. Finally, there are arguments less relevant to welfare economies and more closely related to country strategies and policy priorities. Arguments against industrial policy primarily stress insufficient knowledge and government failure. Finally, we provide a short overview of the history of industrial policy in the European Union, starting from the sectoral policies preceding the Treaty of Rome and extending to the most recent approach. Last, but not least, we reflect on the reasons for the renewed interest in industrial policy.

1.3.2 The economic rationale for industrial policy

This section briefly reviews the economic reasons for state intervention in a market economy. The rationales supporting policy intervention in European manufacturing are different from those which would apply to a closed economy with a strong national focus, since production takes place in the Single Market and most sectors are internationally oriented. There are several groups of arguments, some of which complement each other, while others reflect diverging opinions.

1.3.2.1 The traditional rationale: static market failure

Static market failures which call for state intervention can be related to problems stemming from market power, externalities, information problems, public goods and (static) economies of scale.[11]

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[9] A policy is horizontal if it affects all sectors and industries.

[10] The combination of horizontal measures and sectoral complementary instruments has been labelled as matrix approach (Aiginger, Sieber, 2005).

[11] For an overview of the rationales supporting state intervention see also Ford and Suyker (1990).

In a monopoly and in markets with only a few suppliers, firms tend to supply a lower output and charge a higher price than in welfare maximising competitive regimes. To cope with this problem, governments can encourage entry, set prices or limit price increases, and monitor collusion. Creating a Single European Market reduces monopolies, since it increases the size of the "relevant market" and the number of players in each market. The problem of market power re-emerges in an integrated market, if economies of scale or scope lead to consolidation and mergers and a few large firms gain dominance. The productivity gain from firm size and the potential use of profits for innovation then have to be evaluated against the loss in welfare coming from reduced supply and consumer surpluses. It is the task of competition policy to monitor development in order to minimize market failure.

Externalities occur whenever the activities of one economic agent affect the activities of another economic agent in ways that are not taken into account by costs or prices. In other words, externalities emerge when not all the benefits of a private activity can be recaptured in the market price, or when costs are not paid for in their entirety by the entities that have caused them.[12] The underlying reason for externalities is the problem of insufficiently defined property rights. Important positive externalities relevant to industrial policy are the externalities created by R&D or knowledge. Since the main effects of R&D and knowledge are not static (they do not affect the profits of other firms at the same point in time, but rather over the medium or long run) these externalities will be discussed in the next sections. The most important negative externalities are emissions. If firms do not have to pay for emissions, pollution increases and the implementation of clean technologies is deferred. Policy consequences are the need for the government to limit emissions, to tax emissions or to create a market for emission rights.

A good is a public good if no one can be excluded from using it (or if exclusion is at least difficult or costly) and/or if there is no rivalry between persons or firms in the consumption of the good. Due to these special properties, public goods are not offered by private markets, even if their social benefits exceed the cost of providing them.[13] A large part of the physical infrastructure of a country - such as transportation networks - have public goods characteristics. Information and all sorts of institutions from social relations to government stability are examples of intangible public goods. Public goods can either be produced by public firms or the government can stimulate provision. There may be charges on some of these goods (like tolls on highways), but pricing at full cost may be difficult and suboptimal if capacity utilization is low. There are very few pure public goods. Regulation and the creation of markets can shift the border between public and private goods. However, using public or semi-private agents to regulate or create markets is costly and can raise equity questions. Knowledge is to a large degree non-rivalry, and it is

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[12] The literature often presents spillover effects as rationales for state intervention. Spillovers can be defined as effects through change, whereas spin-offs are planned or targeted effects.

[13] In practice, it is not easy to decide whether a good is public or private. Changing regulation, de-bundling and other economic or legal measures can blur the border line. Furthermore, technological progress can convert public goods

difficult to exclude others from inherent information. Because of its dynamic character, knowledge will be discussed later.

Information is asymmetrical, if the level of information differs among economic agents. A firm could provide a good at a competitive price, however, imperfect monitoring leads to doubts. Consequently, a partner, an owner or a creditor can not monitor the efforts of the firm or its capabilities. This may lead to a suboptimal provision of credits to small and medium-sized firms or start ups. Imperfections in the capital market in general, faulty information and a lack of firms offering risk capital lead to an underprovision of financing for risky projects under uncertain conditions. Information asymmetry may also occur on product markets; for instance, consumers may have less information about the quality of products (specifically for "experience goods" where only the consumption of the good conveys information about the quality of the good). Instruments that may be used to overcome market failure due to the asymmetrical information of consumers are the setting of standards or guarantees.

If large firms incur lower costs than smaller firms, entry is difficult and an oligopolistic market structure or even a monopoly will prevail. Given a perfect financial market, an entrant could theoretically build a plant of equal size and even potential entry might limit monopolistic power. In an integrated market, monopoly positions originating from static economies of scale lose importance, since the minimum scale of efficiency will be reached by more than one firm in most industries. Dynamic economies of scale will be treated under the next group of rationales.

1.3.2.2 Dynamic advantages

This group of arguments justifies state intervention when the advantages held by large incumbents prevent the formation of a competitive market structure or when government is able to predict or at least anticipate future competitive advantages. This calls for the temporary protection of new firms in countries or regions trying to catch up with leading firms or high income regions. Included is the attempt to create or counteract strategic advantages held by firms in oligopolistic industries and policy approaches to counteracting wrong specialisation or promoting sophisticated industries with high growth potential.[14]

Dynamic economies of scale arise when costs are dependent on the cumulative production of firms from the time of their founding onwards (learning curves). If the incumbent firm has attained a low cost position, entry is difficult and the monopolistic or oligopolistic structure is hard to break.

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into private goods when they allow the development of a means of excluding non payers from using the good or service.

[14] We outline the temporary protection of lagging industries, as well as ways of helping firms create strategic advantages and the promotion of dynamic industries. Note however that a number of static arguments also have dynamic implications, when for example static welfare losses due to market power translate into lower growth rates.

Arguments in favour of the creation of European champions in an oligopolistic industry with high entry costs and steep learning curves could fall into this category, specifically if the non-European firms (e.g. US firms) enjoyed unfair advantages, such as government procurement or spillovers from military projects.

This argument has been specifically applied to backward regions and countries trying to catch up with more advanced countries. Subsidisation or import regulation can help the new entrant - in this case the domestic firm - to reach a critical size. Historically, the "infant industry argument" has been applied to justify the protection of specific industries. Transforming the political system of a country into a market economy is a more recent example. In this case, the government provides a "training ground" for protected industries for a limited period of time.

Product cycle theory assumes that every firm runs through four main phases, starting with innovation and expansion, followed by maturity and stagnation (or disappearance). Firms in the innovation and expansion phase are dependent on a well-qualified labour force, as is typically available in industrialised countries. A prudent industrial or regional policy may help to accelerate the catching up of lagging regions specialising in mature or labour intensive industries and enable them to reach this phase of higher product differentiation and product innovation earlier.

Strategic trade theory advocates shifting rents in favour of the domestic economy. Typically strategic trade policy refers to an industry with a small number of large firms. A country which has oligopolistic firms and provides them with starting advantages, might achieve a lasting advantage if the structure of the industry stabilises. The state can improve the competitive position of domestic firms by means of R&D, export subsidies or import restrictions. The domestic firm may become a *Stackelberg*[15] leader, transferring rents from the foreign country to the domestic economy (Hepperle, 2004).

Arguments against this type of policy intervention exist at both the theoretical and political levels. At the theoretical level, it is not obvious whether such policies lead to an increase in welfare even for the intervening country. For example, if two countries simultaneously play the strategic trade policy game, it is likely that both will ultimately be worse off. At the practical level, it is to be expected that the country which loses firms as a result of the strategic trade policy of another country will retaliate (Georghiou et al., 2003, pp. 24-25). Finally, in a common market "beggar-my neighbour" policies that try to shift rents are very problematic.

Interventions designed to create national champions fall into this group. Competition of countries for headquarters and large plants at multi-national firms (regional or competence centres) may also be a rent

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[15] In a Stackelberg Leader-Follower model, the leader picks its output level and then the other firms are free to choose their optimal quantities given their knowledge of the leader's output. Taking into account the expected reaction of the follower, allows a leader to profit at the follower's expense. (Carlton and Perloff, 1994).

seeking activity, besides of an activity to increase domestic employment. Countries are offering multi-national enterprises high subsidies for new plants, since rents can be expected to accrue in a country once a foreign firm has selected it as a location and has started to expand.

Industrial policy can look beyond today's competitive advantages. Comparative advantages may change over time, and governments can, to some extent, predict change, since analyses show that comparative advantage and industry structure change with the income position of a region. Governments can prevent or limit specialisation in declining industries and promote early structural change. This creates a first mover advantage in industries with growth potential and reduces the costs of future structural change. This argument is used in development theory, where it is argued that countries should try to move away from monocultures, from industries with low income elasticities and industries based on low wages. It is used on the other side of the industry spectrum in promoting "future industries", high-tech industries, picking the winners or creating European champions. Spillovers from sophisticated industries to other firms strengthen the argument.

The counter-argument against this type of public intervention is that the government has no information advantage and secondly, that it should be possible to finance these investments in the financial markets. Interventions are justified if they counteract financial market imperfections, if the spillovers from projects, firms or industries on other parts of the economy exist. Finally a difference between the private and the social time preference rates may lead to underinvestment in projects that favour future generations (Ferguson and Ferguson, 1998).

1.3.2.3 Technology and knowledge-based arguments

There are several arguments supporting a significant role of government in technology and knowledge-based industries. In these dynamic industries, externalities and spillovers are abundant.

Externalities are created by firms investing in R&D and in knowledge. Since firms are not able to reap all the benefits of their investments in R&D, the amount they do spend on R&D will be below the social optimum. Patent policy strives to increase private appropriation of the benefits, but cannot prevent dissipation and imitation completely. Similarly, employees trained by the firm they work for, or learning on the job, take their acquired knowledge with them when they move to other firms. The consequence of this market failure is that a government which maximises welfare has to subsidize research and training, or provide them as public goods. Additionally, it is beneficial for countries to develop and apply a new General Purpose Technology as quickly as possible. Early starters have a specific advantage in network industries due to the value of a large network for consumers and the ability of the early starters to set standards. Countries with an innovation system capable of producing and diffusing innovations quickly will grow faster, as will firms working in a favourable business environment. New growth theory, as well as evolutionary growth theory and Porter's cluster approach provide the theoretical basis for a set of

arguments supporting a proactive policy approach, ranging from the development of a favourable framework for technology and knowledge intensive industries, to the provision of institutions for technology diffusion, knowledge transfer and direct support.

Box 1.2: New theoretical approaches highlight the importance of research and training[16]

Growth Theory

New Growth Theory underlines the importance of two externalities: human capital and research. It stresses the public good character of knowledge. Though it does not bring forward absolutely new rationales for policy intervention it makes a better case for a proactive policy in favour of innovation, education and knowledge production. It underlines that this intervention is not only positive for a one shot increase in welfare, but also for long-run economic growth. New Growth Theory also emphasises the importance of profits to innovation, thus calling for higher profitability in technology driven industries. Many models predict an inverted U relationship between innovation and competition: innovation is low when competition is low; it rises with tougher competition, and decreases when competition is too strong.

The importance of knowledge and its character as a non rival public good supports cluster policy. Upstream, downstream and horizontal co-operations can be beneficial to firms and society. Institutions creating and transferring knowledge should be encouraged and supported.

Evolutionary Theory

Evolutionary Theory considers innovation and technological progress to be continuous processes generating change, competitiveness and welfare. This theory is less formal than the New Growth Theory. It highlights soft factors of competition and the importance of qualitative changes and the heterogeneity of behaviour. Knowledge and information are seen as central factors of production. It differentiates between codified and tacit knowledge and postulates that the latter form of knowledge is a driving force for innovation. As tacit knowledge can be transferred only from person to person by learning-by-doing and experience, there are limits to diffusion; location and organisation become crucial sources of competitive advantage.

Systems of Innovation Approach

The Systems of Innovation Approach emphasises that innovation is the result of interactions amongst various actors within an institutional system. This innovation system consists of all economic, social, political or organisational factors that influence the development, diffusion and use of innovation.

Factors influencing the probability of innovation are (i) the capacity to adapt to technological change, (ii) the speed of absorption and diffusion of knowledge, (iii) access to highly-skilled labour, (iv) the availability of venture capital and (v) the university system. All these factors are critical to innovation and therefore to competitiveness. Furthermore, firms also consider complementary knowledge to be a prerequisite for innovation.

The ubiquity of externalities in dynamic industries results from the importance of R&D and skills in new industries in general and especially in the pharmaceutical industry, biotechnology and information and communication technologies. These industries are science-driven and profit from basic research much more than other industries. The knowledge acquired in one firm can usually be used by related firms.

A General Purpose Technology develops when a radical innovation initially emerges in the form of a rather crude technology with a limited number of users, but evolves into a complex technology for which

[16] Box 1.2 builds partly on Navarro (2003).

there is a dramatic increase in the range of users. This transformation takes place once the technology has a wide range of applications and a great number of complementarities (Lipsey et al., 1998, pp. 15ff).[17] A country which nurtures close relations between firms and universities is in a good position to start early in the production of new products. A GPT reduces the costs of production and increases price competitiveness, and spreads easily to other sectors. The impact of information technologies on economic growth documents the contribution of the value added of the ICT producing sector, its impact on total factor productivity and finally on the dynamics and competitiveness of ICT using industries.

Network externalities occur when the utility of a product increases with the number of users (of this "network"). These are dynamic, demand-side economies of scale. They exist, for example, in the mobile phone sector or computer operating systems. Technology competition is feasible ex ante but not ex post. Technologies may prove incompatible, thus creating substantial welfare losses. A main determinant of the ultimate success of a technology is rooted in the earliest formations of consumer expectations about its superiority in the end. Government interventions favouring standard settings may reduce the search and information costs otherwise borne by consumers. On the other hand, there is also the danger that the wrong technology might be chosen ("Lock in" effect); even small and temporary cost differences can, at a critical moment, have long term impacts on the competitiveness of firms and technologies. Standard setting could also be used strategically by governments to foster a special "domestic technology", particularly when development is strongly path-dependent (Brösse, 1996, pp. 38-39). Setting a European standard early may lead to the rapid diffusion of a new technology across member countries and improve the competitiveness of European firms relative to non-EU firms, as was the case with the GSM technology (Arthur, 1990).

Cluster theory emphasises the relation between a firm and its competitors, its suppliers, consumers and "related industries" in general. Locations characterised by intensive relationships between firms and their environment, as well as by strong competition, are supportive of both competitiveness and innovation, and may be called clusters[18]. Promoting clusters by regions or states therefore fosters competitiveness (Navarro, 2003). National competitiveness according to Porter is established by four elements: (i) high quality input factors, (ii) domestic demand conditions (the domestic market can be seen as a test market), (iii) the existence of a well developed network of suppliers and other related industries, and (iv) competition and firm strategies.

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[17] This source lists four characteristics of a GPT: scope for improvement, wide variety of uses, wide range of uses, strong complementarities with existing or potential new technologies.

[18] Clusters are defined as networks of independent firms linked together through a production chain, together with universities, research institutes, suppliers of (knowledge-intensive) business services and customers. Within a cluster, interaction and interdependence among participants are essential, as they promote a learning process which benefits from a wide range of non-market mechanisms.

Industrial policy can strengthen these four components, e.g. by supporting education systems, basic research, fostering co-operation between firms and research institutes, and implementing a tough competition policy. To a certain extent, the Porter approach is the antithesis to favouring "high tech" industries, since he emphasizes that all clusters can be desirable. "What matters is not what a nation (location) competes in but rather how it does so." (Porter, 2000). Therefore all existing or emerging clusters should be supported, focusing on the removal of obstacles, relaxing constraints and eliminating inefficiencies.

1.3.2.4 Policy focused arguments

In real world industrial policy, interventions are not based exclusively on economic theory, but are also derived from the demands of interest groups and social pressures.[19] This is specifically the case in declining industries or during times of high unemployment. Structural changes brought about by unfettered market forces may be too sudden, causing macro-economic shocks or crises on the regional level. This leads to the conclusion that the short term effects of structural breaks in the market and changes in regime might be greater than theoretically conceived. Economists in the Keynesian tradition emphasise that large, non insurable risks may call for intervention, mainly during cyclical downturns, but also during periods of medium term crisis. The intervention should help stabilise the economy and prevent social costs from developing out of the downward spiral of declining production and demand.

Many real world interventions are justified by reference to subsidies and unfair practices in other countries, thus restoring the level playing field (for more on second best solutions see Lipsey, 1998). This holds on the passive end of the spectrum (steel, textiles), and the argument can also be used for industries at the technology frontier (Airbus, R&D subsidies). In principle, European integration as well as the WTO, want to end this situation by setting strict rules or entirely forbidding subsidies.[20]

In cases where the structural adjustment process would otherwise result in too high a social cost (for instance unemployment) the defensive, but temporary support of a declining industry may be justified. This is especially true when an overall loss of faith in an affected region could result in capacity reductions that are too great. However, one has to bear in mind that protecting firms in ailing sectors are always second or third best solutions.

Uncertainty about the success of innovation or risky projects in general may also result in underinvestment or underproduction. This is the case when entrepreneurs are risk averse and uncertainty is of a non-

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[19] Since some of the arguments in the previous subchapter are also focused on policy, we could call this subsection socio-political arguments.

[20] The newly upcoming request for intervention against the rising textile imports from Asian countries after the phasing out of the Multi Fibre Agreement is a proof for this. A phasing out phase of ten years is now ex post not considered as enough for adoption (see Section 1.5.7 in this report).

insurable nature (correlated risks, cyclical risk, periods of strong structural change, regional deprivation; Tichy, 2004A, B). This argument justifies interest subsidies, the provision of venture capital finance, specific regional programmes (steel cartels, programmes for German unification, Objective-1-Regions).

Sometimes governments argue that certain industries are essential to the economic and political development of countries. At one time this was the case for basic goods industries, but today there is an oversupply of these products and they can be bought easily on the international market. The argument first shifted to technologically important industries and then to those with military relevance. In transition countries privatisation and restructuring has reopened the discussion about "strategic industries"; lately the argument has re-emerged in connection with the provision of goods vital to health (infrastructure, services for the common interest: water etc.).

1.3.3 Arguments against policy intervention and caveats

Some arguments against intervention in a market economy were addressed in the previous section directly after making the case for a specific type of intervention. We therefore only need to summarise the more general arguments and caveats.

An important general objection against industrial policy is that it is usually designed with good intentions, but the outcomes do not live up to the expectations. Policies designed to promote structural change in existing firms or industries may slow down actual change. Temporary protection or aid may become permanent. Support for new firms or promising industries may help firms without viable business plans and management, or may lead to a specialization pattern not compatible with long term capabilities or advantages. Forecasts as to which industries will be dynamic in the future, and which technology will be successful may prove wrong. Creating a strategic advantage may be paralleled by similar attempts in other countries, a policy rationalised as retaliation may lead to another round of retaliation and finally to an economic war. Static market failures may prove less important in the long run, specifically if competition is intense and profits are used for innovation.

Secondly, the occurrence of a market failure does not necessarily call for government intervention, if it is relatively minor, since intervention has its own administrative costs. Furthermore, government intervention can be misguided by insufficient information, or biased by vested interests or the self-interest of bureaucrats. Government failure can prove to be worse than market failure.

Thirdly, some of the arguments for intervention are more relevant on the national level than from the international perspective. Promoting national programmes, domestic regions and national champions may incur costs and disadvantages to other firms, industries and regions.

Last, but not least, market failures need not be combated by direct interventions such as subsidies and regulation. Welfare can be improved by the creation of new markets, by improving market access, pricing

emissions, facilitating entry, competition for projects and markets. The creation of a large single market will make monopoly the exception. Competition policy can prevent mergers and monopolistic behaviour. Decreasing administrative and economic costs for new firms strengthens competition and may reduce market failures. Improving property rights and the patent system may reduce externalities in research. Quality control and certification may reduce market failures in education and training. The Single Market Programme is one policy approach in this direction. Policy programmes fostering cooperation and institutions or promoting the diffusion of technologies are other substitutes for direct interventions and subsidies. New Growth Theory, evolutionary theory and the cluster approach highlight the importance of institutions.

1.3.4 Industrial policy and European integration

Four phases

The history of European industrial policy can be divided into several phases. We follow Jacquemin in recognising the treaty establishing the European Coal and Steel Community (1951) and the foundation of EURATOM as the first attempts to implement some sort of an Industrial Policy on the European level; both were precedents of today's European Union (Jacquemin, 1975, for similar view see also Stöllinger, 2000, Hepperle, 2004).

The treaty establishing the European Economic Community (EEC) marks the second phase; the treaty itself does not mention industrial policy. The main purpose of European integration – aside from political goals – was the creation of an internal market. The attempt to increase competition and the free flow of goods necessitated the reduction of tariffs and trade barriers. Subsidisation and national assistance to specific sectors had to be abandoned or at least made subject to common rules. The treaty nevertheless allowed various versions of industrial policy to be maintained in different member countries, some of which focussed on sectoral policies, others on framework conditions.

The third phase began with the discussions surrounding the Maastricht Treaty, which established industrial policy explicitly as an area of the Community's responsibility. Industrial policy was defined as the promotion of competitiveness, with a focus on the horizontal approach. The importance of new technologies in general and of information technologies was acknowledged.[21]

The renewed interest in industrial policy since about the year 2000, has been stimulated by globalisation, enlargement, deindustrialisation and slow European growth. It constitutes a fourth phase emphasising the sectoral dimension of the horizontal approach.

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[21] The Maastricht Treaty is widely seen as the start of a community-wide industrial policy. Interestingly, it does not use this term explicitly, the headline of the chapter reads "Industry".

Interventions in the Coal and Steel Industry (ECSC 1951)

Beside the main aim of securing peace in Europe, one of the central economic goals of the ECSC was to ensure the provision of coal and steel, which was in short supply at that time. Instruments such as investment planning, quotas, minimum prices and trade protection were used to achieve this goal. Price regulations and subsidies were made contingent on the scrapping of capacities. From today's perspective, this was not only a sectoral approach; with respect to the instruments used for co-ordination, it could nearly be described as a form of central planning. The policy was continued – with less direct intervention – for several decades and was even maintained after the market turned into oversupply. Today the ECSC treaty has expired, and iron and steel are subject to the general rules of the EU. The industrial policy implemented and the instruments used to regulate the coal and steel industries convincingly document how industrial policy has changed since its start and today. The success of the coal and steel policy in dampening cycles and in transforming the market from one of short supply to one which provides cheap inputs, as well as the disadvantage that necessary adjustments were often slowed down, highlights the advantages and disadvantages of government influence, which can also be observed under more mild forms of intervention.

Opening the market plus sectoral industrial policy

Industrial policy was not included explicitly in the Treaty of Rome (1957; (Darmer and Kuyper, 2000)). The main emphasis of this treaty, which established the European Economic Community (EEC), was on reducing tariffs, limiting subsidies, abolishing non tariff barriers and finally establishing a common market. These policies have a specific impact on industry and could be included under a broader definition of industrial policy (see Darmer and Kuyper, 2000, pp. 17ff). The first steps toward an explicit industrial policy are mentioned in a memorandum on industrial policy dated 1970 (Commission Bulletin 5, 18. 03. 1970). This communiqué calls for the establishment of structural policy in the European Union, because of the "inadequate degree of efficiency.....when measured by the standards of its main rivals".[22]

The first time that industrial policy is explicitly mentioned is in Article 130 of the Maastricht Treaty of 1992 (now Article 157 in the European Community treaty (European Community, 2002)): "The Community and the Member States shall ensure that the conditions necessary for the competitiveness of

[22] A Committee on Industrial Policy was proposed by the Council in the same year, but never set up. In 1973, the Council of the European Community set up guidelines for a European Industrial Policy, which concentrated on removing barriers to production and trade and also published the "European scale promotion of competitive advanced technology undertakings". The Single European Act (1986) formed in Article 130 EEA the base for a common Research and Technology policy. Its goals of strengthening the scientific and technological basis of industry and its competitiveness are clearly related to industrial policy. In 1990, the industry council agreed on goals of industrial policy, which were then documented in the Communication 1990 (European Commission, 1990) and became the basis for an explicit paragraph in the Maastricht Treaty.

the Community's industry exist. … the community should contribute to the achievement of the objectives … through policies and activities it pursues under other provisions of the Treaty."[23]

Thus can be seen as the umbrella for European industrial policy. The treaty (European Community, 2002) mentions four main goals of economic policy, which clearly constitute an industrial policy, namely

- speeding up the adjustment of industry to structural changes,
- encouraging an environment favourable to initiative and to the development of firms and businesses throughout the Community, particularly small and medium-sized firms,
- encouraging an environment favourable to cooperation between firms, and
- exploiting the industrial potential of policies focussing on innovation, research and technological development.

The Treaty of Nice (European Community, 2001) led to a change in Article 157, insofar as the Council no longer needs to decide unanimously on specific measures.

Fostering European competitiveness by horizontal policies

The mature phase of industrial policy started in the nineties. A new consensus had been reached that seemed to mark an end to the sectoral approach (Darmer and Kuyper, 2000) and defined industrial policy as policy that fostered the competitiveness of European industry.

The main principles of European industrial policy, following its inclusion in the Maastricht treaty, were laid down in the Communiqué "Industrial Policy in an Open and Competitive Environment: Guidelines for a Community Approach" (European Commission, 1990).

In order to meet the challenges of European industrial policy on the Community level, areas that affect the importance of structural adjustment are emphasised. This comprises "maintaining a favourable business environment", "implementing a positive approach to (structural) adjustment", "maintaining an open approach to markets" and "enabling an ever higher standard of living". The main aim should be to facilitate the structural adjustment process, by pursuing the following three stages of structural change:

- Ensuring the necessary prerequisites for adjustment (like securing a competitive environment, maintaining a stable economic environment, ensuring a high level of educational attainment, promoting social cohesion and achieving a high level of environmental protection);
- providing catalysts for adjustment addressing internal market policies, with special emphasis on standards, public procurement, the legal framework for business and the abolition of national quotas, and a liberal trade policy and

[23] The article originally demands a proposal from the Commission and unanimity for any decision of the Council to achieve these objectives.

- accelerating adjustment (such as policies to promote SME, a more effective use of human resources, ensuring the prerequisite conditions for the development of business sectors and promoting research and technology).

The communiqué points out that sectoral policies of intervention were not effective in fostering structural change. It therefore proposes that industrial problems should be resolved by horizontal measures. On a practical level, sectoral problems in the steel, textile and shipbuilding industries retained an important place on the agenda (Darmer and Kuyper, 2000). Explicit strategies for biotechnology, information technology and mechanical engineering might additionally hint at sectoral elements at the other end of the industry spectrum.

A connection to innovation policy is specifically visible in the documents on the global information society in 1994 and on Europe's way to the information society. It led to the Competitiveness Advisory Group and finally to the Annual Reports on the Competitiveness of European Manufacturing. Many documents carved out European strengths (for example, trade surpluses, a good position in quality competition), as well as weaknesses (European Commission, 1990, Competitiveness Reports 1997 ff, Aiginger, 2000, Aiginger et al., 2001). The findings were that Europe's position was not unfavourable, but nevertheless in need of an ambitious vision. Policies would have to be redirected, leading to the fulfilment of the Lisbon target of becoming the most competitive region by 2010. This would be achieved by fostering growth and innovation (as well as social cohesion and environmental sustainability).

Renewed interest and the matrix type approach

The reasons for the renewed interest in industrial policy which developed at the turn of the century are manifold.

The first were new challenges. Globalisation, faster technological progress, and the increased speed of structural adjustments call for new policy instruments. Traditional policy instruments cannot be used – at least not to the same extent - because of GATT and WTO agreements and rules on European competition. The new geographical landscape of an integrating Europe has been leading to the redefinition of the status of regions. Several medium-income regions have no longer been able to subsidize investments. The new member countries have been trying to attract foreign direct investment more aggressively in order to reduce their gaps in productivity and per capita income.

At the same time, economic growth slowed down to a disappointing level, ranging between 1 % and 2 %; medium term growth prospects have been lower than in the US. Unemployment is persistently high, at about 8 % in the old member and 12 % in the new member countries, pointing to severe structural problems. Progress in the liberalisation of network industries and in the Internal Market Programme in general, as well as in privatisation and deregulation, did not contribute to growth as fast as expected. The

Lisbon targets of a 3 % growth rate and of becoming the most competitive region in the world still seem far from being met.

Thirdly, fears re-emerged, that Europe might lose some of its core industries and that the share of manufacturing would decline too fast. Outsourcing could endanger employment and new plants would be built in more dynamic regions. These fears can be summarised under the heading "de-industrialisation". The new dynamic of China and India as a competitor but also as a location for new plants belongs to this group of arguments.

A fourth reason for the renewed interest may be the entry of new member countries. The gap between old and new member countries in productivity and income is large, as are regional imbalances. After a period of abstaining from interventions, the new member countries paid increasing attention to the structure and dynamics of the industrial sector. Complementary domestic investment and capabilities should prevent the development of monolithic industry structures in the future.

Investigating the issue of de-industrialisation, the European commission could not find signs of absolute de-industrialisation.[24] It confirmed, however, the slowdown in the growth of industrial productivity and the disappointing performance in Europe, especially in the high-tech sectors (European Commission, 2004D and European Commission, 2003A). It stresses that an attractive environment for industrial development is necessary, since such an environment would enable industry to fulfil the competitiveness and growth targets which were laid down at the Lisbon Council.

The communiqué "Industrial policy in an enlarged Europe" (European Commission, 2002B) tries to incorporate some of the issues raised into its industrial policy design. The communiqué underlines the fact that a vital manufacturing sector is essential for Europe’s prosperity and therefore emphasises the importance of securing the competitiveness of European industry. Knowledge, innovation and enterprise initiatives are mentioned as the three key points of industrial competitiveness, which should therefore be promoted.

Furthermore, the approach states that although industrial policy should be horizontal in nature and aims at promoting the framework conditions necessary to competitiveness, the specific needs of individual sectors have to be kept in mind. The varying impact of horizontal policies on different industries needs to be investigated. Complementary measures might differ across industries. We therefore call this approach a

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[24] "Some Key Issues in Europe’s Competitiveness – Towards an Integrated Approach", European Commission (2003A). Absolute de-industrialisation may be defined as the long-term decline of the manufacturing sector, implying an absolute decline in employment, production, profitability, exports and capital stock in the manufacturing sector and the emergence of persistent manufacturing trade deficits. However absolute de-industrialization should be distinguished from relative de-industrialization characterised by a decline in the share of manufacturing in GDP, which reflects a process of structural change towards a service-dominated economy as a result of manufacturing productivity growth, increased real income and therefore rising demand for services.

"matrix type" of industrial policy, acknowledging that the horizontal lines (the rows) have priority over the vertical columns. "Industrial policy inevitably brings together a horizontal basis and sectoral applications." (European Commission, 2002B)[25]

Summarising the most recent developments, we conclude that the new challenges and the somewhat disappointing progress with regard to growth, job creation and competitiveness, the fear of de-industrialisation and the question of new member countries catching up have initiated a new discussion on the necessity and focus of industrial policy (Darmer and Kuyper, 2000). This report aims to contribute to the design of a positive, future-oriented industrial policy, which meets the new challenges, and prevents the repetition of failures from past attempts.[26]

Box 1.3: The matrix type of industrial policy in recent EU documents

European Commission (2002B):

"Industrial policy is horizontal in nature and aims at securing framework conditions favourable to industrial competitiveness. Its instruments, which are those of enterprise policy, aim to provide the framework conditions in which entrepreneurs and business can take initiatives, exploit their ideas and build on their opportunities.

However, it needs to take into account the specific needs and characteristics of individual sectors. It therefore needs to be applied differently, according to the sector. For example, many products, such as pharmaceuticals, chemicals, automobiles, are subject to detailed sector-specific regulations dependent on their inherent characteristics or use.

Industrial policy therefore inevitably brings together a horizontal basis and sectoral applications."

European Commission (2004D):

"The Union must continue to develop the sectoral dimension of industrial policy. This implies analysing the effectiveness at a sectoral level of policy instruments which are of a horizontal nature, with a view to evaluating their relevance and to propose, if necessary, the appropriate adjustments. The Communication presents the sectoral initiatives that have already begun over the last few months and announces several new initiatives in sectors such as the car industry or mechanical engineering."

1.4 Industrial policy in practice

1.4.1 Introduction

Having summarised the rationales and the caveats, as well as the evolution of industrial policy in treaties and documents, this section gives an overview of actual industrial policy, its instruments, types, conflicts and synergies with other policy areas. Since industrial policy developed on the national level, the bulk of

[25] The communiqué "Fostering structural change: an industrial policy for an enlarged Europe", European Commission (2004), calls for action in three areas: a better regulatory environment for business, better mobilisation of all EU policy, further work on individual sectors to match specific needs.

[26] It may be an interesting task to investigate the correlation between the four phases of industrial policy with more general economic and technological trends. The importance of mechanics and electronic technology may be the cause of the sectoral approach in the fifties and sixties.

assessments concern industrial policy on the country level. We define industrial policy in the next subsection and present various opinions on its scope and success. We provide data which indicate differences in country approaches, as far as these are reflected statistically. In depth analyses of specific countries and projects are presented in Section 1.5.

1.4.2 Definition and Instruments

No generally accepted definition of industrial policy can be found in the literature. Some definitions are very broad, like "everything that affects a company", while others are quite narrow, such as "specific measures oriented towards specific sectors".[27] There is not even agreement on whether the term "industry" in industrial policy indicates manufacturing - as is more usual in Europe - or whether industrial policy should include measures of producer related services, finance, consulting, and transport (or even construction and energy, which would conform to the US definition of "industries" as sectors). Some definitions indirectly suggest the approach these authors implicitly advocate: stressing that industrial policy targeted at different sectors indicates a sectoral approach (Tyson and Zysman, 1983)[28], stressing that industrial policy fosters productivity or creates favourable general conditions for firms lays the foundation for a horizontal approach. In order to provide an overview of the wide variety of definitions, we include a selection of various definitions in Appendix 1.1.

This project defines industrial policy as "activity to create a favourable environment for European business in general, the manufacturing sector and its industries in specific". This definition stresses the central role of manufacturing, but also acknowledges that service activities and the regulatory environment are important and that the borderline between manufacturing and services is no longer rigid. The definition does not advocate a strong sectoral focus; it highlights all policies improving competitiveness and productivity. It is open to the differences in horizontal measures across sectors and to the fine-tuning of strategies to the needs of different sectors and regions.

Economists, as well as policy agents, have very different views about the effectiveness of industrial policy. For the US, the slogan has been coined "that the best industrial policy is no industrial policy". Many assessments of industrial policy in textbooks and overviews start from the assumption that if there is no explicit industrial policy, then an implicit one would be the consequence, since many regulations, subsidies, and taxes exert a non neutral impact on manufacturing. [29]

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[27] Darmer and Kuyper, (2000), p. 4: As an example of a broad definition, see Johnson (1984): "industrial policy means the initiation and co-ordination of governmental initiatives to leverage upward the productivity and competitiveness of the whole economy and of particular industries in it." For a narrow definition see for example Tyson and Zysman (1983) or Krugman and Obstfeld (1988) in the Appendix 1.1.

[28] "Industrial policy … means government policy *aimed* at or *motivate*d by problems within specific sectors."

[29] "Businessmen know from everyday experience that the EU...has a tremendous effect on their companies..... Politicians certainly believe that the EU has an industrial policy.....two Directorate Generals in the Commission are

In a survey among economists and policy advisors, 68 % of the respondents disagreed with the claim that "the best industrial policy is no industrial policy" while only 24 % agreed[30]. Rejection is somewhat weaker among the US experts, but even here a slight majority rejects laissez faire. As to the success of industrial policy, the opinion is mixed: the experts are evenly split on the question whether "industrial policy is subsidisation in disguise", and whether "recommendations by experts have an influence on industrial policy". The results of these surveys, which were carried out in the late nineties, tell us that the importance of industrial policy is widely acknowledged, while its success is seen as mixed.

1.4.3 Types of industrial policy

Sectoral versus horizontal policies

Sectoral industrial policy targets the performance of one specific industry or a small set of industrial sectors. Steel and textiles are industries with decreasing output shares, for which policy measures are developed; pharmaceuticals or information and communication technology industries are examples of fast growing industries. Horizontal measures want to improve the overall performance of the economy by supporting specific activities such as innovation, education, and retraining. Promoting entry or tax incentives are also usually relevant to all sectors of manufacturing.

Picking the winners versus framework conditions

Overlapping but not completely identical with the differences between sectoral and horizontal policies is the dichotomy between an active industrial policy targeting projects or narrowly defined industries and the framework conditions approach. The first is sometimes labelled the French approach; outstanding examples are Airbus, Concorde, Minitel, HDTV, and TGV. Often, supporting the space industry and energy is also project oriented, or follows a specific strategy with a strong top down component. The alternative approach calls for the provision of a stable macroeconomic environment, low inflation and interest rates, a favourable business environment or "framework conditions" and has been labelled the "German approach". The French approach may include sector based planning, the nationalisation of core industries, major innovation programmes, the promotion of key technologies and regions and a top down definition of core projects to be supported by government. In general, the French approach assumes that government has good foresight, and a substantial capacity for giving direction or even managing. Industrial policy in the UK relies more on market forces and asks for a stable macroeconomic environment, maintaining and developing open and competitive markets, reducing barriers to trade, and

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responsible for what most people associate with industrial policy...DG Enterprise and DG Competition", Darmer and Kuyper (2000).

[30] Aiginger et al. (1998) and Aiginger et al. (2001). The respondents were economists in the field of industrial organisation, competition policy and innovation, with the majority working in academic institutions and a minority in government institutions and competition authorities.

removing unnecessary burdens of regulation with particular attention to SMEs. It adds cooperation and sponsorships between government and business to foster competitiveness (Darmer and Kuyper, 2000).

Sunset versus sunrise industries

Industrial policy can support old industries and large mature firms, thus preventing exit, or it can support new firms, encourage entry, and encourage new technologies. Somewhat in between are subsidies to large firms or major industries, which are made conditional on structural change and restructuring. The intention is to foster change in given sectors and to accelerate adjustment; the result is often to slow down adjustment.

While structural change, adapting to changes in consumer preferences or technology, generally contributes to economic welfare, fast structural change may in the short run increase unemployment. This is specifically the case when there are imperfections in the capital market, mobility is low, and employees are unqualified or highly specialised. Cumulative forces may create welfare losses at least temporarily higher than those attributable to slow adaptation.

Structural change might also call for the temporary protection of small, young firms, which are lagging on the experience curve. Structural policy might include programmes to upgrade qualifications, capabilities, marketing and management.

Dichotomies package

Margaret Sharp (1998) nicely puts together several of these elements and adds a few others, classifying industrial strategies into two packages. Policies before 1970 typically fulfil the characteristics mentioned in the first package; since the introduction of a more horizontal approach, policies have tended to be characterised more by features of the second package.

Table 1.6: The matching pairs of industrial policy

Package I	Package II
Passive, reactive	Pro-active, adapting
Vertical, selective	Horizontal, generic
Negative, defensive	Positive, adapting
Top-down	Bottom-up
(Re-)regulation	De-regulation
Supply push	Demand pull
Mission oriented	Diffusion oriented

Source: Sharp (1998).

1.4.4 Instruments

In general, industrial policy applies the following instruments: subsidies, tax incentives, restructuring programmes, public procurements, cluster strategies and the development of innovation systems.

Subsidies[31]

The most widely used instrument – not only historically, but probably even today - is subsidies. Subsidies are given to firms, industries, and regions. Support is provided conditional on physical investment (sometimes also for the scrapping of capacities), for stabilising or increasing employment, for boosting productivity or research, or for upgrading qualifications. Since subsidies or state aid in general distort competition, the general rule is that "they are incompatible with the common market" (EC Treaty, Art 87(1), European Community, 2002). There are exemptions for restructuring, for small firms and preferable activities[32], and different ceilings are set for different regions. A strict notification process increases transparency and limits the amount of money spent on this instrument. State aid is comprised of interest subsidies, grants, guarantees, debt write offs, and the waiving of dividends for public firms. The specific type of subsidy has no influence on the rules.

Tax incentives

Many countries once offered, and some still offer, the favourable treatment of physical investment through taxation. This may take the form of preferential depreciation rules fictitious tax allowances and tax crediting. The favourable treatment can be given in general or for specific industries or activities, for a certain type of investment, for a certain size of firm, for marginal increases only, etc. Tax incentives are specifically and increasingly used to foster research and development.

Restructuring programmes

Restructuring programmes make use of subsidies[33], and sometimes also tax incentives, but are more comprehensive in programmes adapted to the strengths and weaknesses of regions or to the problems of specific industries. Institutions can be created, wages subsidised, training provided, and mobility or downsizing supported. On the active side, the university-firm connection can be strengthened, start ups and inward FDI can be encouraged.

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[31] The framework for subsidies is set out in Articles 87 to 89 of Consolidated Version of the Treaty Establishing the European Community (European Community, 2002).

[32] The European Commission is preparing a Communication on a reform of state aid rules in order to enhance most of the "preferable activities" and simultaneously set stricter rules for distorting aids.

[33] However, these subsidies have to comply with the above mentioned state aid rules.

Public procurement/champions

Government expenditures have often been used to support national suppliers or to develop industries. As far as defence is concerned, this does not conflict with Community rules. There are large fields in which medium-term contracts and government plans can support the development of national standards and even help domestic industries make use of the experience curve or attain the minimum scale or the minimum network size necessary to become internationally competitive. Government plans for the creation of the information society indicated to firms in which direction they should develop for a minimum level of certainty and demand.

Large projects on the national level (rail networks, highways, and trade fairs) have been used to support the competitiveness of a region, as well as to increase demand for domestic firms. In the long run, competition rules call for fair tendering and access for foreign firms. Support for large firms (champions) or national or European projects (Airbus, HDTV, Concorde) belong in this category, but are discussed in the section on French Industrial Policy and on Airbus.

Cluster policy

The purpose of this instrument is to increase research and knowledge spillovers between firms, as well as forward and backward linkages, partly following the analyses of Porter's diamond stressing the importance of supply and demand relations, competition and institutions. Specifically, a few sectors of an economy or a regional cluster of firms in which a country has certain strengths, or at least the potential for development, are singled out. These regions or sectors receive support, sometimes in the form of subsidies, usually by institutions promoting the internalisation of knowledge, skills and spillovers. Subsidies are only one potential instrument of cluster policy. Examples for large pro-active initiatives are the German BioRegio contest or the French programme for "poles de competitivite". Competitive tendering for being chosen as cluster gains importance, instead of the selection of clusters by exports or administration. Most countries have special support for small firms, some relying more on direct subsidies, some on tax break, others offer support for specific managerial functions or finance.

Research and innovation

Fostering innovation is a horizontal policy very important to competitiveness. Innovation is promoted by public support of basic research, and transfer institutions, tax incentives and subsidies. Even if "subsidies" are also part of an innovation strategy, their rule and rationale is very different from subsidies distorting competition in declining mature industries. Article 164 of the EC Treaty (European Community, 2002) for example enumerates four activities to strengthen the scientific and technology base of the community: research programmes, cooperation between firms, research centres and universities, cooperation with third countries and the training and mobility of researchers. Competition rules allow explicitly research joint ventures, since the benefits to society are considered larger than the costs of cooperation. This was the

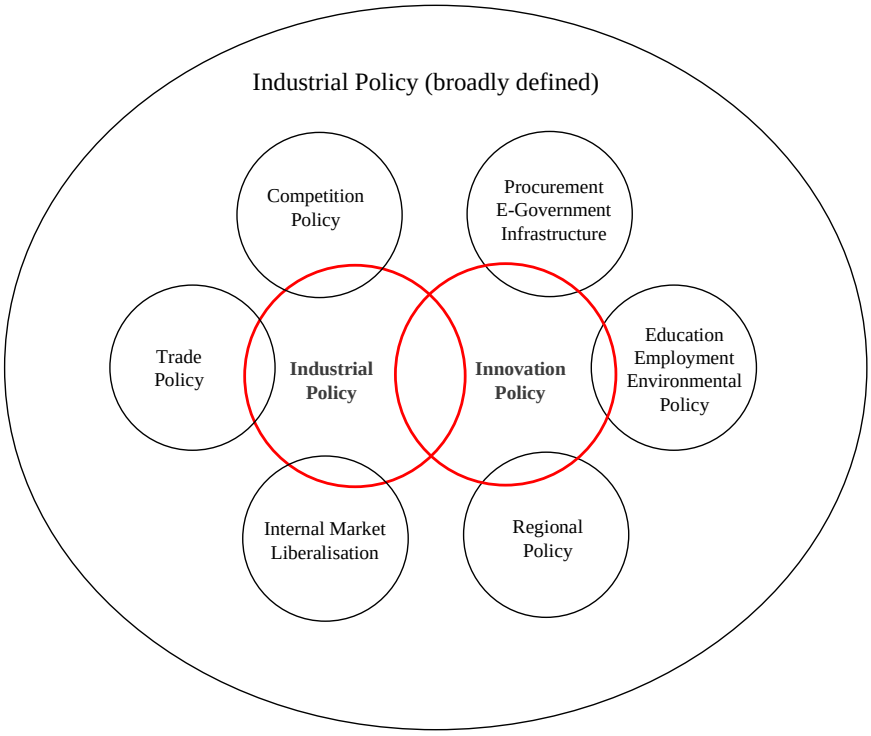
case earlier only for pre-competition R&D cooperation, and is now extended to all types of R&D cooperation. Patent policy and intellectual property rights are also important instruments. Framework programmes provide for the creation of multi-annual research programmes and foster the cooperation of European researchers creating a "European Research Area".

The complete set of instruments are available for industrial policy depends on how industrial policy is defined. We use Graph 1.5[34] to describe the relation between industrial policy and other policies. Industrial policy in the narrow sense overlaps to a considerable extent with innovation policy. Additionally industrial policy also overlaps considerably with competition policy, trade policy and internal market policy. Overlaps also exist with regional policy, education, employment and environmental policy, procurement and infrastructure. Since these overlap strongly with innovation policy, the picture depicts these overlaps, but bear in mind that there are also overlaps between regional policy and industrial policy.

In the next section the overlaps – partly conflicts, partly synergies – with some of the above mentioned policies are described. The first part presents the overlaps with competition policy and trade policy, which are the key to industrial policy. Afterwards the overlaps with education, employment, regional and environmental policy are discussed which play a role, but will not have the same direct impact on market structure like competition policy or trade policy.

[34] The picture is a revised version of a picture in Sharp (1998), which describes technology policy and its overlap with other areas, interpreting all of them together as industrial policy.

Graph 1.5: The scope of industrial policy



Source: WIFO revised version using Sharp (1998).

1.4.5 Conflicts and complementarities with other policy areas

The previous section described policy instruments used for industrial policy purposes.[35] Some instruments do not solely serve the goals of industrial policy, but may also be used e.g. for regional policy or innovation policy, as well. Interdependencies may also exist with policies usually not included under the heading of industrial policy.[36] They may either support the objectives of industrial policy or conflict with them. Which constellation prevails is largely dependent upon whether industrial policy is designed as intervention in the market process to support an industry that would otherwise not survive, or as a set of horizontal measures that strengthen the market-performance of enterprises. In this subsection, we

[35] We acknowledge the input of Heinz Handler in this sector following a presentation by Paul Geroski in the WIFO workshop on Industrial Policy in Vienna, March 2005.

[36] The European Commission (COM, 2002, pp. 26-27) distinguishes between policy areas where (i) the integration of its instruments into industrial policy is well developed, such as trade policy, internal market policy, energy and transport policy, research and development policy, competition policy, regional policy and policy areas; and where (ii) the integration of its instruments into industrial policy could be improved, namely sustainability, strategic social and employment policies (e.g. vocational training policy), consumer protection, public health policy, and environmental protection (corporate social responsibility). Darmer and Kuyper (2000) classify the following subsectors of industrial policy: competition policy, state aid, structural funds, EU research, small and medium-sized enterprises, specific sectors. Furthermore, the following areas are labeled "policies of importance to industry": the internal market, economic and monetary union, trans-European networks, EU environmental policy, and trade policy.

summarise synergies and conflicts with competition, trade, employment, and regional and environmental policies. An effective industrial policy design minimises conflicts ex ante and attempts to develop synergies.[37]

Competition policy:[38] counteracting or supplementing industrial policy?

There is a substantial amount of literature analysing the relationships between competition policy and industrial policy.[39] Specialists for industrial policy tend to see competition policy as a subsystem of industrial policy (e.g. Darmer and Kuyper, 2000), while authorities on competition would rather argue in favour of a competition policy which is completely independent of industrial policy. In the latter case, the two policies are assigned different goals. In this vein, the primary task of competition policy is to limit the market power of individual enterprises and thereby to enforce competition, which in turn should maximise consumer surplus in the long run. On the other hand, industrial policy is directed towards helping domestic producers (via state aid, creating national champions and perhaps also through protectionist measures) to establish or maintain competitiveness at home and in world markets. Depending on the time available and the dominant policy objective in mind, there may be synergies between the two policies, but they may also conflict with each other. The ultimate aim of either policy is of course to further the well-being of citizens.[40]

If the goals and instruments were bundled in such a way that competition policy formed an integral part of industrial policy, potential conflicts would not be visible. Instead, they would be resolved within the confines of industrial policy making. Geroski (2005) adheres to this view: "...the notion that there is an inherent tension between industrial policy and competition policy is basically wrong", because "the kind of 'competitiveness' which competition policy actually strives to create is virtually the only way a nation state can achieve the kind of 'competitiveness' which industrial policy proponents aspire to". The "competitive advantage" of a firm, a term coined by Porter (1990), is a concept which is consistent with

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[37] We intentionally do not analyse the relation between industrial policy and innovation policy, since the synergies between a forward looking industry policy and innovation policy are ubiquitous and the conflict between an innovative policy and a defensive industrial policy are clear cut. Article 163 (1) of the consolidated version of the Treaty states that: "The Community shall have the objective of strengthening the scientific and technological bases of Community industry and encouraging it to become more competitive at an international level."

[38] The framework for competition policy, which is clearly a community competence, is set out in Article 81 to 89 of Consolidated Version of the Treaty Establishing the European Community. The exemptions under Article 81(3) and Article 87(2) and (3) reinforces the link between competition policy and other policies like industrial policy. For more details see European Commission (2002), pp. 81ff.

[39] For an analysis of the economic aspects of the links between competition and enterprise policies see European Commission (2002A), pp. 83ff.

[40] One of the sources of the conflict is often that industrial/innovation policy is more sensitive towards the expected evolution of (dynamic) markets whereas competition policy, largely for legal reasons, needs to respond to the more certain market structure of the time in which a given competition investigation takes place. We owe this remark to a comment by Llois Navarro on a preliminary version of this report. See also Chapter 4 of Competitiveness Report 2002.

both versions of competitiveness. The idea that "structural policies" can and should be used synonymously with competition policies is much older, however, and expresses the presumption that both utilise the market to emit signals indicating the most efficient production process (Giersch, 1964).

The integrated approach is not mirrored in the basic set-up of competition policy in the EU, where many national competition policies are designed to be independent of other policies. In line with this development, we prefer to keep things separate and discuss some of the potential conflicts between the two policy areas. As mentioned above, conflicts may arise when the operational (short-term) goals of competition policy and industrial policy differ. This is the case when competition policy is perceived as an instrument that countervails and controls industrial policy, but does not support it. In practice, competition policy should secure that (i) the number of firms in a market is not too low and new firms are encouraged to enter the market, (ii) the market shares of large firms are limited through merger control, and (iii) anti-trust behaviour and abuses of a dominant position are prevented. Industrial policies comprise measures to help firms to grow, markets to consolidate, and national champions to evolve. Such measures, if not explicitly market oriented, are all too often in conflict with competition policy.

Subsidies have been frequently allocated to large firms, which makes it more difficult for smaller and perhaps more innovative firms to survive in the market. Small and medium-sized enterprises (SMEs) are often not able to exploit economies of scale to an extent which would permit them to remain in the market. SMEs are also exposed to information asymmetries, as many of them would not be able to cover the costs of having all available information permanently at hand. Such asymmetries are often regarded as justifiable reasons for government intervention, which then contributes to creating a market and not disturbing it. The question for competition policy is where to draw the borderline between SMEs and other companies. Conflicts also arise if industrial policy attempts to counterbalance structural change or allows firms to co-operate and restructure. However, modern innovation theory settles the conflict somewhat, as it stresses the positive impact of competition on innovation, and consequently on growth and competitiveness (at least up to a certain point; see Aghion et al., 2002).

A number of authors (e.g. Porter, 1990, Leibenstein, 1966, Aiginger and Pfaffermayr, 1997) argue that a competitive environment is positive for growth and competitiveness, as competition helps to eliminate slacks and pressures firms to increase the speed at which they adopt the best available technology. This literature is also in line with Hayek (1968), who claims that competition forces firms to innovate and promote the search and discovery process. In Germany, government agencies responsible for industrial policy and the Monopoly Commission have debated the potential conflicts and their economic effects particularly fiercely (recently documented by the Monopolkommission, 2004).

An opposing view is held by Schumpeter (1942), who stresses the importance of monopoly profits to innovation. Limits on competition policy are also acknowledged in the literature on R&D cooperation, and on standards. This literature holds that the benefits from not duplicating fixed costs or from

standardisation may outweigh the welfare loss originating from reduced competition. Competing for markets (i.e. competition to supply a market), or trying to develop or dominate a standard, may be a substitute for competition in the market (Geroski, 2003), although encouraging the former may entail limiting the latter. In the case of natural monopolies with no competition in the market, competition for the market (through concessions) may be a feasible first step to introducing market elements. Part of the literature claims that a prudent competition policy should maximise dynamic welfare instead of static welfare. It should also include considerations on technological development and innovation.

This strand of the literature maintains that there is an "optimal level" of competition intensity. Empirical investigations also seem to confirm an inverted-U shaped relationship between innovation and competition intensity, with an optimal point (see Box 1.4). When competition intensity is low, investment incentives may also be low: since R&D is risky, a dominant firm might be content with earning its established monopoly rent and not invest in R&D. As competition increases, there is pressure on firms to innovate and thus attain a more favourable position in the struggle to survive on the market (selection principles are specifically stressed by evolutionary theory). On the other hand, when many firms compete on equal terms, the rents derived from innovation are soon competed away, and there remains little incentive to further invest in R&D (Schumpeterian markets).

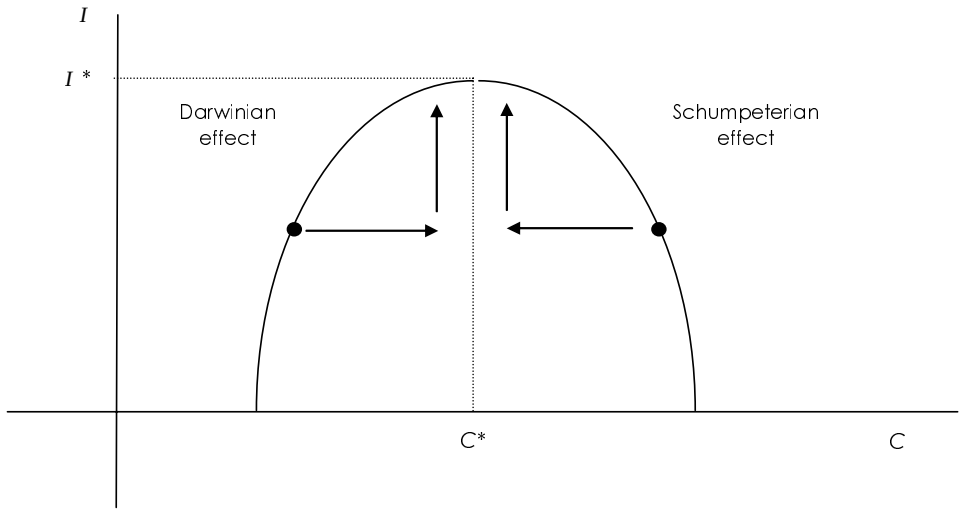
The optimal intensity of competition is most likely not uniform over time and across industries, but dependent upon the business cycle and the cost characteristics of enterprises. In a lasting demand trough, as currently experienced in Europe, profit expectations are subdued and incentives to innovate low. If, in such a climate, entrepreneurs were forced to accept additional cost pressure (e.g. excessive wage demands), they might not take the "escape route" of more innovation, but rather the "Schumpeter route", particularly if they were lacking the necessary financial resources to sustain adequate innovation activities. The impact of competition on innovation also depends on the sector in question; take the liberalisation of network industries as an example: here exposure to a competitive environment will most certainly increase innovation.

As stated by Knieps (2001), the expectation of acquiring some form of temporary monopoly, e.g. via the protection of intellectual property rights (IPRs), is a precondition for firms to invest in R&D and innovate. IPRs usually do not create an over proportionally large amount of market power in the anti-trust sense, as long as the market remains open to substitutes for the protected patent. Although this creates temporary distortions to resource allocation, they can be justified by the long-term welfare gains for consumers. The returns on patents should not be treated like the returns on other monopolies, because in the long run, in a competitive environment for innovations, the expected gains from R&D activities are close to zero.

Box 1.4: An inverted U-relationship between competition and innovation and the "optimal level" of competition (Böheim, 2004)

Empirical evidence on the relationship between competition and growth has been ambiguous for a long time. In recent years evidence has been mounting that increasing competition may first increase innovation, and then, during a period of extremely fierce competition, reduce innovation. This idea implies the existence of a "virtual" optimum of competition intensity (C*) that maximises efficiency, innovation and growth. The resulting "inverted U-shaped" relationship demands different policy measures depending on which side of the optimum a market lies. For markets with competition intensities below the optimum (C < C*), increasing competition would foster economic growth. For markets beyond the optimum (C > C*), the opposite would be the case (see Graph 1.6).

Graph 1.6: The "inverted U"



Source: Aghion et al. (2002), WIFO. – C . . . competition intensity, C* . . . "optimum" competition intensity, I . . . innovations indicator, I* . . . "optimum" innovation level.

The optimum intensity of competition C* is likely to vary by industry and over time. The empirical identification of the position of C* is difficult given the lack of adequate data. The available evidence indicates, however, that the optimum is located at rather high levels of competition intensity. According to Aghion et al. (2002), innovative activities as measured by patents weighted by the number of citations, reached their maximum in UK manufacturing industries at competition intensities (measured by applying the Lerner Index; this calculates price minus marginal costs over price) in the range between C = 0,90 and C = 0,95, which is close to perfect competition (C = 1). International comparisons in the form of "competition intensity benchmarking" might serve as a valuable tool in assessing the competitive environment of markets, and may thereby lay a sound economic foundation for an innovation and growth oriented competition policy.

Overall, in a given market, the potential conflict between competition policy and industrial policy cannot be negated. However, increasing the "relevant market" by expanding the integration area should contribute to reducing monopoly power. A competition policy which takes the arguments of market failure into consideration (such as innovation and other externalities) and also acknowledges the potential lack of financial resources available for innovation will not necessarily conflict with industrial policy. An industrial policy fostering innovation and spillovers, rather than protecting mature firms and national

champions, and a competition policy incorporating dynamic drivers of competitiveness should in principle be particularly compatible. A competition policy limiting anti-competitive practices will increase mobility, dynamics and innovation. For both competition policy and industrial policy, it is important to take into account the dynamic aspects of market evolution, knowledge creation[41] and innovation.

Industrial policy and trade policy

Industrial and trade policies may also have conflicting goals. A liberal trade policy would be designed to establish or maintain, in line with international agreements such as the GATT and WTO, an open trade regime and to eliminate tariffs or non-tariff trade barriers. Goals could conceivably clash when a protectionist industrial policy simultaneously was to favour domestic firms on the home market and assist them to gain market power in international markets. A potential conflict could also arise if liberal trade policies discouraged protected firms from adjusting to market conditions.

In contrast, a protectionist trade policy could be used to respond to foreign price dumping or subsidies, and thus substitute for or complement a defensive or interventionist industrial policy. However, the increasingly ambitious rulebook of the World Trade Organisation (WTO) limits the scope for using protectionist trade measures as an indirect form of industrial policy (Darmer and Kuyper, 2000). A border case is anti-dumping duties which can be levied on imports, in agreement with the WTO's multilateral trade regime, to reassure domestic firms that trade liberalisation may not result in unfair practices.

Globalisation and liberalisation partly intensify and partly alleviate the tensions between the two policy areas. On the one hand, globalisation and a more liberal trade regime increase the importance of positive spillovers which foster competitiveness and thus reduce tensions. However, spillovers are often only of regional significance or are confined to neighbouring countries or other regional clusters. On the other hand, developments such as "innovation races" or "winner takes all competition" render it more attractive for policy makers to subsidise firms and industries in the early stage of the product cycle or in intensive technological competition. Successful research by one firm may impose a negative externality on another firm, whose research efforts could suddenly appear worthless. In such an environment, trade policies become focused on the reduction of negative externalities, whereas industrial policies are more oriented towards the realisation of positive externalities (Foray, Rutsaert and Soete, 1995).

Industrial policy, education and employment

Labour skills are a major key to industrial growth. Improving education and human capital is essential to enhancing the ability of individuals and firms to learn about and adapt to new technologies. Therefore,

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[41] European Commission (2004D) p. 29: "For industry to be competitive, better use must be made of knowledge: this requires ... a competition policy that takes this dimension into account.".

institutions for creating and diffusing skills and knowledge support industrial competitiveness, particularly over the long run. The increasingly rapid turnover of the knowledge base requires education and training programmes for life-long learning, if the skills and the adaptability of the workforce are to be maintained and improved.

Globalisation and technological change create new challenges for employers and employees alike, in particular for low-paid and low-skilled migrant workers in declining industries. Low-paid migrants as substitutes for domestic workers often produce tradeables in low-performance industries, in particular manufacturing, with a low capital to labour ratio (e.g. clothing, leather and textiles, as well as tourism) and also non-tradeables (e.g., construction and personal, health and domestic services). This trend retards economic growth and should be countered by innovation-prone industrial policies. In contrast, highly skilled foreign workers may foster economic and industrial growth, in particular if they complement domestic workers, i.e., if they create job opportunities for nationals.

Synergies between industrial policy and education policy can be promoted by improving the co-ordination between the education and training system on the one hand, and the structure and quantity of industry demand for various qualifications on the other. The more responsive the training and educational institutions are, the more will they contribute to raising the productivity of the enterprise sector. Towards this end, a number of instruments are available, including early analyses of the competence requirements, developing work-based vocational programmes, and the provision of Carriers Guides for young people. State aid for education and regional training programmes can also widen the synergies, as would the promotion of a flexible and transparent system of vocational qualifications and of special innovation-related professions.

On the one hand, the theoretical literature unanimously supports the view that human capital is a very important, if not the most important factor of economic growth. However, there is less support, in particular from empirical investigations, for the presumption that externalities demand public policies for all sorts of education. Hanushek (2002) attributes the growth effect of education in general to better workers and more human capital and not to government involvement per se. If education is costly and not market oriented, this may even result in a conflict between education policy and competitiveness. High costs with little contribution to relevant skills may be a net burden to firms which finance education through the taxes they pay. A number of countries are about to reform their educational systems to broaden the supply (e.g. by introducing competition between public and private suppliers) and to increase the market orientation of institutions and the relevance of contents. In an era of radically changing technologies, education can easily become overspecialised, while firms may develop a demand for more general requirements.

Specific employment strategies are designed to lower the burden of structural change by limiting the speed of adjustment or by keeping workers in existing firms and regions. Inflexible regulatory schemes may lead

to a misallocation of human capital, e.g. when state regulations prevent redundant workers from being fired. Support for declining industries can either give struggling firms a new chance to catch up with the market or increase costs to firms in dynamic industries.

The discussion on labour market flexibility is long, intensive and politically sensitive, but not at all conclusive, since the effects depend on the institutional and behavioural characteristics of the countries concerned. Some countries provide an alternative to the security of existing jobs in the form of an active labour market policy, including retraining. The northern European countries put great emphasis on measures which foster quick reemployment when a job is lost, and programmes for upgrading skills and supporting life-long learning have been well developed. The Netherlands has developed strength in labour market flexibility via part time jobs, whereas Denmark combines flexibility for firms with security for employees.

Against the backdrop of future perspectives on competition and employment patterns, the major challenge will be to combine industry policies, employment policies and education policies to foster both competitiveness and employability.

Industrial policy and regional policy

The "New Economic Geography" literature (e.g. Krugman, 1991, Krugman and Venables, 1995; for a recent survey see Ottaviano and Thisse, 2003) analyses the interaction between economies of scale and transaction costs. It concludes that shrinking transaction costs (higher integration) may cause concentration of economic activities in regions that have sufficient access to larger markets. The outcome is spatial polarisation which, in a setting of low worker migration (as in Europe), will cause rising regional disparities in income. If spatial concentration is advantageous because of economies of scale, agglomeration creates economic gains. In this case, any attempt to counteract the tendency of firms to concentrate (rather than to stimulate agglomeration) necessarily leads to losses in efficiency and reduced growth potentials. Increasing returns are thus not only at the core of a theoretical foundation of regional policy, they also constitute a potential trade-off between compensation-oriented regional policy and growth-oriented industrial policy (Martin, 2003). Such conflicts between regional and industrial policies arise because of the different goals they pursue.[42]

However, this does not mean that there are no synergies between the two policy areas. In the context of regional policy, a shift from centrally conducted regional policies to more decentralised approaches is apparent in many countries (Marcusen, 1995). This endows lower levels of government with more discretion over the provision of infrastructure and fosters a more growth-oriented stance in regional

policy, shifting the focus from regional compensation (equity) to regional competitiveness (efficiency). At the EU level, this trend is reinforced by the Lisbon strategy, which is strongly growth oriented and now serves as a joint heading for all community policies. EU structural and cohesion policies stick heavily to measures compatible with growth-oriented (horizontal) industrial policy.

Regarding industrial policy, many of its instruments parallel those of regional policy. Policies designed specifically for SMEs are likely to benefit lagging regions in particular, and the same is true for measures which ensure that businesses have access to markets, for benchmarking and the exchange of good practices, for the development of the service sector, and for programmes encouraging the dissemination of innovation. Moreover, the dynamic elements of learning, innovation, skills and entrepreneurship are becoming increasingly important factors in competitive advantage (Maskell et al., 1998). The economic properties of a firm's location influence the amount of knowledge created by the firm. For these reasons, successful industrial policy will have to take more regional issues into consideration. Competitiveness will depend directly on the degree of interaction with localised capabilities, namely regional infrastructure (including rules, habits and traditions) and the knowledge and skills available in the region[43].

In the EU, regional economic policy aims at promoting solidarity by reducing income differences and differences in employment rates between regions. Although Art. 87(1) of the EC Treaty (European Community, 2002) prohibits market-distorting state aid of European relevance in general, Art. 87(3) explicitly exempts regional state aid from this rule. EU regional policy was established to accompany the creation of the single market and the economic and monetary union. It is designed "to reduce disparities and to promote greater economic, social and territorial cohesion" (European Commission, 2004I). In particular, it strives to help lagging regions catch up, restructure declining industrial regions, diversify rural areas by providing an alternative to agriculture, and revitalise urban neighbourhoods. Such a horizontal, future-oriented regional policy, which aims at upgrading skills and fostering innovation does not contradict market-oriented industrial policy, even when the two are pursued at different levels of aspiration in high and low income regions.

However, extending assistance to individual firms in less developed or more peripheral regions often implies the desire to prevent closures and reductions in employment. Firms newly attracted to an area by its regional policy are often searching for low-wage labour. Such regional policy is likely to conflict with

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[42] New Economic Geography indicates that there is a second stage in development, where further decreasing transport costs foster dispersion, and there is evidence that centrifugal forces are already stronger than centripedal forces today (Aiginger, Pfaffermayr, 2004, Aiginger, Leitner, 2002)

[43]) Maskell and Malmberg (1999): "The region is not merely a "container", in which attractive location factors may or may not happen to exist, but rather a milieu for collective learning through intense interaction. In the end, it is the region's distinct institutional endowment that embeds knowledge and allows for knowledge creation which – through interaction with physical and human resources – constitutes it's capabilities and enhances the competitiveness of the firms in the region".

the goals of industrial policy, which aims at increasing the productivity of existing firms and establishing new firms which provide sophisticated jobs.

In the EU, major instruments for pursuing regional policy on the Community level are the structural and cohesion funds. Over the last few years, the governing principles were laid down in the Lisbon agenda and in the Agenda 2000. Regional developments consistent with market-oriented industrial policies are to be directed towards structural reforms which improve the framework conditions of entrepreneurial activity, the creation of new jobs which assure social inclusion and gender mainstreaming, as well as towards education and training, R&D and innovation, environmental concerns and sustainability. The new European structural, regional and cohesion policy, laid down in the "Agenda 2007", will concentrate on convergence and competitiveness, regional competitiveness and employment, and European territorial co-operation (see Dunford, Louri, Rosenstock, 2001).[44]

State aid is not only an important instrument of industrial policy, it is also of particular relevance to competition policy. In this context, Sasi (2002) recognises two problem areas: Due to either political (e.g. the excessive influence of vested interests) or institutional failure (e.g. inadequate enforcement mechanisms), state aid may be directed in a way which undermines competition, fairness and efficiency. There is, on the other hand, a clear role for well-targeted state aid in alleviating market failures and promoting structural reform. This pertains to the EU state aid regime, which is governed by strict rules for aid to traditional industries and by more permissive rules when market insufficiencies (e.g. R&D and environmental protection) are being addressed.

An attempt to combine the economic virtues of industrial and regional policies was made, e.g., in Germany, where competitions among regions for the long-term, federal government funding of clusters was introduced.[45] However, this kind of policy tends to reinforce the strength of a particular region and to neglect the convergence aspect of regional policy.

A number of other policies relate to industrial policy, but simultaneously have a regional dimension. An example would be the setting of "EU standards" as part of the creation of an internal market. Standards counteract the anti-cohesive forces which may prevail even after a single market is established. Standard-setting should be particularly favourable for less developed regions of the EU, as the industries in more developed areas would no longer be able to protect themselves with exclusive technical specifications. However, positive effects can only materialise, if dominant (groups of) enterprises can be prevented from pushing through their own standards at the disadvantage of other firms.

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[44] It should be noted, however, that not all types of (EU compatible) state aid have an unambiguous impact on cohesion. It could well be that horizontal state aid (e.g. for R&D or education) tends to benefit richer regions, where research centres are concentrated; while poorer regions may not have the financial resources to take full advantage of regional state aid.

[45] Examples are the German BioRegio contest and the InnoRegio contest.

Industrial policy and environmental policy

Environmental policy aims at sustaining of the use of natural resources, reducing emissions and the development of clean technologies, while ensuring that firms compete on a level playing field. Public support for costly research and investment in environmental technology is rationalised by the high risks for individual enterprises or externalities. Some of the instruments applied for environmental purposes (in particular regulations and taxes) raise the costs of enterprises in the first place[46] and imply a loss of flexibility or speed of adjustment. This would interfere with the aim of improving the competitiveness of European industries (Darmer and Kuyper, 2000).

However, the overall impact on productivity and growth is a priori indeterminate. According to the "Porter hypothesis" (Porter, 1990), firms may adjust their production possibilities to the new framework by innovating new processes and products and thereby strengthen their future competitive advantage. Environmental policy would then result in a "double dividend" in favour of the environment and of the firms concerned. This effect will almost certainly be achieved when innovation in clean technologies is promoted.

Investments originally imposed on firms by ecological considerations can result in innovation and ultimately create new market opportunities with first-mover advantages. Firms in related industries are often world leaders with competitive advantages, offering a potential for substantial employment creation.

In conventional empirical studies, the effects of environmental regulation on productivity are mostly adverse: as regulation stiffens, productivity declines, at least modestly (Jaffe et al., 1995), and investments in the reduction of negative environmental externalities tend to crowd out other investment (Gray and Shadbegian, 1998). This view was questioned by, among others, Porter and Van der Linden (1995) who presented case studies supporting the view that only strict regulation would motivate firms to achieve cost-effective compliance with environmental considerations. Lanoie et al. (2001) complement this view with the message that current environmental regulation lowers total factor productivity growth, while past regulations have a net positive effect.

Summary

The above discussion delivers a clear message: To avoid frictions between different policies and implementing authorities, there should be a coherent policy strategy with regard to objectives, intermediate targets, and instruments. Industrial policy as core element of the Lisbon strategy and the attempt to foster growth, competitiveness and employment should cooperate with the other policies as to establish market-oriented framework conditions under which private enterprises can improve their

[46] For an overview of the costs of environmental policies see European Commission (2002A), pp. 109ff.

competitiveness and it should be closely related to the Lisbon strategy. Even if some policies are community competences (like trade policy), some are shared between community and member countries (competition policy) and others are mainly implemented at the level of member states, there should be a coherent general strategy. Then the potential conflicts between various policy areas would be internalised and utilised to develop synergies.

1.4.6 Quantitative indicators of the use of policy instruments in the member states

Indicators of industrial policy

The implementation of industrial policy in the EU is rather complex. Strategies and their real outcome vary according to industry structure and dynamics. A country selects its policy instruments according to the set of problems with which it is faced, as well as in light of the goals it seeks to pursue. This section presents quantitative indicators on policy priorities and differences, while the next section will use case studies for several different countries to illustrate approaches to industrial policy. It is important to bear in mind that indicators are derived from statistical evaluations, which are sometimes subject to inconsistencies in reporting and measurement.

We present four sets of data: the first set is on the amount of state aid reported in each country; the second measures (de)regulation, market access and competition; the third is comprised of figures on innovation, education, technology diffusion and access to (innovation) finance. While these three sets of indicators look at instruments, the fourth set looks directly at "outcomes" by measuring the share of technology driven and skill intensive industries.

A traditional approach of industrial policy is to support firms by means of direct aid; subsidies can be given to specific sectors or granted for specific purposes. In this paper, we report figures on total state aid in relation to GDP, state aid to manufacturing in relation to value added, and the share of horizontal measures. The indicators of regulation refer partly to the product markets and partly to the labour markets. In addition, regulation indicators describe the speed of liberalisation in network industries and progress in the Single Market Programme. Thirdly, we present indicators of investment in research, education and information technology and report broadband penetration, indicating the industrial policy approach consistent with the Lisbon target. This group of indicators could be also summarised under the title "investments in the future" (see Aiginger, 2004B). Finally, we provide indicators of the ex post industry structure, by measuring the share of value added in technology driven and skill intensive sectors in the total value added of manufacturing. High shares of sophisticated industries reflect the policy pursued over the past decades, but also may be a persistent, inherited characteristic of a country, which depends on comparative advantages. The indicators are listed in Table 1.7.

Table 1.7: List of indicators

State aid	Total state aid (share in GDP) 2002
	Manufacturing state aid (share in manufacturing value added) 2002
	State aid to horizontal objectives (share in total aid) 2002
Regulation, liberalisation, internal market	Product market regulation 2003
	Administrative regulation 2003
	Economic regulation 2003
	Network liberalisation 1998
	Labour market regulation (EPR, Employment protection regulation) 2003
	Open tender (Published public procurement as % of total public procurement 2002)
Investment in the future	Public R&D expenditures (share in GDP) 2001
	Business expenditures on R&D (share in GDP) 2001
	Science & engineering graduates (% of 20 – 29 years age class) 2002
	Population with tertiary educations (% of 25 – 64 years age class) 2002
	Participation in life-long learning (% of 25 – 64 years age class) 2002
	Penetration of broadband 2004
	ICT expenditures (as % of GDP) 2003
	Venture capital investments: early stage (as % of GDP) 2003
	Venture capital investments: expansion and replacement (as % of GDP) 2003
Industry structure	Technology driven industries (value added in % of manufacturing industries value added) 2001
	High skill industries (value added in % of manufacturing industries value added) 2001

Sources: European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

First we describe the indicators, then the position of countries per indicator, and then by country to highlight deviations from the EU average for each country. Afterwards, we cluster countries to characterise different approaches to industrial policy.

Indicators of state aid

Historically, state aid has been the most intensively used instrument of industrial policy. In support of its goal to create open and well-functioning markets, the European Union tried to limit the use of this instrument or at least to make its implementation more transparent and the subject of certain rules. At the 2001 European Council in Stockholm, member states agreed - consistent with earlier attempts - on two goals: first, the overall amount of state aid should be reduced and secondly, remaining aid should be redirected toward horizontal objectives (European Commission, 2004A).

The 2002 values confirm significant disparities between member states. The share of state aid in GDP ranged from less than 0.20 % in Sweden, the UK, Finland and the Netherlands to around 0.55 % in Germany, Spain and Portugal and 0.72 % in Denmark.

However the share of state aid in GDP decreased in 14 of the 15 members of the EU-15 between 1999 and 2002, with the sharpest fall in Portugal (due to a sizeable reduction in a regional tax scheme in Madeira) and in Ireland. In contrast, the share of state aid in GDP increased in Denmark, due to substantial

increases in horizontal state aid for employment and even more for the environment (European Commission, 2004C).

State aid to manufacturing includes assistance for shipbuilding, steel, textiles and other manufacturing sectors, as well as for horizontal objectives. The latter include aid for research and development, SMEs, environment, reductions in energy consumption, employment, training and regional development. It is not always known which specific sector(s) will profit most from these horizontal objectives. This uncertainty can lead to an overestimation of the state aid spent on manufacturing, as may especially be the case in Greece, where almost all aid is awarded through regional development schemes, and in Denmark, where training and the environment receive high levels of state aid (European Commission, 2004C). Denmark recorded the highest share of state aid to manufacturing amounting to more than 4 % of value added; shares above 2 % are reported for Greece, Luxembourg and Spain. The smallest share – less than 1 % - was measured for the United Kingdom, Sweden and Finland.

State aid for horizontal objectives usually creates less distortion than sectoral and ad hoc aid. In most countries, there is presently a shift towards horizontal objectives. For instance, in Denmark, Greece and Finland nearly 100 % of all state aid is horizontal; in the Netherlands, Belgium, Italy and Austria the corresponding figure is more than 95 %. In Portugal, Ireland, France, Germany, Spain and the United Kingdom, a substantial amount of state aid is still sectoral, ranging from 40 % in Portugal to 70 % in the UK (albeit measured in relation to the much lower importance of state aid in general). Germany, France and Spain still support their coal sectors with considerable amounts of aid.

The high share of sectoral state aid in Portugal is due to the tax aid scheme in Madeira. In the UK, the government set up a substantial rescue package for British Energy in 2002. The majority of member states, in particular Ireland and Italy, continued to redirect state aid to horizontal objectives between 1998 and 2002. In three member states, the share of horizontal aid declined slightly, although from a relatively high point of departure (a level of 85 % or more; European Commission, 2004C, pp. 19-21).

Indicators of (de)regulation and liberalisation

The OECD regulatory database provides indicators describing product market and labour market regulation (Aiginger, 2004A). The information is ranked on a scale from 0 (unregulated) to 6 (highly regulated).

The overall product market regulation indicator provides a single synthetic measure of regulation in each member state (OECD, 2004A.). Regulation is lowest in the United Kingdom, followed by Ireland, Sweden and Denmark. The strictest product market regulation can be found in Italy, Portugal and Greece, followed by France and Spain.

The subcategory "administrative regulation" reports on such indicators as licence and permits systems, administrative burdens for corporations, sole proprietor firms or sector specific administrative burdens (OECD, 2004A). The countries with the least regulation are the same as in the aggregate; high levels are reported for the Netherlands, Portugal and Spain. "Economic regulation" reports inter alia the scope and size of the public enterprise sector, the degree of direct control over business enterprises, and the existence of legal barriers or antitrust exemptions (OECD, 2004A). Italy, France and Finland are more regulated with respect to economic regulation than to administrative regulation. Administrative regulation is stronger relative to economic regulation in the Netherlands and in Austria.

The indicator of network liberalisation (labelled as dynamic product market regulation in Aiginger, 2004B, since it is available over time and for more than just one year) measures the degree of regulation and the liberalisation of network industries. It is calculated as the average of seven indicators of network industries (airlines, telecom, electricity, gas, post, railways and roads). In the network industries it is again the United Kingdom which has the highest degree of liberalisation, followed by Sweden, Germany and Finland. The lowest degree of liberalisation is in Greece, followed by Italy, Ireland and Portugal.

Labour market regulation is measured according the indicator of employment protection legislation (EPL), which is actually an indicator of one specific aspect of labour market regulation.[47] The employment protection legislation is strict in Portugal, Spain, Greece and France, while in the United Kingdom, Ireland and Denmark the indicator has a very low value. Sweden and Finland have rather strict regulation for permanent contracts, but very few rules for temporary workers (Aiginger, 2004A and 2004B).

Public procurement, that is, purchases of goods, services and public works by governments and public utilities, can have an important influence on the activities of firms and the development of core technologies, especially in sectors where public procurement is an important demand factor, like defence, transport or health care (European Commission, 2003A). The value of openly tendered public procurement[48] as a percentage of total public procurement 2002 can be seen as an indicator of market access and openness to competition. The high share in Greece (more than 40 % of total public procurement) is due to the fact that structural funds are subject to open tenders (European Commission,

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[47] The overall EPL indicator is basically a summary of the two indicators for regular and temporary contracts. These again are constructed by using factor analysis to aggregate the basic indicators which were constructed on an in-depth review of existing regulations. For regular contracts, indicators of procedural requirements (duration, notice and severance pay and standards and penalties of unfair dismissals) were reviewed. For temporary contracts, the objectives according to which temporary contracts can be offered, the maximum number of successive renewals and cumulated duration are reviewed. For further details see Nicoletti et al. (2000).

[48] Eurostat Website Structural Indicators, Explanatory texts: Data on public procurement are based on information contained in the calls for competition and contract award notices submitted for publication in the Official Journal of the European Communities (the S series). The nominator is the value of public procurement, which is openly advertised. For each of the sectors - works, supplies and services - the number of calls for competition published is multiplied by an average based, in general, on all the prices provided in the contract award notices published in the Official Journal during the relevant year.

2004A). The second, third and fourth best results (all above 20 % of total public procurement) are reached by Spain, the United Kingdom and Italy. Germany lags behind the EU15 member states, followed by the Netherlands; for both countries the resulting figure is below 10 % of total public procurement.

Indicators on "investment in the future"

Investing in innovation, education and the diffusion of new technologies is important for growth and competitiveness and is therefore the core of the Lisbon Strategy. R&D plays an important role in today's innovation system, first of all since radical innovations are almost always based on R&D, and secondly because minor innovation and thirdly, the dissemination of new technologies are also based on R&D. Future-oriented strategies are always in need of innovation and skills.

Sweden (above 4 %) and Finland (above 3 %) report the highest research expenditures relative to GDP, outperforming even Japan and the US. Denmark and Germany rank closely behind them with approximately 2.5 % (European Commission, 2004A).

Public R&D is highest in Finland and Sweden at 1 % of GDP, followed by France at approximately 0.8 % (European Commission, 2004B). Luxembourg has the lowest share, with a bit more than one tenth of the Swedish and Finnish values, followed by Ireland and Greece with values around 0.4 %.

The impact of business research is considered to be stronger than that of public research. Accordingly, the Lisbon strategy calls for increasing the private share of R&D relative to the public share. Business enterprise expenditures include all R&D expenditures of the business sector "manufacturing and services". Specifically, impressive shares of business enterprise expenditures in GDP are again reached by Sweden (above 3 %) and Finland (above 2 %), followed by Germany and Denmark. In contrast business expenditures in Greece, Portugal and Spain are only 0.5 % and below.

For education, our research investigates the share of science & engineering graduates, the share of population with tertiary educations, and engagement in life long learning.

The share of all science & engineering graduates is defined as the share of persons in the age class 20 - 29 with a post-secondary education in life sciences, physical sciences, mathematics and statistics, computing, engineering and engineering trades, manufacturing and processing or architecture and building (European Commission, 2004B). Performance leaders are Ireland, France and the United Kingdom, with values around 20 %. Luxembourg has by far the lowest share, with less than one tenth of the Irish and French values, followed by Austria, Italy and the Netherlands with around 6 % (European Commission, 2004A). Over the period 1998 to 2001 the (EU[49]) percentage increased clearly; some convergence is starting to

[49] The share is higher in the EU than in the US, although the number is still higher in the US (because of the higher overall number of graduates.

take place. In Ireland, Germany and Austria the share remained unchanged or even declined. However, in most countries it increased.

Tertiary education is measured as the share of population aged 25 – 64 which has attained some form of post-secondary education. It is largest in Finland, with tertiary education above 30 %, followed by Denmark and the United Kingdom. In Portugal and Italy only 10 % of the population in this age class has a tertiary education, followed by Austria (around 17 %).

Life-long learning is defined as participation in any type of education or training course during the four weeks prior to the survey.[50] Life long learning is well developed in the United Kingdom, with values above 22 %, followed by Finland, Sweden and Denmark (around 18 %). Very low levels are reached by Greece, France and Portugal (below 3 %).

Broadband promotes the development of new services and allows the re-organisation of production and working processes. Therefore, the use of advanced services on a secure broadband infrastructure, a main objective of eEurope2005, opens the opportunity for substantial benefits (European Commission, 2004A). The highest rates of broadband penetration[51] are in the Scandinavian[52] countries, together with Belgium and the Netherlands, followed by Austria. The lowest penetration rate is in Greece. Ireland also has a remarkably low broadband penetration rate; Luxembourg lies at the lower end of the distribution.

Total ICT expenditures include office machines, data processing, data communication and telecommunication equipment, as well as related software and telecom services. ICT are related to the reorganisation of business structures and processes; they therefore have a major impact on productivity growth. Hence, fostering their diffusion is one main policy area for a dynamic, knowledge based economy. Sweden, the United Kingdom and the Netherlands record high levels of ICT expenditures; the lowest levels are recorded in Ireland and Spain.

Venture capital is an indicator of financing for innovative and risky projects. It is available for two investment stages: first, the early stage and secondly, the expansion and replacement stage, and is presented as venture capital investments as a percentage of GDP.[53]

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[50] Participation rates are only a crude indicator, as no statement regarding the quality or the amount can be made. European Commission (2004B).

[51] Broadband penetration measures the number of broadband connections related to population (100 x number of broadband access lines / number of inhabitants). Broadband lines are defined as those with a capacity equal or higher than 144 Kbits/s. (Eurostat Website Structural Indicators, Explanatory texts: http://europa.eu.int/newcronos/reference/sdds/en/strind/innore_bp_sm.htm)

[52] In this paper, the term "Scandinavian countries" refers to Sweden, Denmark, and Finland, the terms "Scandinavian" and "Nordic" are therefore used interchangeably.

[53] Eurostat Website Structural Indicators, Explanatory texts: (http://europa.eu.int/newcronos/reference/sdds/en/strind/innore_vc_base.htm).

Especially early stage venture capital, which includes seed finance plus the financing of the start up phase (investments in product development and initial marketing before selling starts), is important for new innovative enterprises with high growth potential. As these types of investment are highly risky, they are often supported by the government through funding, tax breaks or incubation support. The most venture capital investments (in absolute values) are made in the UK, France, Germany and Italy.[54]

The best values for early stage venture capital are reached by Sweden and Finland, followed by Denmark. Italy, which holds the last position, reached only a tenth of Denmark's value, followed closely by Greece.

Although Finland also achieve very high levels of venture capital investments in the expansion and replacement phases (Ranks 2), the best performance is by the United Kingdom with a value of more than 0.2 % of GDP. Similar to the case in early stage investments, Greece performs very weakly in expansion and replacement stage investment, and Germany places second to last.

The share of sophisticated industries

High income countries need to increase the share of technology and skill intensive industries. This reorientation of European industry is taking place, is necessary and must be continued (European Commission, 2004D). High shares of sophisticated industries may evolve as a result of firm strategies, but are also influenced by policy priorities.

The highest shares of technology driven industries[55] are held by Ireland, Sweden and Finland; the lowest by the southern European countries. Italy's share is larger than that of Spain, Portugal or Greece. France and Germany have fallen behind the top countries and are now ranked 4th and 5th.

The highest share of skill intensive industries is reported for Denmark and Sweden, followed by Germany and the UK. The lowest shares are held by Greece, Portugal and Spain.

Country profiles EU15[56]

This section presents an overview of all indicators for each member state. Specifically we compare the intensity with which a policy instrument is used in one country with the average use in the EU-15[57]. We use graphs to represent the values for each member state relative to the EU average, which is described by

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[54] European Commission (2004A). This work includes no figures for largest markets on raising venture capital; the largest markets for raising venture capital funds are the UK, Sweden and the Netherlands.

[55] For a definition of technology driven industries see Peneder (2001) and Appendix 1.2.

[56] Luxembourg is not presented due to the unavailability of data.

[57] In cases of missing data for a member state (which is often the case for Luxembourg), the average is calculated as the average of the remaining countries. For the sake of uniformity, the term "EU15 average" is used, even though it may be calculated as the average of only 14 countries.

the unit circle. Each indicator outside the unit circle shows a superior performance compared to the EU average.[58] We invert the scale for state aid (the first two indicators) and regulation, to indicate that policies using less of the instrument of state aid, and a more market- oriented system of product and labour market regulation, together with high investments in the future and a high share of sophisticated industries pursue a future-oriented industrial policy.

Finland

The majority of Finnish indicators are above the EU average. The exceptions are the rather high level of economic regulation, the low share of open tenders and the industry share of high skill industries.

Especially high are all categories of "investments in the future", like R&D, lifelong learning, broadband penetration or early stage capital venture. State aid is low. Finland has a high share of technology driven industries and relies heavily on ICT.

Sweden

Just as in Finland, the majority of Swedish indicators are above the EU average. Sweden shows only one small "negative" deviation in labour market regulation, insofar as the regulation of permanent (not temporary) contracts is high (OECD, 2004A). Sweden is leading in many indicators of future investment; specifically it has the highest level of business expenditures on R&D. Venture capital (especially early stage) is high, state aid is low.

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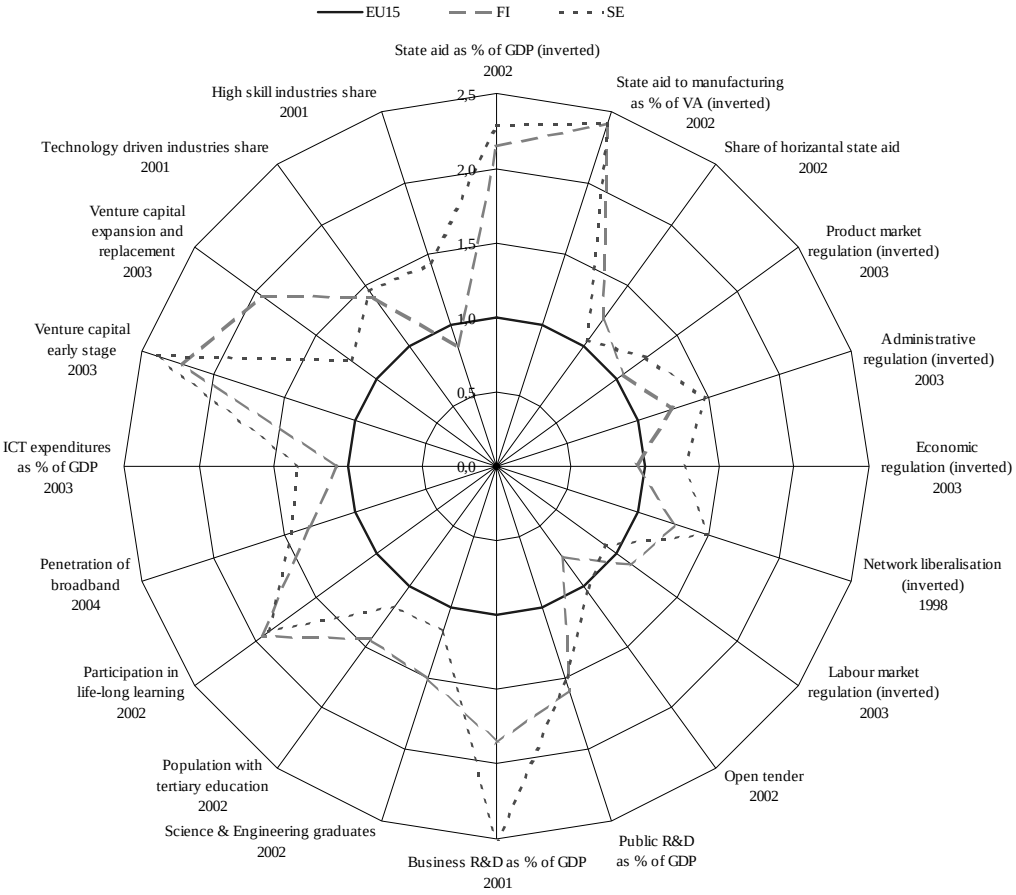
[58] When comparing the "performance" of the indicator compared to the EU average, one has to bear in mind that a result better than the EU average is not always a value above one. A value below one for the indicators "state aid as % of GDP", "state aid to manufacturing as % of value added" or for the indicators of product or labour market regulation can be interpreted as a better than average result. For all other indicators, just the reverse is true (a value above one should be interpreted as a positive performance).

In order to simplify the graph for this first group of indicators, the reverse value was taken, so that one can immediately recognise which results were better than the EU average. This should lead to an easier interpretation of the figures, as a point above the unit circle always represents a "better than EU average" result. Countries with less recent data may be "punished", since some indicators tend to increase over time; an old data set in relation to the more up to date EU average can present a disadvantageous picture.

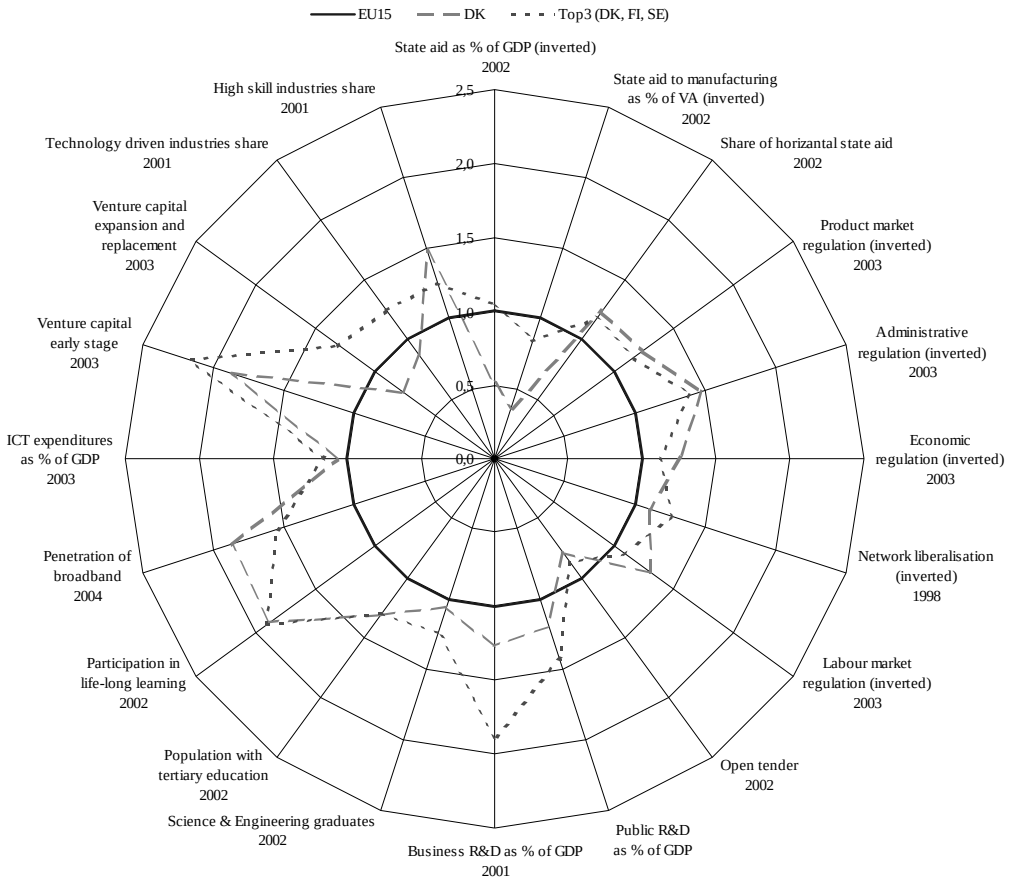
Graph 1.7: Country profile for Finland and Sweden (relative to the EU15 average)



Note: Total aid less agriculture, fisheries and transport; S&E graduates (% of 20 – 29 years age class): Finland 2001.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Graph 1.8: Country profile for Denmark and the Top3 (relative to the EU15 average)



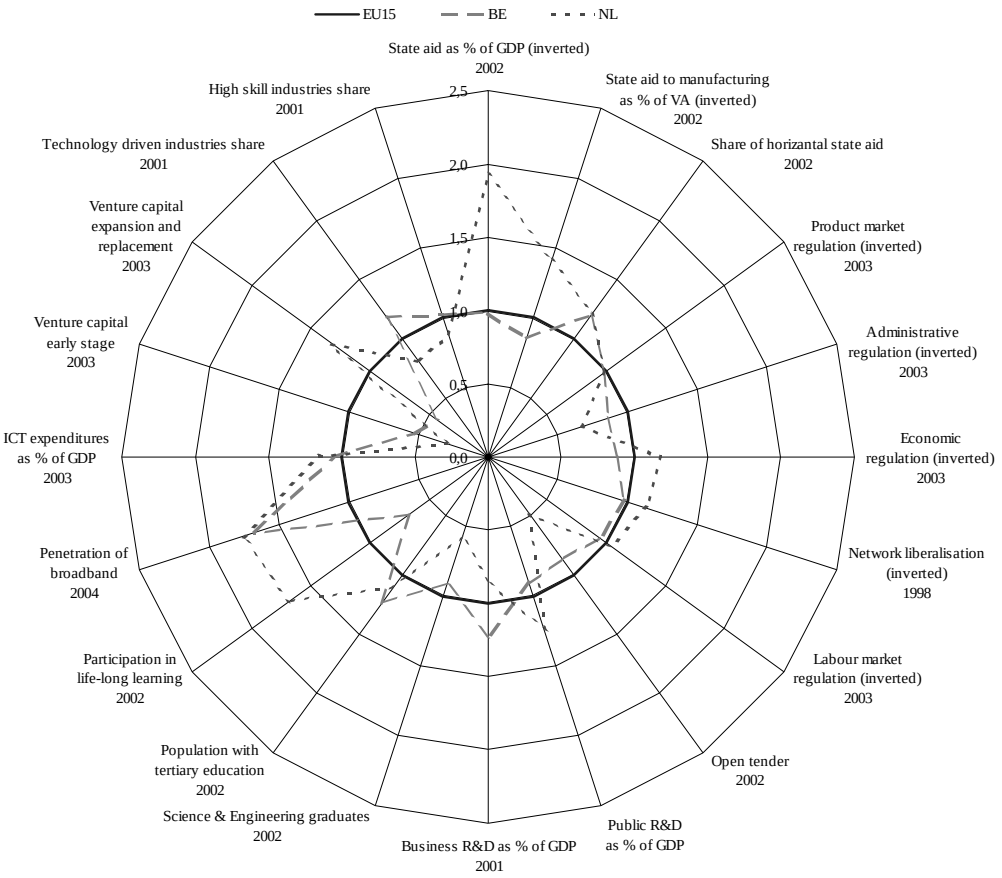
Note: Total aid less agriculture, fisheries and transport; S&E graduates (% of 20 – 29 years age class): Denmark 2001.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Denmark

Similar to the other two Nordic states (Sweden and Finland) the majority of indicators for Denmark lie above the EU average. Exceptions are low levels of venture capital in the expansion and replacement phase, and a rather low share of technology driven industries. State aid is horizontal, but high (due to aid for environmental purposes and an active labour market policy). Excellence is shown in broad band penetration and in life long learning. All in all, Denmark is an excellent user of new technologies and clusters; Denmark upgrades its firms and industries, and retrains employees.

Graph 1.9: Country profile for Belgium and the Netherlands (relative to the EU15 average)



Note: Total aid less agriculture, fisheries and transport.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

The Netherlands

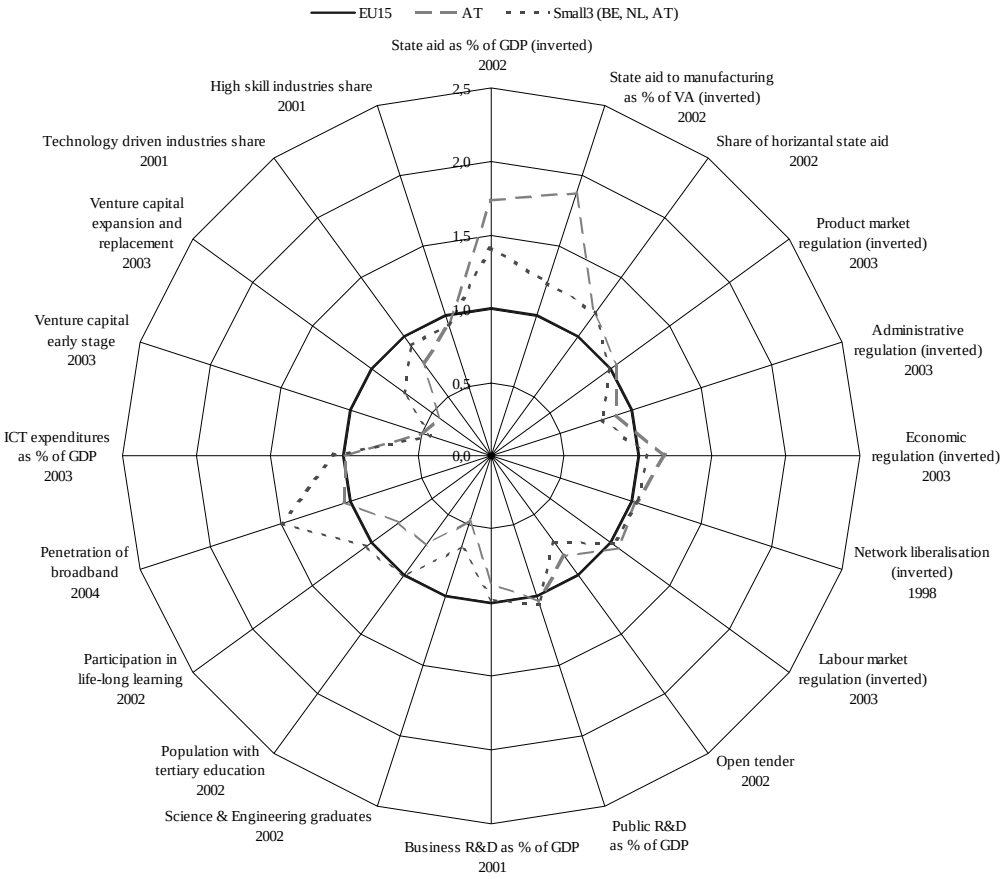
The Netherlands focuses on life long learning and broadband penetration; other investments in the future are only average. Regulation is not high on the agenda, the share of open tenders is low, administrative regulation is high, the regulation of network industries and economic regulation is below the EU average.[59] Venture capital in the start phase is low, as is the share of science and engineering graduates. The share of state aid expenditures is low relative to the EU average.

[59] Better regulation is a top3 priority of the government (business impact assessment, Brinkhorst and Harney simplification initiative).

Belgium

Belgium reports high shares of broadband penetration and population with tertiary education; the share of business expenditures on R&D lies above the EU average. Venture capital is low. Regulation is near the EU average.

Graph 1.10: Country profile for Austria and the Small3 (relative to the EU15 average)



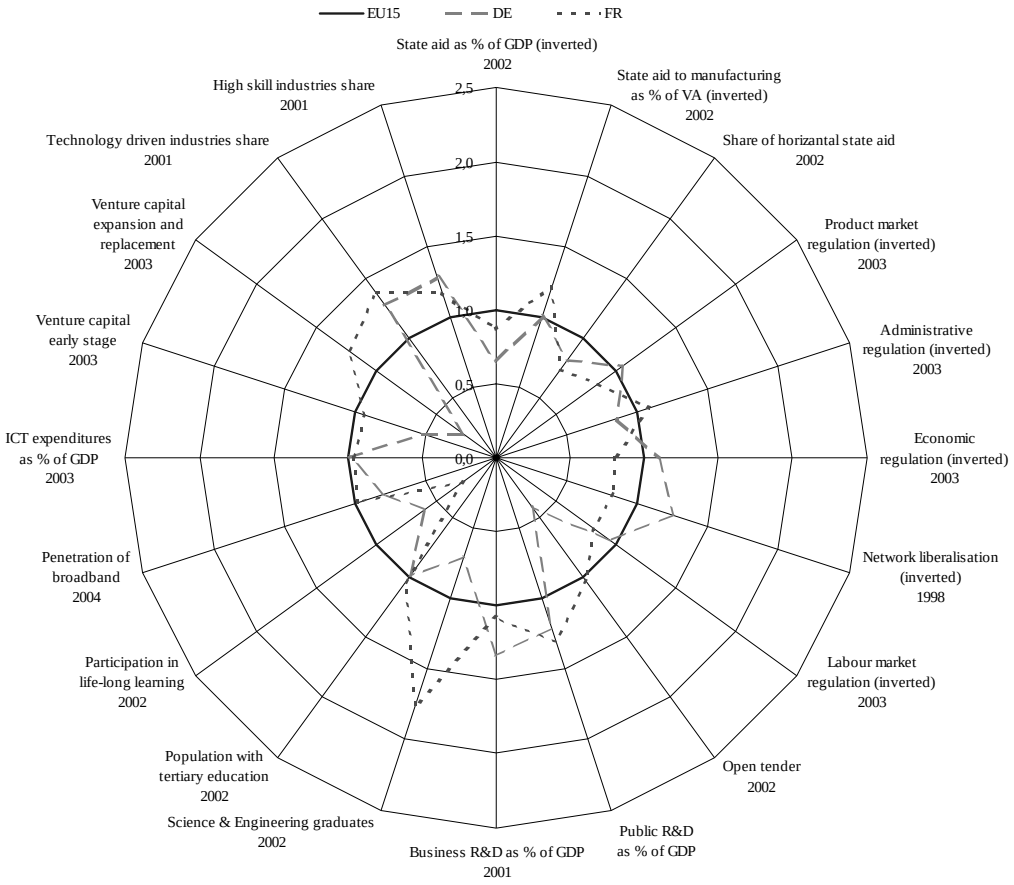
Note: Total aid less agriculture, fisheries and transport, Public and business expenditures on R&D share in GDP: Austria 1998.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Austria

For Austria, the indicators of education and venture capital are disappointing. Whereas the regulation indicators are similar to the EU average, state aid is low and it is mainly horizontal. Investments in the future would be more characteristic of a medium income country, than of a country with high productivity in manufacturing and high per capita income.

Graph 1.11: Country profile for Germany and France (relative to the EU15 average)



Note: Total aid less agriculture, fisheries and transport; S&E graduates (% of 20 – 29 years age class): France 2001.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Germany

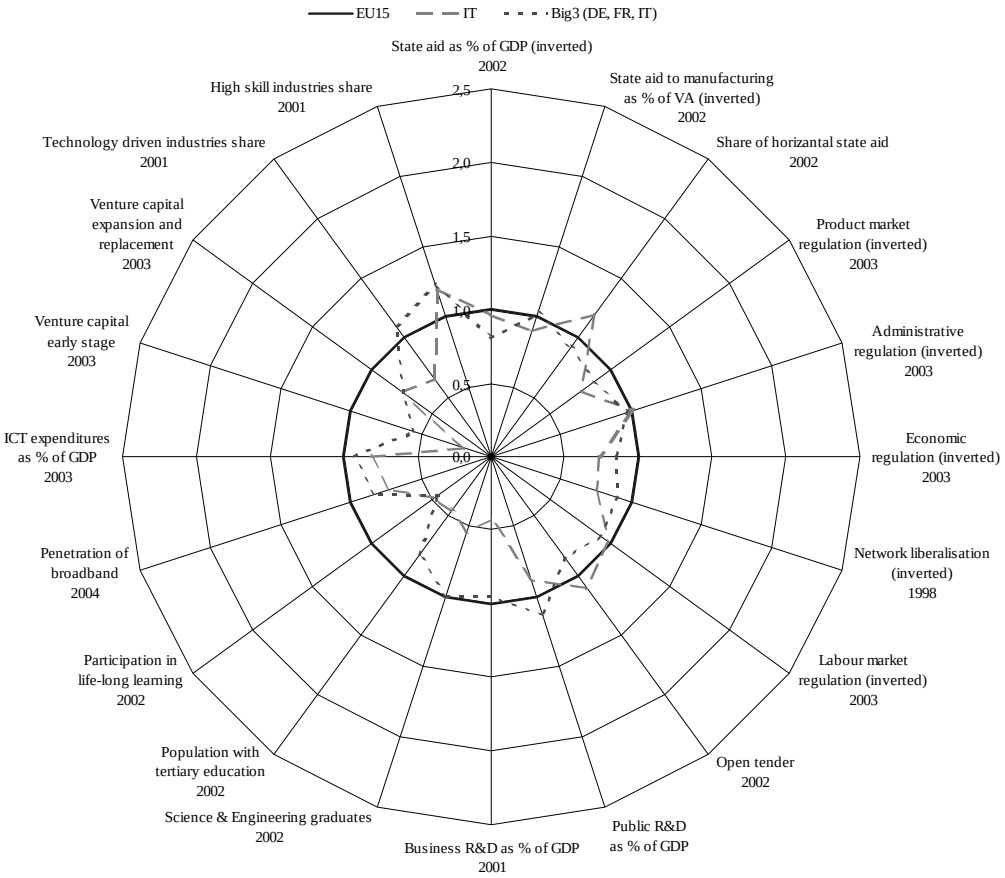
Germany shows poor results for venture capital and life long learning. It has an average position for many other indicators of investment in the future. R&D is still higher than the EU average, but the Nordic countries have surpassed Germany, which had the highest ratio in the eighties. The outcome for the regulation indicators is mixed: network industries are liberalized, labour market regulation and administrative regulation are stricter than the EU average.

France

Similar to Germany, France has a slightly above average result for the R&D indicators, but is nevertheless behind Sweden and Finland. Expansion and replacement venture capital and the share of technology driven industries is high. The results for education are somewhat ambiguous; the share of science and engineering graduates is high, while the importance of life long learning is low. Regulation is rather high,

network liberalisation is lagging, and state aid is reported to be average with a higher degree of vertical state aid.

Graph 1.12: Country profile for Italy and the Big3 (relative to the EU15 average)



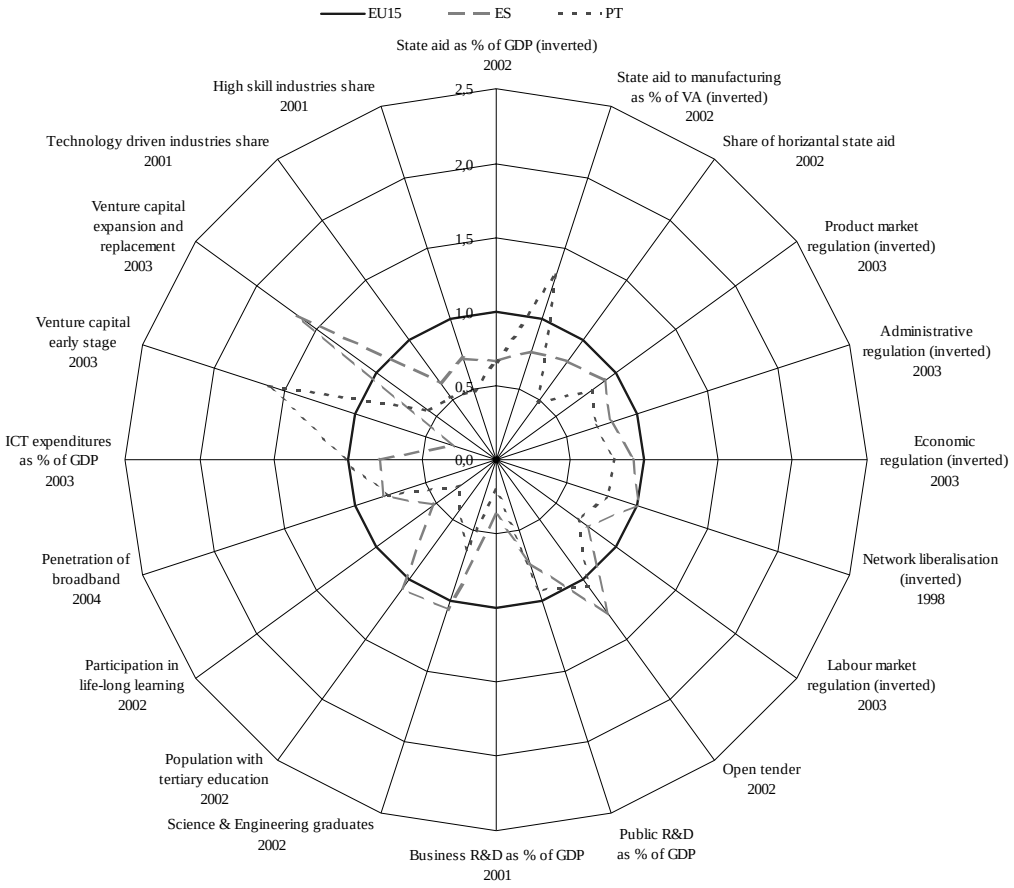
Note: Total aid less agriculture, fisheries and transport; S&E graduates (% of 20 – 29 years age class): Italy 2001.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Italy

The third largest continental European economy - Italy – reports a moderate position for state aid. Regulation is tight, specifically in the product market and network industries (with the exception of administrative regulation); indicators of education and innovation are disappointing. Skill intensive industries are above the European average, technology driven industries and ICT expenditures are low.

Graph 1.13: Country profile for Spain and Portugal (relative to the EU15 average)



Note: Total aid less agriculture, fisheries and transport.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Portugal

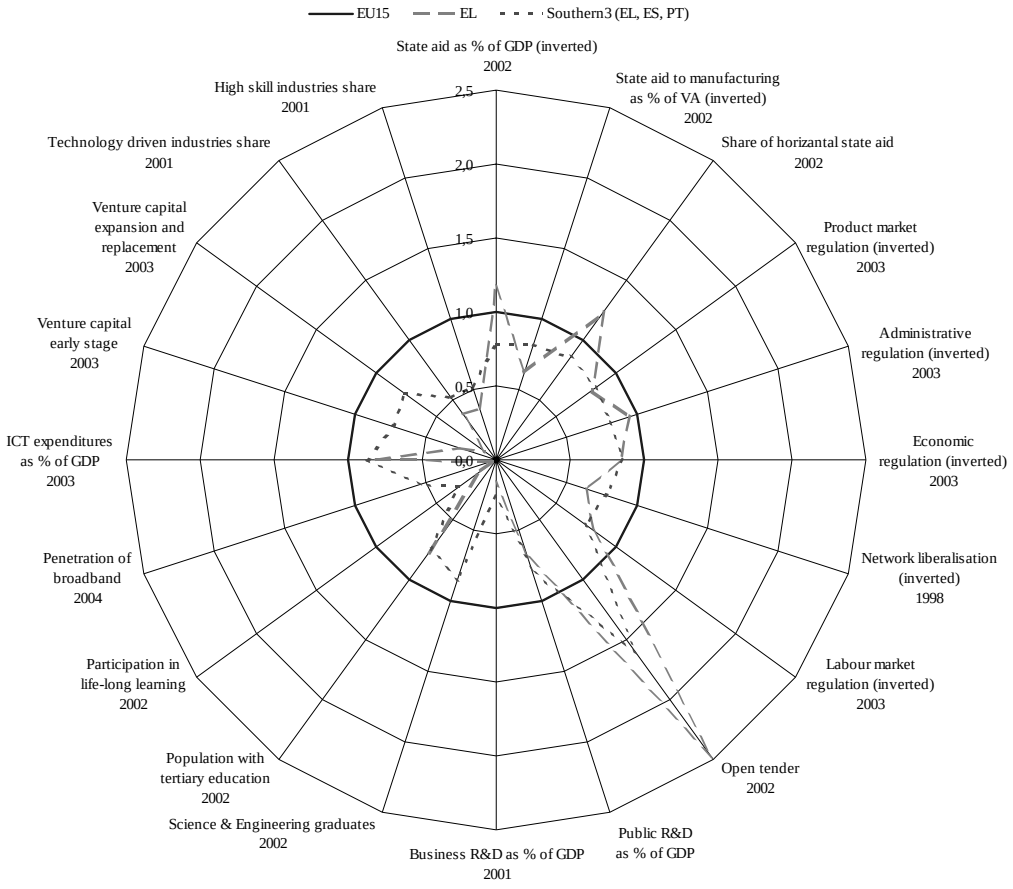
Portugal reports a high value for early stage venture capital investments (although the indicator of expansion and replacement venture capital investments is below the EU average). Nearly all other indicators lie below EU average, exceptions are the indicators for share of manufacturing state aid, ICT expenditures and open tenders.

Spain

Spain performs very well with respect to the indicator of expansion and replacement venture capital investments (although the indicator of early stage venture capital investments is below the EU average). Among the regulation indicators, only the liberalised network industries indicators are above the EU average. Noticeable are the above average share of S&E graduates, the share of population with tertiary

educations, and the percentage of open tenders. As is generally the case in southern Europe, most other indicators lie below the EU average.

Graph 1.14: Country profile for Greece and the Southern3 (relative to EU15 average)



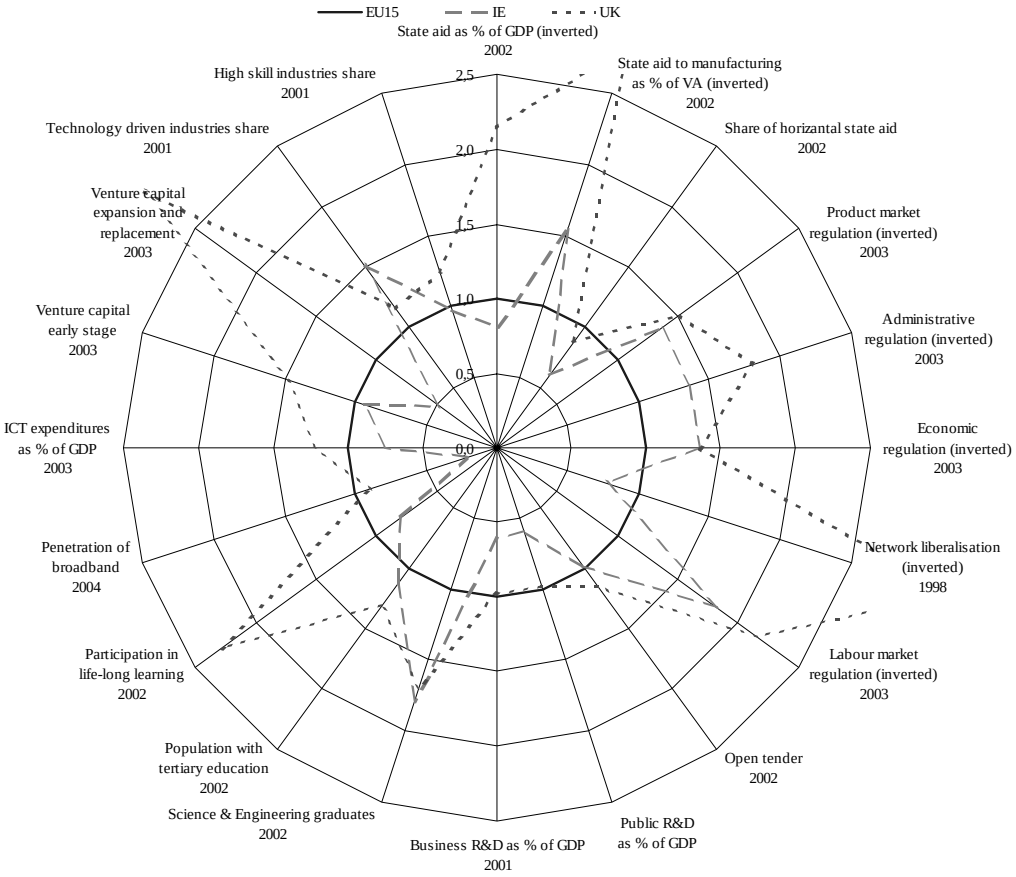
Note: Total aid less agriculture, fisheries and transport. Greece: no figures for S&E graduates are available.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Greece

Total state aid share in GDP is low and horizontal, tenders are reported to be open (tenders for structural funds must be publicly announced). Indicators of innovation and education are low. The deregulation of product and labour markets is not high on the agenda.

Graph 1.15: Country profile for Ireland and the United Kingdom (relative to the EU15 average)



Note: Total aid less agriculture, fisheries and transport.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

United Kingdom

Similar to the Nordic countries, the majority of indicators lie above the EU average; however, the focus is somewhat different. First of all, the United Kingdom has the lowest level of regulation (according to all six regulation indicators), reflecting the market oriented approach for which the United Kingdom is well known. On the other hand, the R&D indicators lie just around the EU average. Venture capital is high, specifically for the expansion and replacement phase.

Ireland

For Ireland the picture is rather mixed. Regulation is low, with the exception of the regulation of network industries. Innovation is low compared with the EU average, as is broadband penetration and investments into ICT. The share of science and engineering graduates is high, as is the share of population with tertiary educations and the share of technology driven industries.

Grouping of countries

The results from the country profiles suggest building groups or clusters of countries according to the set of policy instruments used:

A group of small northern countries, comprising Sweden, Finland and Denmark, which operates a future-oriented industrial policy, very much in line with the Lisbon strategy. These countries spend little money on state aid, they have less regulated product and labour markets, they invest heavily in research, education and life long learning, make use of information technology and consequently have a high share of technology driven and skill intensive industries.
Within this group, Denmark is somewhat unique, relying more on state aid (primarily for environmental purposes, partly for training), technology diffusion and clusters, than on research and ICT production. In all countries, labour market de-regulation (specifically for part time work) is made acceptable by support for training and finding new jobs (flexicurity[60], retraining programmes, etc.)

A group of big continental countries, comprising Germany and France and possibly Italy. This group spends more on total state aid than the European average (each country, not only Germany in the wake of unification), the share of horizontal aid is partly relatively low, and regulation is high (with the exceptions of network industry in general, economic regulation in Germany and administrative regulation in France). As far as investment in the future is concerned, France and Germany have moderate positions, while Italy performs rather poorly (this could be a reason for grouping only Germany and France together). Life long learning, broadband penetration and ICT expenditures are below the EU average in both France and Germany and even lower in Italy.

A group of small continental countries comprising Belgium, the Netherlands and Austria. This group has low expenditures on state aid, somewhat more administrative and less economic regulation, reflected by generally moderate rankings (with the exception of higher levels of state aid in Belgium). These countries have a smaller share of sophisticated industries, are extremely short in venture capital and have a low share of science and engineering graduates. They have a moderate position in research and a slightly better position in information technology, probably leaning towards incremental innovation and

[60] Flexicurity is the technical term for a regime combining flexibility for firms (easy dismissals) with security for employees (new job offers or training).

technology diffusion. In general, industrial policy seems more flexible and future oriented than in larger countries, although there have been some attempts to soften the impact of pressure for change through the use of regulations. The moderate position in innovation indicators – particularly in contrast to the high per capita GDP in these countries - may be due to the fact that when the European market was still segmented, large firms did not locate headquarters and research units of sophisticated industries in small countries.[61]

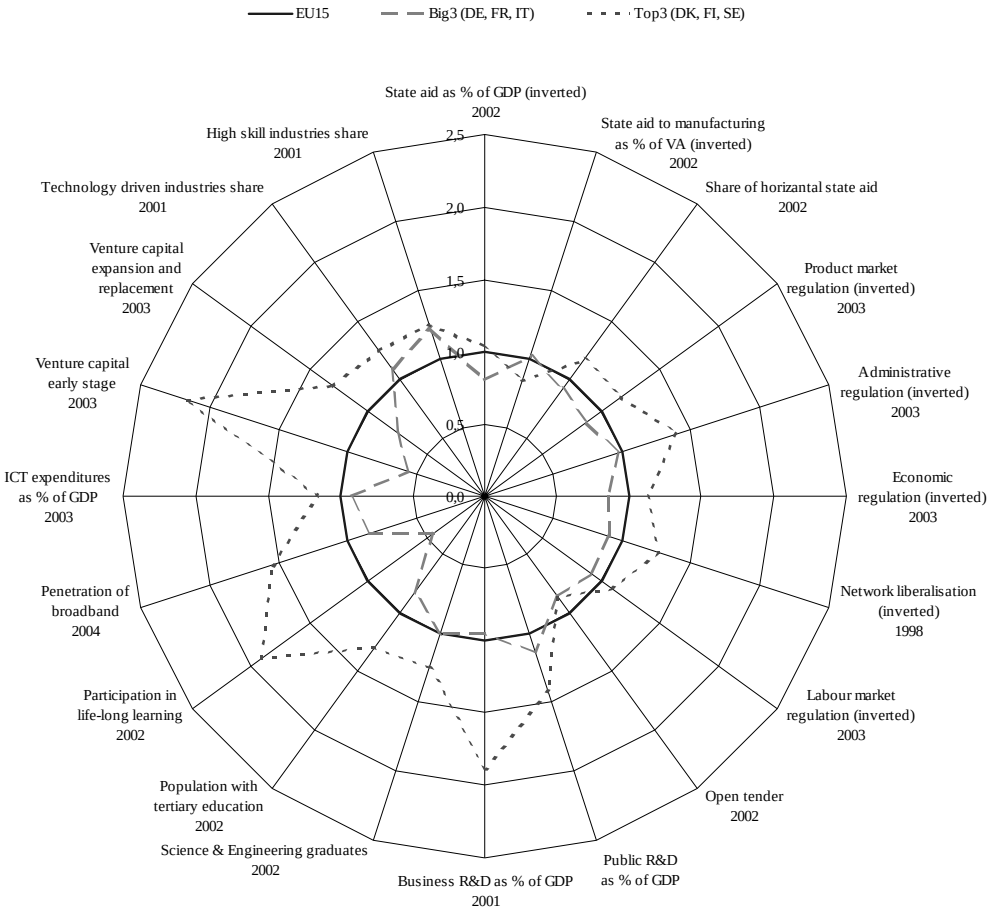
A group of southern peripheral countries comprising Spain, Portugal and Greece. This group of countries has strict regulations and low investments in the future. The share of sophisticated industries is low. According to some indicators, state aid is not exceptionally high, open tendering seems to be enforced by EU programmes.

The United Kingdom and Ireland can not be easily assigned to any one of these groups. The UK resembles the northern countries to a certain extent, but regulation is lower, as are investments in research and development. Both characteristics are also typical of Ireland, with the exception of network liberalisation and less research, reflective of the fact that a large part of the growth strategy was based on foreign direct investment.

Name of the group:	Big 3 continental countries	(DE, FR, IT)
	Top 3 countries	(DK, FI, SE)
	Southern 3 countries	(EL, ES, PT)
	Small 3 countries	(BE, NL, AT)

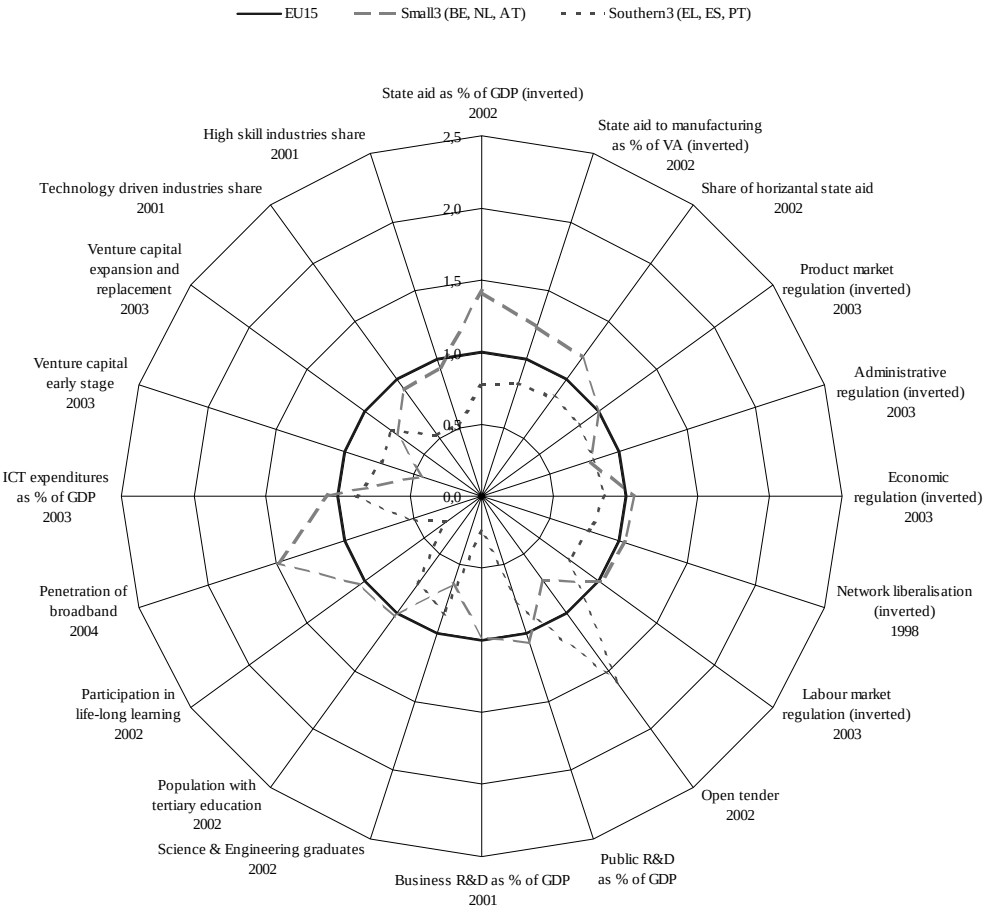
[61] With the exception of the Netherlands which succeeded in attracting many headquarters due to its geographical position and favourable tax regimes.

Graph 1.16: Country profile Big3 and Top3 (relative to the EU15 average)



Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Graph 1.17: Country profile Small3 and Southern3 (relative to the EU15 average)



Note: Total aid less agriculture, fisheries and transport, R&D expenditures as % of GDP: Greece, Ireland, Italy, the Netherlands, and Sweden 2001, Public and business expenditures on R&D share in GDP: Turkey, Switzerland 2000; Austria 1998, S&E graduates (% of 20 – 29 years age class): Denmark, France, Italy, Finland 2001.

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

As a final exercise, we present the ranks for four sets of indicators: state aid, regulation, "investments in the future" and industry structure.

Countries are ranked according to their performances. The value 1 stands for the best performance (low state aid and regulation and high shares of investment in the future as well as large shares of sophisticated industries). The rank 14 indicates the lowest performance. A simple unweighted average is reported for each set, as a crude way of sharpening the picture, together with a column (superrank) ranking the countries according to their average ranks.[62]

[62] On account of many missing values, no figures for Luxembourg are presented.

Table 1.8: Country Rank for State Aid

	State aid as % of GDP (inverted) 2002	State aid to manufacturing as % of VA (inverted) 2002	Share of horizantal state aid 2002	Average Rank	Superrank
BE	7	11	5	7,7	7
DK	**14**	**14**	*1*	9,7	10
DE	13	9	11	11,0	**13**
EL	6	13	2	7,0	6
ES	11	12	10	11,0	**13**
FR	9	8	12	9,7	10
IE	10	5	13	9,3	9
IT	8	10	6	8,0	8
NL	4	6	4	4,7	4
AT	5	4	7	5,3	5
PT	11	7	**14**	10,7	12
FI	2	2	3	2,3	*1*
SE	*1*	2	8	3,7	2
UK	2	*1*	9	4,0	3

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Table 1.9: Country Rank for Regulation

	Product market regulation (inverted) 2003	Administrative Regulation (inverted) 2003	Economic regulation (inverted) 2003	Network liberalisation (inverted) 1998	Labour market regulation (inverted) 2003	Open tender 2002	Average Rank	Superrank
BE	8	10	10	9	8	9	9,0	10
DK	3	2	3	6	3	11	4,7	3
DE	5	10	7	3	8	**14**	7,8	7
EL	12	8	11	**14**	11	1	9,5	11
ES	10	12	8	8	13	2	8,8	9
FR	11	6	12	10	11	7	9,5	11
IE	2	4	1	12	2	8	4,8	4
IT	**14**	7	**14**	13	7	4	9,8	13
NL	8	**14**	5	5	6	13	8,5	8
AT	5	9	5	7	5	10	6,8	6
PT	12	13	12	11	**14**	5	11,2	**14**
FI	5	5	8	4	4	12	6,3	5
SE	3	2	3	2	10	6	4,3	2
UK	*1*	*1*	*1*	*1*	*1*	3	1,3	*1*

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Table 1.10: Country Rank for R&D / Education / Broadband + ICT expenditures / Venture Capital

	Public R&D as % of GDP 2001	Business R&D as % of GDP 2001	Science & Engineering graduates 2002	Population with tertiary education 2002	Participation in life-long learning 2002	Penetration of Broadband 2004	ICT expenditures as % of GDP 2003	Venture capital early stage 2003	Venture capital expansion and replacement 2003	Average Rank	Superrank
BE	10	5	8	4	8	3	5	8	11	6,9	7
DK	6	4	6	2	3	*1*	5	3	7	4,1	3
DE	5	3	9	10	9	9	8	8	13	8,2	8
EL	13	**14**		11	**14**	**14**	11	13	**14**	13,0	**14**
ES	12	12	6	8	10	9	13	11	3	9,3	11
FR	3	6	2	9	13	7	10	6	5	6,8	6
IE	**14**	10	1	6	6	13	**14**	6	10	8,9	9
IT	11	11	12	13	11	12	11	**14**	8	11,4	13
NL	4	9	11	7	5	2	3	11	4	6,2	5
AT	7	8	**13**	12	7	6	8	10	11	9,1	10
PT	9	13	10	**14**	12	11	7	4	9	9,9	12
FI	*1*	2	4	1	2	5	4	2	2	2,6	*1*
SE	2	*1*	5	5	3	4	*1*	*1*	6	3,1	2
UK	8	7	3	3	*1*	8	2	5	*1*	4,2	4

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Table 1.11: Country Rank for "Industry Structure"

	Technology driven industry share 2001	High skill industry share 2001	Average Rank	Superrank
BE	6	7	6,5	7
DK	8	*1*	4,5	3
DE	5	3	4,0	2
EL	**14**	**14**	14,0	**14**
ES	12	12	12,0	12
FR	4	6	5,0	5
IE	*1*	8	4,5	3
IT	11	5	8,0	9
NL	9	10	9,5	10
AT	10	9	9,5	10
PT	13	13	13,0	13
FI	3	11	7,0	8
SE	2	2	2,0	*1*
UK	7	4	5,5	6

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Table 1.12: Country ranking for four policy sets

	Superrank State Aid	Superrank Regulation	Superrank R&D / Education / Broadband + ICT / Venture Capital	Superrank "Industry Structure"
BE	7	10	7	7
DK	10	3	3	3
DE	13	7	8	2
EL	6	11	14	14
ES	13	9	11	12
FR	10	11	6	5
IE	9	4	9	3
IT	8	13	13	9
NL	4	8	5	10
AT	5	6	10	10
PT	12	14	12	13
FI	1	5	1	8
SE	2	2	2	1
UK	3	1	4	6
Big3 (DE, FR, IT)	3	3	2	2
Top3 (DK, FI, SE)	2	1	1	1
Southern3 (EL, ES, PT)	4	4	4	4
Small3 (BE, NL, AT)	1	2	2	3

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Country profiles of new member states

The following section presents, as far as data are available, the most current sets of industrial policy indicators for the new member states and compares the results with the EU15 average.

The countries are presented in the following four groups.

Czech Republic, Hungary and Poland

Estonia, Latvia and Lithuania (the three Baltic States)

Slovenia and Slovakia

Cyprus and Malta[63]

One reason behind the grouping is pragmatic: data were not available for every indicator, therefore countries were grouped according to the availability of data. In a second stage, the countries were grouped according to similarities (this primarily concerns the Baltic States and Slovenia and Slovakia).

At first glance, it is noticeable that for all new member states (as far as data were available), the share of ICT expenditures lies above the unweighted EU15 average.

The Czech Republic, Hungary and Poland

In the Czech Republic, Hungary and Poland, the levels of state aid are relatively high, whereas the share of horizontal state aid is relatively low[64]. As data on regulation are only available for these three new member states, a comparison with the remaining new member states is not possible. However, it may be worth mentioning that the labour market regulation indicator lies below the unweighted EU15 average for all three countries and that the administrative regulation indicator for Hungary is below the average EU values. Additionally, Hungary is the only new member state with an average value for the share of technology driven industries above the unweighted EU15 average.

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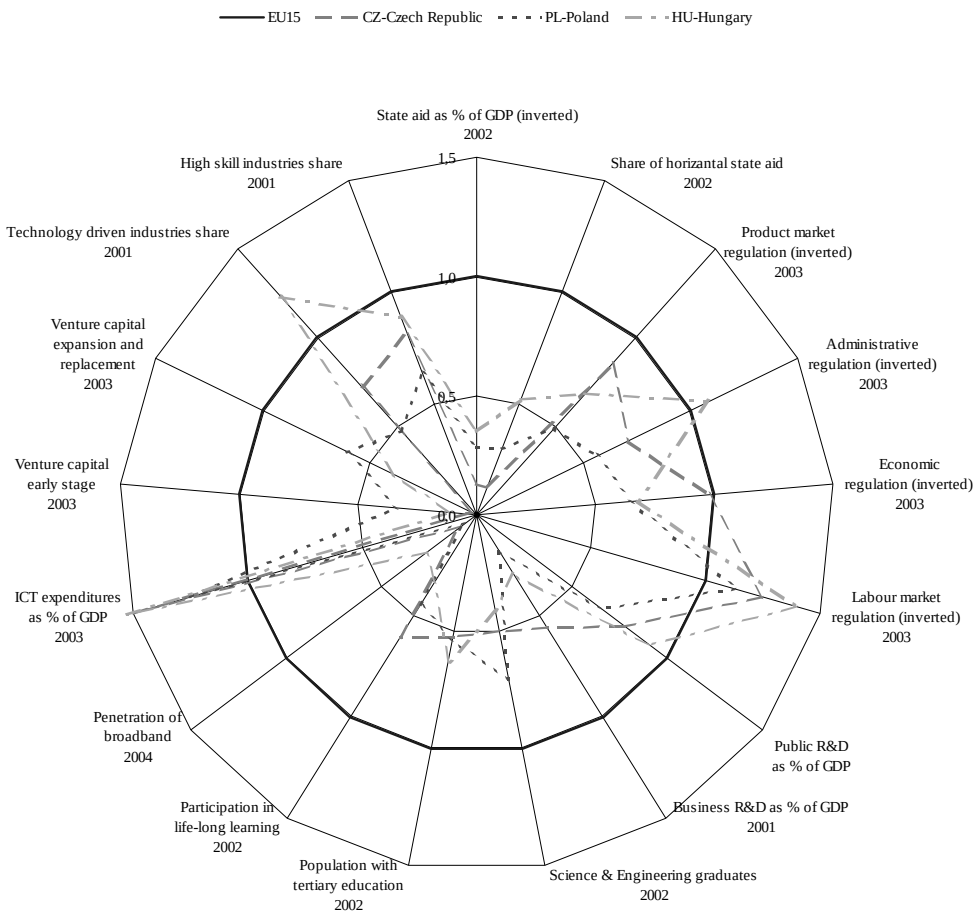
[63] Very few data are available for Cyprus and Malta.

[64] However, the autumn update of the State Aid Scoreboard 2004 indicates that these high shares do not necessarily reflect a more lax attitude toward the control of state aid, but are due to country-specific situations (e.g., the general bank crisis in the Czech Republic; see European Commission (2004E).

Graph 1.18: Country profile for the Czech Republic, Poland and Hungary (relative to the EU15 average)



Note: Total aid less agriculture, fisheries and transport; Total state aid and state aid to horizontal objectives for the new member states: average 2000-2003.

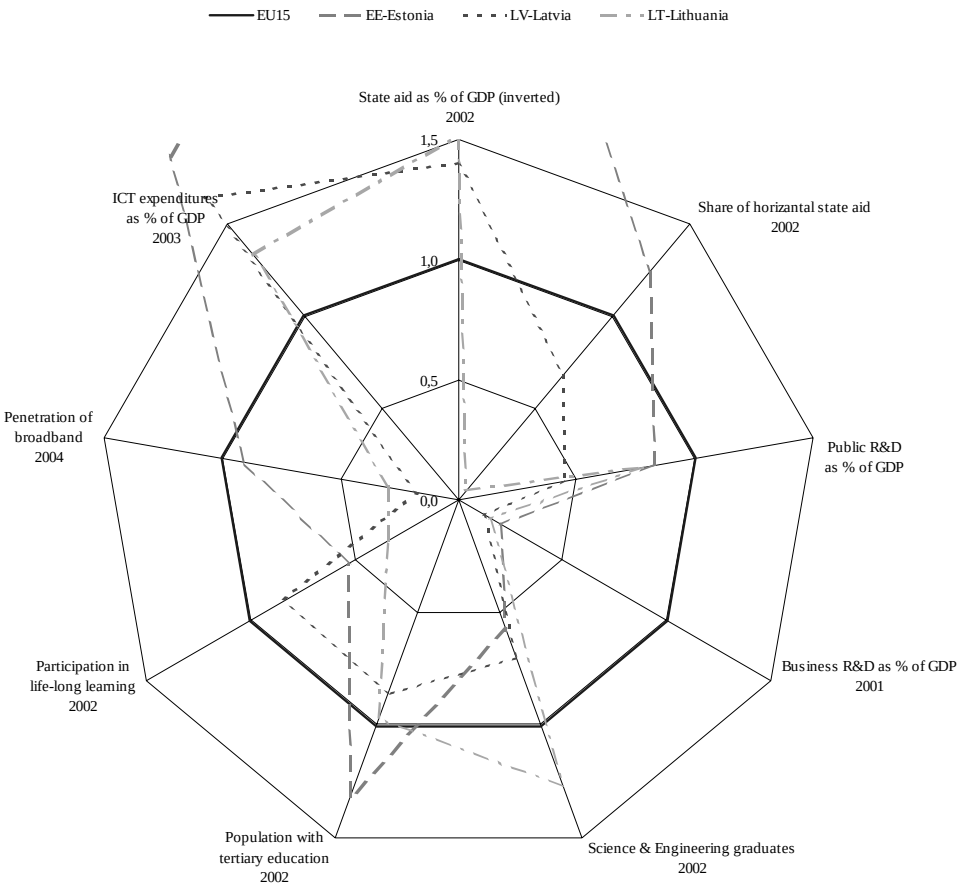
Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Estonia, Latvia and Lithuania (the three Baltic States)

Two Baltic States exceed the EU15 performance within the group of education indicators. Estonia reports a value above the EU average for tertiary education (similar to Malta, which is the only exception under the remaining new member states) and Lithuania reports a value above the EU average for science & engineering graduates.

The second striking point is the very low level of state aid as a percent of GDP. However, the indicator of state aid to horizontal objectives, for which Estonia is above and Latvia and Lithuania are below the EU average, does not reveal such a uniform picture.

Graph 1.19: Country profile for Estonia, Latvia and Lithuania (relative to the EU15 average)



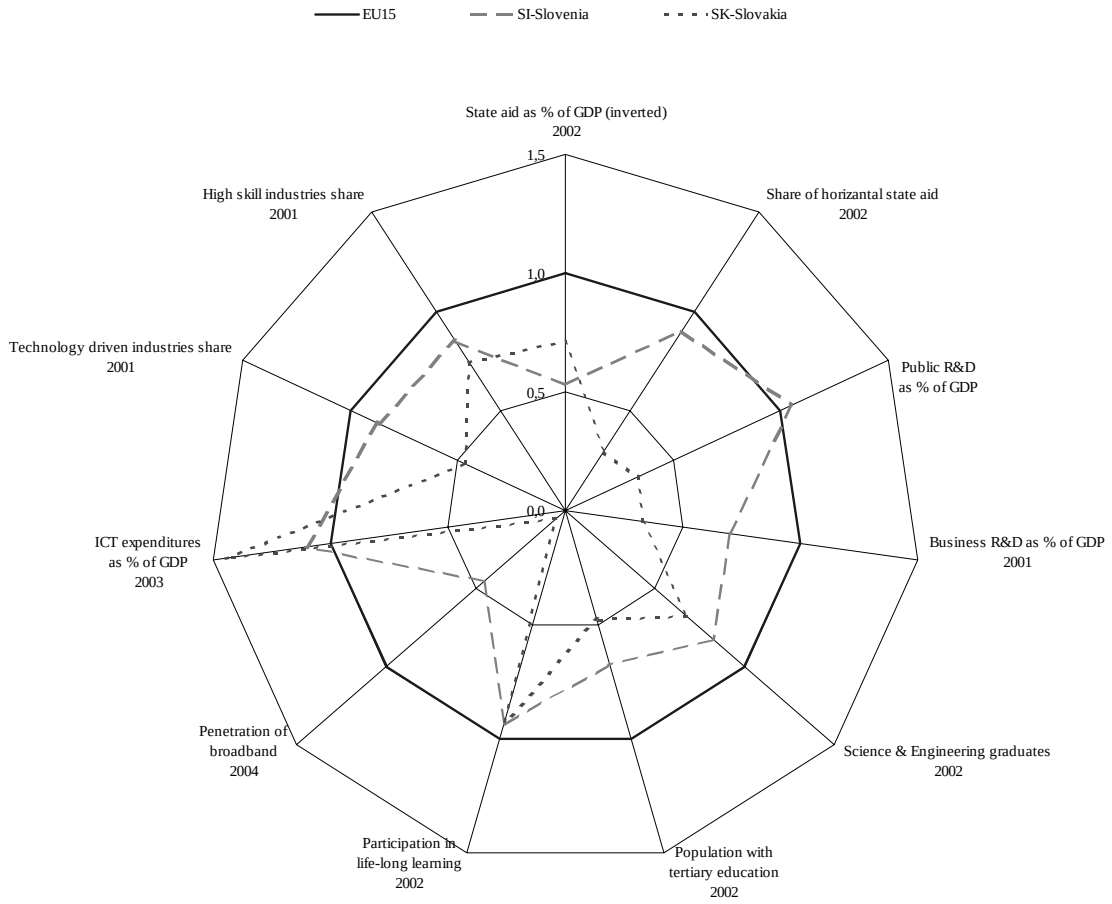
Note: Total aid less agriculture, fisheries and transport; total state aid and state aid to horizontal objectives for the new member states: average 2000-2003

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators.

Slovenia and Slovakia

Relative to the other new member states, Slovenia generally performed quite well. Slovenia is the only country among the new member states that surpassed the unweighted EU15 average for the indicator "share of public R&D expenditures". In addition, the indicator of participation in life-long learning is near the EU15 average for both countries.

Graph 1.20: Country profile for Slovenia and Slovakia (relative to the EU15 average)



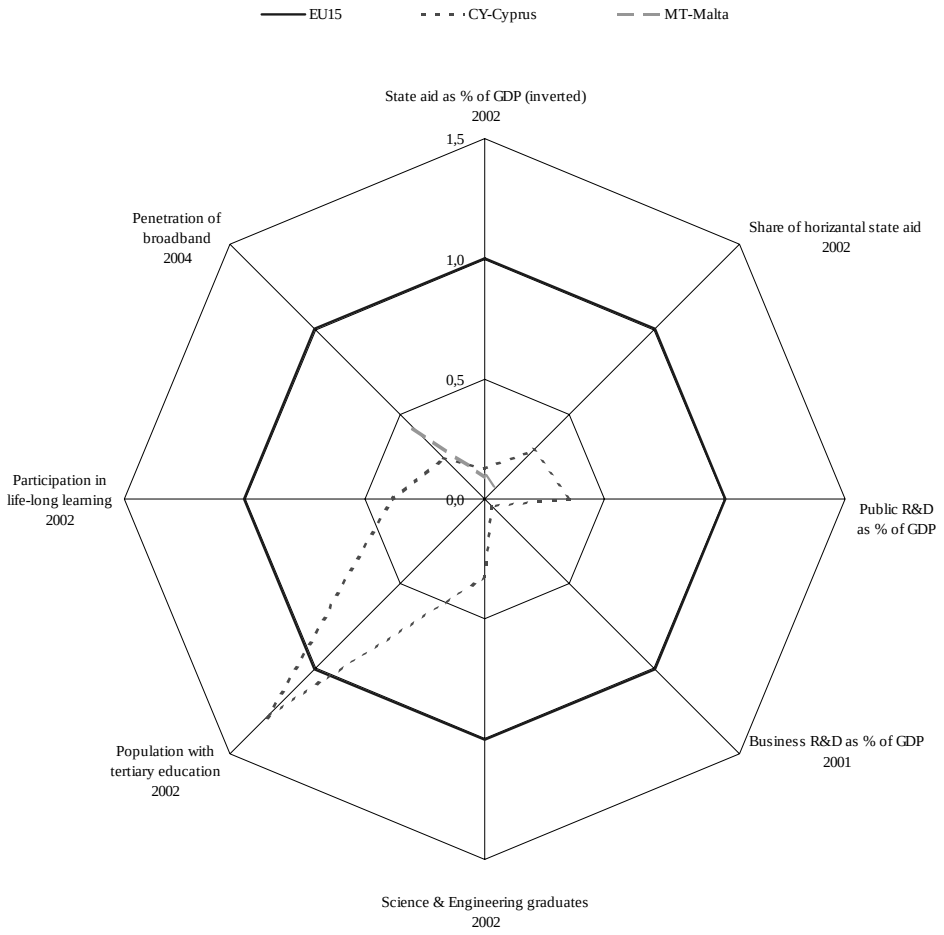
Note: Total aid less agriculture, fisheries and transport; Total state aid and state aid to horizontal objectives for the new member states: average 2000-2003

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos.

Cyprus and Malta

Cyprus and Malta report very high levels of state aid combined with very low shares of aid to horizontal objectives[65]. Cyprus reports an above average share of the population with tertiary educations.

Graph 1.21: Country profile for Cyprus and Malta (relative to the EU15 average)

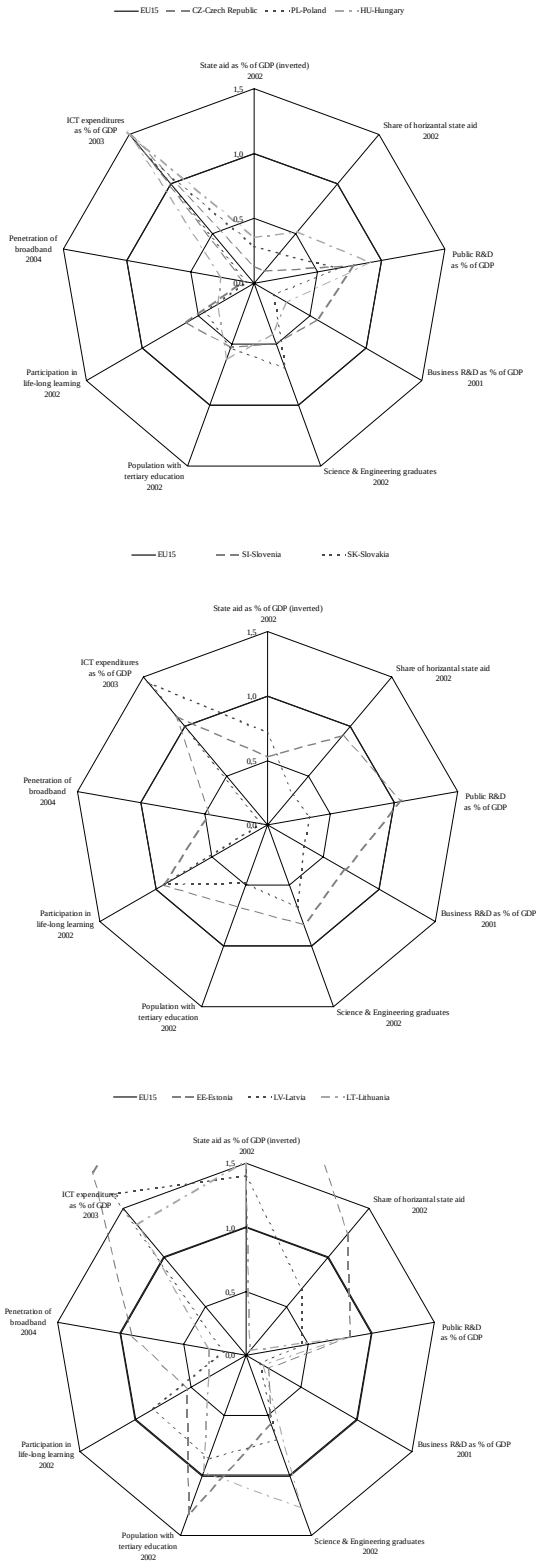


Note: Total aid less agriculture, fisheries and transport; Total state aid and state aid to horizontal objectives for the new member states: average 2000-2003, Malta average 2000-2002, S&E graduates (% of 20 – 29 years age class): Cyprus 2001

Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos.

[65] However, as already mentioned, the autumn update of the State Aid Scoreboard 2004 indicates that these high shares do not necessarily reflect a more lax attitude towards state aid control, but are due to country-specific situations (e.g.: tax relief under the International Business Enterprise Act in Cyprus or restructuring aid to the shipbuilding and repair sector in Malta). Most of the measures are either being phased out under transitional arrangements or are limited in time. See European Commission (2004E).

Graph 1.22: Comparison of the three new member states by group



Sources: WIFO calculations using European Commission State Aid Scoreboard, European Commission Innovation Scoreboard, Eurostat Structural Indicators and New Cronos, OECD Regulatory Database.

Summarising the results, we see high ICT expenditures for all new member states, a low level of state aid in percent of GDP for the Baltic States, and relatively high levels for the Czech Republic, Poland and Hungary. Public R&D levels are high in Slovenia, followed by the group comprising the Czech Republic, Poland and Hungary. On the other hand, a tendency towards performing relatively well with respect to some of the education indicators is evident in the Baltic States.

1.5 Specific strategies in countries and industries

1.5.1 Introduction

This section provides case studies on industrial policy in Japan, the USA, France, Finland and in new EU member countries, and also analyses the Airbus case as well as the textile industry. The case studies should complement the overview given on industrial policies by statistical data in the last section. Japan and the US were chosen as non member countries, both representing industrial policy approaches different from the European approach; Finland was selected because the transformation in industry structure which has taken place there over the past decade has been dramatic, and progress towards a knowledge based society compatible with the Lisbon strategy has been impressive. Industrial policy in the new member countries have to be seen in relation to the need of restructuring and to catch up and thus having policy priorities different to countries at the technology frontier. Airbus is an example of a European project, at least successful insofar as Europe's market shares in the airline industry have increased dramatically. The textile industry provides an example of decade-long restructuring story, now entering a new phase after the Multi Fibre Agreement has expired.

1.5.2 French industrial policy[66]

1.5.2.1 Objective

Two features have been characteristic for French industrial policy for a long time: its sectoral approach and large projects with a technology focus ("grand projects") backed by government. The sectoral approach has its foundation in the French system of "planification", a system of indicative, non-compulsory planning specifically prominent in the first decades after 1945. Active promotion of grand programmes has been the response to French deficiencies felt vis-à-vis the UK or later the US, intended to promote French specialisation in progressive, high tech industries. This report gives a brief historical review of industrial policy and its background in France. It then presents a short overview of the objectives and impact of MINITEL, one of the grand programmes considered less successful (in contrast to Airbus which is described in the next chapter). We then summarise two recent evaluations of French

[66] Prepared by Alain Alcouffe.

industrial policy, namely the Levet Report and the Datar report, and discuss two new initiatives, one to support regional centres of excellence and one to promote projects involving promising technologies with substantial demand potential. The later initiative, summarised in the BEFFA Report, may be considered an echo of past grand programmes, following a decade of reduced scope for industrial policy in France. It gained strong support in France, due to the perception that horizontal industrial policy and the internal market policy had not been sufficient to change industrial specialisation towards high-tech industries and new technologies. The proposed new policy has a national focus, but may also be a stimulus for top-down policies at the European level.

1.5.2.2 Historical overview

The notion that government can enhance productive capacity is deeply routed in French history and can be traced back to Jean-Baptiste Colbert, Louis XIV's minister of finance. The ambition of "Colbertism" was to eliminate mass poverty as well as strengthen national industrial champions necessary for national grandeur. It was revived by the Saint Simonies ideology adopted by Napoleon III, which, however, advocated free trade and is usually credited with having sustained the major industrial advance of the century. The Great Depression of the 1890s re-introduced the call for protection and tariffs.

By the beginning of the 20th century, all industries of the Second Industrial Revolution were in place: steel, electricity, petrol, railways, telegraph, chemistry, automobiles, aeronautics. But the French industry – dispersed and decentralised – did not experience a boom comparable to that of other big industrialised countries. The United States, Germany and the United Kingdom surpassed France in terms of economic growth (Dormois, 2005). The Popular Front was the first manifestation of the public service elite's new commitment to planification and strategic government intervention. But Leon Blum's New Deal amounted to the multiplication of trade and industry subsidies by a factor of nine. An Act passed in the summer of 1936 providing temporary financial assistance to businesses in difficulty to fend off closures. Nevertheless it is difficult to find a coherent vision of economic development: up to the eve of the Second World War, French governments largely adhered to a liberal doctrine and interventionist policies generally provoked hostile reactions from intellectuals as well as businessmen (Alcouffe, 1999).

In 1945, a new strategy came with Jean Monnet returning from the US where he had been involved in Roosevelt's economic policy. Monnet stressed the need for "indicative planning" to promote pioneering technologies and to create a national drive to achieve reconstruction, modernisation, and an improvement in living standards. He persuaded Charles de Gaulle to take full responsibility for this Commissariat au Plan. The three first French plans were a success, and the basis of the French economy was re-established.

A fund for national modernisation and equipment was created and financed by the equivalent in francs of the Marshall Plan funds.[67]

The French planning commission offered: a) an interface between policy-makers and the private economic and financial players, b) data collection needed to evaluate policies, and c) an independent research centre concerned with growth and player co-ordination. This think tank benefited from an improvement of econometric tools, co-ordinated growth forecasts and created a climate of confidence, reducing uncertainty about investment (Pierre Massé). After lagging behind the other industrialised countries since the first industrial revolution, France was second just to Japan during the 1960s and early 1970s.[68]

1.5.2.3 The large-scale programmes: an overview

The "grand programmes" made up the second difference to other countries and they still mark the French economy. A sizeable amount of public funds has been invested in order to create new projects, yielding important technological advances: Concorde, the TGV (high-speed trains), civil nuclear energy or Minitel. The following table presents the large-scale programmes that have been launched.

[67] Like many other countries, the UK used the money for internationalisation, and underestimated the importance of investment to increase productivity and technological excellence (as was, e.g., stressed by Jean Fourastié).

[68] The rate of growth of the French economy between 1952 and 1973 was only slightly lower than the German and Italian one. GNP grew at a yearly rate of 5.2 % as opposed to 5.6 % and 5.7 % in Italy and France respectively http://www.art.man.ac.uk/HISTORY/undergraduate/hi2450/hi2450_ln19a.htm - j.harrison@manchester.ac.uk

Table 1.13 : The large-scale programmes (1962–1989)

Programme	Launch date	Technological break-through	Principal industrial group	Amount invested
Concorde	1962	Electric flight controls	Aérospatiale	€ 3.8 billion between 1970 and 1990
Computing	1966	Digitalisation	UNIDATA, Bull	€ 8 billion € in support for Bull [1]
Telecommunications	1968	Network digitalisation		Not known
Civil nuclear energy	1968	Nuclear subsector	CEA, EDF	Not known
Airbus	1969	Motorisation, steering, maintenance, costs	Aéropsatiale, Airbus	€ 3 billion of repayable advances for Aérospatiale from 1971 to 1997 (all programmes)
Space research	1973	Ariane	Aérospatiale, Air liquide	Not known
Reactors	1973	Airbus motorisation	CFMSG	Not known
Train à Grande Vitesse (high-speed train)	1974	Doubling of commercial speed	Alsthom, SNCF	€ 2.1 billion of public investment for the launch of the first TGV line
Minitel	1978	Telematics	France Telecom	€ 1.2 billion in investments for PTTs
Components	1989	Miniaturisation	Thomson, then STMicroelectronics	Not known

Sources: DPAE; Court of Accounts (Cour des Comptes) (adapted from Cohen 1992 and Beffa, 2005).

The Airbus,[69] civil nuclear energy and components programmes were successes, the computing programme is considered a failure financed by the public authorities for too long. The success of previous large-scale programmes contributed largely to defining French industrial assets in high technology, and France continues to support these large-scale programmes of the past. The following table presents some current large-scale programmes.[70]

Table 1.14: Current large-scale technological programmes

Programme	Activities	Means of public support	French public budget
Nuclear energy	3rd generation reactor: EPR participation in the international ITER programme for nuclear fusion	Public research (CEA) and aid for AREVA	~ € 550 million of public research spending (2003), € 30 million of public funding for private R&D (essentially AREVA)
Space research	Terrestrial observation (Envisat, Calipso, Champ, GMES, etc.), space observation: Cluster, Mars express, telecommunications: Galileo Space flight: Ariane V and ISS	Public research (CNES, ESA) partially outsourced	Budget € 1.7 billion , of which € 0.6 billion for the ESA (2003), € 150 million of public funding of private R&D
Aeronautics	Development of new commercial aeroplanes (A 380, A 350, A 300-0G)	Repayable advances to Airbus	Repayable advance of € 1.2 billion for the A 380 (2004 -), request for repayable advance of € 1 billion for the A 350

Sources: CNES; Chambolle & Méaux (2004); CEA; MINEFI.

The direct effects of the Grand Programmes have not been generally evaluated. Their institutional consequences, on the other hand, are better documented (e.g., Darmois, 2005) and can be exemplified by the telephone programme of which the Minitel was a highlight.

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[69] See the airbus case in this report.

[70] Darmois links Grands Programmes to the fifth Plan (1966–70). It inaugurated a new approach to "proactive" industrial policy, defining activities of special significance to French industrial development in which the government intended to build up national champions capable of competing on a par with world leaders. "The selected activities had to be nurtured on French soil thanks to a privileged diet of monopoly exemptions, public orders, fat operating subsidies, preferential tariffs, and public R&D financing before facing foreign competition." (p. 85).

1.5.2.4 The Minitel case: an example

An initiative of the DGT

The French telematics project was started in the 70s,[71] at a time when the French telecommunications system was probably one of the most inefficient, unsophisticated and underdeveloped systems in all the industrialised countries. By 1974, only 12 % of French homes had a telephone. The head of France Télécom submitted a plan to the government, aimed at creating 14 million new lines over a seven-year period. The project was accepted, with the DGT becoming the main agency and co-ordinator for the telecommunications sector. The National Industrial Agency (Division des Affaires Industrielles – DAI), which was in charge of specifying, jointly with the CNET, the technical features and standards of the new network, set down objectives in terms of standards, compatibility and low-cost equipment for suppliers to meet. The project was highly successful insofar as by the middle of the next decade, 95 % of the French homes had a telephone. Seventy percent of the network was digital. The DGT moved on to the next challenge which consisted of developing new online services.

Distributing terminals for free: A political, economic and social project

Backed by a public-sector company, the project called for services which would "contribute to improving democracy and citizenship". The online service should be accessible to the entire population, serve everyone's needs and provide as much public and commercial information as possible. The system was also expected to create an incentive for all to become more familiar with computers and telematics, so as to prevent the development of "a two-tier information society, consisting of those with access to it and those without". Furthermore, the system had to be upgradeable, so as to incorporate services with higher value added . It also had to make a profit. Between 1983 and 1991, 5 million terminals (the Minitels[72]) were distributed free of charge throughout France. By 1989, 38.2 % of all residents of France had a Minitel at work or at home, giving them access to more than 12,000 services. By 1997, the number of services had more than doubled, accounting for more than 110 million hours of usage yearly.

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[71] The initiative came from the government, through the National Telecommunications Administration (Direction Générale des Télécommunications – DGT).

[72] Minitel is the name used for the terminal linked to the Télétel network. The system, in operation since October 1982, extends to all of France and has expanded as the number of terminals and available services increased. It consists of the switched telephone network RTC (Réseau Téléphonique Commuté) for users and the Transpac network for servers, along with videotex access points to link the two. The Télétel access service acts as the interface between Minitels and the servers in three ways, namely as a telecommunications device, for interaction between users and servers, and as a means of determining the method of payment. By combining these techniques, anyone who is connected to the network has access to data-transmission, service providers and communication facilities. The Minitel is compatible with other techniques and technologies used in business, such as personal computers, office electronics and other telecommunications devices. It can be used by companies for sales or financial transactions, and as a promotion, telecommunications or information tool.

In 1983, the Minitel was actually the most sophisticated data transmission system available and it remained so until the advent of browsing systems developed for the Internet in the early 1990s. The Minitel was the first instrument that combined a computer with a telephone and, as such, it became dominant in its field. Thanks to the Télétel system, firms could develop their own server and bulletin board, as well as use them for in-house, external and business communications, and for relations with customers and suppliers. Confidentiality of data is ensured by the fact that this is a closed network (not accessible from the outside), as well as by access codes or passwords. This is one reason why the Minitel is more popular than the Internet in France, with both consumers and business. In France, 95 % of firms with more than 500 employees and 80 % of all businesses use the Minitel.[73]

In 1994, expansion of the Minitel system in France came to a hold. First the drop in the number of Minitel terminals sold was apparently compensated by the growth in emulation boards which enable a PC to access the Minitel. There was a decline, firstly, in the total number of Minitel compatible terminals, and secondly and more importantly, in calls to the Kiosques. Furthermore, the Internet started catching up with the Minitel. Growth in the number of Minitels in France continued until 1985, then the annual growth rate began to fall and, although Minitels were being replaced by newer models, from 1990 it continued to decline at an even faster rate.

A final appraisal

The Minitel effectively set a new technological standard, but this standard was not open to competitors. This "locked in" a technology that failed to keep up with other technological developments such as packet-switching protocols (e.g. TCP/IP) and protocols that are broadly interoperable across a wide variety of communication service providers in other networks. Consequently, the system and some of the services it supports are at an economic disadvantage vis-à-vis other network systems not based on proprietary technology.

One lesson that may be drawn from this is that de facto standards set by market acceptance may be superior to de jure standards set by the government or private entities. Although the Internet protocol, TCP/IP, was, like the Minitel, formally developed as a co-operative effort between government and industry, it was a non-proprietary, open system. Accordingly, in order to achieve widespread adoption and interoperability, systems must be truly open.

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[73] The "Kiosque" system provides for secure billing and ease of access. Users of the service are charged for calls from their Minitel to the server as well as various rates for using services. Billing is included with invoices for telephone service. France Télécom collects all payments and turns over portions to service providers. "This billing system, which requires no password or subscription, exists nowhere else in the world; it makes things simpler for users (a single bill) as well as for service providers, who need not concern themselves with collecting payment." (Rincé, 1990, p. 103).

The French government does not assess Minitel on the basis of pure financial return, but on "overall productivity" standards, including short-term and long-term positive economic and social externalities.[74] By adding up the income generated by the entire Transpac system (€ 100 million); the increase in revenue by firms manufacturing the technology, software and terminals required by the system; and the growth in VAT generated by the system, the Minister came up with a total added value generated by the project of about € 800 million in 1988 (Housel, Davidson, 1991).

More generally we have to remember that the Minitel was only a part of a large-scale programme devoted to telecommunications. On the positive side, Minitel helped to improve the poor standards of the French telephone system. It modernised French technologies and productive capacity, and supported counter-cyclical public spending. The choice of digital time-division switching instead of the American analogue space-division switching[75] ensured France industrialists a technological lead. Large French firms, such as Matra, Alcatel or Sagem, at the time received a initial impetus and benefited from these programmes to develop and reach an efficient size. The DGT itself was to become France Telecom in 1988, an autonomous provider of a public service, and eventually, one of the world's leading telecommunications carriers, with over 118.6 million customers in 2004, and its performance stands comparison with historical counterparts. The results in terms of well-qualified jobs, domestic employment and exports into the United Kingdom are certainly important achievements.

The drawbacks of the project were that (i) costs were not adequately evaluated, that (ii) in a situation of monopoly, the administration decided about the price of telecoms without taking into account the demand side, the monopoly rent financed different programmes and became an alternative to taxes; and that (iii) at the dawn of globalisation, DGT and later France Telecom failed to properly assess the development of videotex and made Minitel so very French that it was difficult to expand abroad and eventually was surpassed by the more international Internet.

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[74] In 1989 a dispute arose between an Inspector General and the then Minister for PTT and space, Paul Quilès. The Inspector's report claimed that the Minitel project was not breaking even. Paul Quilès answered by first stating that "the system must be evaluated not just on the basis of its immediate income but on that of the income it generates for the rest of the economy", and secondly that "the productivity of this system can be measured only over the long run"; and finally that "it is very hard to assess the social benefits from special services for the handicapped, free information, distant education, etc. from a standpoint of financial profitability alone".

[75] http://www-rocq.inria.fr/qui/Philippe.Deschamp/RETIF/20000922-tout.html#C provides us with a glossary for technical terms.

1.5.2.5 The debate about a renewal of French industrial policy

The French doctrine about industry and industrial policy

The place of industry in the French economy has been a matter of public concern repeatedly over the last half century. J. Fourastié specifically stressed the importance of productivity and technical progress in economic growth.[76]

As France engaged in the European construction project, it seemed important to keep alive French industry vis-à-vis the other industrialised countries although everybody knew that technical progress would reduce employment in this sector. Unfortunately at the beginning of the 1980s, the more representative sectors of the traditional industries (textiles, coal and metallurgy) were in very bad shape. The first government appointed by President Mitterand undertook a large programme to nationalise the banking and finance sector as well as indebted industrial firms in the primary sector in 1981. The state inherited control over a large part of the French economy. As Elie Cohen put it: Until the great U-turn of 1983, the French state controlled prices, investment flows, monetary rates, exchange rates, a big chunk of the financial system, even the Bank of France, as well as regulatory bodies like the COB or the Conseil de la Concurrence. Through credit controls, specialised credit channels and interest rates subsidies, the state essentially substituted itself for the financial markets in the allocation of resources to the various sectors of the economy. In this type of capitalism, there is a market for goods and services (although it may be subject to state intervention), but hardly for factors of production.

But very quickly, centralisation of the economy reached its limits as the constraints imposed by the foreign exchanges was felt. The French government had to realise that it could no longer implement the national industrial policy it had dreamed about. Indeed during the 1970s the French government pursued a project to safeguard some sectors (créneaux) in which French firms seemed to enjoy serious advantages. The successor governments sustained by right or left majorities privatised as many firms as possible in order to reduce debts and prune the scope of industrial policy.

Table 1.15: Public ownership in France

State shareholding					
	1999	2000	2001	2002	2003 *
Dec. 31; number of firms	1 657	1 594	1 569	1 623	1 447
First rank	99	97	96	100	99

[76] Using an approach similar to Colin Clark or Simon Kuznets, he shows that technical progress very quickly enhanced productivity in agriculture and industry whereas the corresponding evolution was very slow in services. He consequently forecast a dramatic evolution of employment towards an overwhelming importance of services in the future. Consequently he advocated reducing working hours in order to avoid mass unemployment as a consequence of technical progress.

% employment	5.30	5.10	5.,10	5	5.20
First rank/ total public sector	86.50	84.70	84.60	85	84.30

Source: www.minefi.gouv.fr/vie. publique-Etat actionnaire

By the end of 2003, the public sector was reduced to a mere 5 % of total employment, and although the number of firms partially owned by the state is impressive, the French legal structure of firms which accords a legal existence to many subsidiaries must be taken into account. Indeed, out of the top hundred of firms 85 % are governed by the public sector. This share will be reduced soon with the privatisation of EDF and GDF. This reduction in state shareholding does not mean that the firms are better managed and could be helpful in implementing a strategic industrial policy. On the contrary, the management of this residue is fiercely attacked by a recent Parliament report denouncing "the omnipresence of the government allied to a lack of strategy".

Although the large industrial French firms behave pretty well compared to other global firms, their anchorage in the French economy is increasingly weakened. Thus of the top ten French firms included in the largest 500 industrial firms, no more than 40 % of their employment is in France.

It is interesting to note that among these ten largest firms two are public utilities which are currently state-owned. Renault was nationalised after 1945, and four were nationalised in 1981 (five if we include Aventis which was formed from the Rhone Poulenc pharma sector). Only the two family-owned firms (Michelin and Peugeot) were never throughout their history a segment of the public sector.[77]

Table 1.16: French firms in the top 500

	Sales	Profit	Employees (world)	Employees (France)
Among the first hundred				
Total Fina Elf	102 540	5 941	121 469	53 440
PSA Peugeot Citroën	54 436	1 690	198 600	123 700
Électricité de France	48 359	481	171 995	115 100
Suez	46 090	-863	198 750	60 550
101 to 200				
Renault	36 336	1 956	132 351	78 000
Saint-Gobain	30 274	1 040	172 357	49 980
201 to 500				
Alstom	21 351	-1 381	109 671	26 320
Aventis	20 622	2 091	78 099	Not available

[77] The national character of French firms is also questionable if we consider the shareholders. Ownership of the largest French firms has been increasingly scattered all over the world so that a great number of former national champions have more than 50 % of their stock held by foreigners. For the 40 largest listed firms (CAC 40 index), the latest estimate of Banque de France shows an increase to 44.4 %. The same study reports that among the 33 firms which were permanently included in the index between 1997 and 2004, one third has the majority of its stock in foreign hands (Bulletin de la Banque de France, N° 134, Février 2005).

Alcatel	16 547	4 745	75 940	25 000
Michelin	15 645	614	126 285	26 305

Source: Sessi, l'industrie en quelques chiffres Édition 2003, 2004.

Wide-ranging liberalisation and large-scale privatisation against a background of weak institutional investors have thus brought French-style capitalism to an abrupt end. Resistance to liberalisation does exist but concentrates on issues relating to competition in the transport, postal service and electricity sectors, which are dominated by state-owned monopolies. This conclusion seems too far-fetched as French corporate governance is still very much characterised by the dense networking of boards and special careers of directors which in 41 of the first 100 companies include an initial stage at a ministry.

Table 1.17: The affiliations of top managers

Class	X	IEP	HEC	ENA	ENPC	ESMP	Ministry
1-100	40	26	16	20	8	18	41
101-200	22	22	18	10	5	10	22
201-300	16	17	24	5	5	9	15
301-400	13	18	12	7	4	2	15
401-458	5	7	10	6	0	0	9
Total	96	90	80	48	22	39	102

Note: Ecole polytechnique IEP, Institut d'études politiques, HEC: hautes études commerciales, ENA: école nationale d'administration, ENPC, Ecole nationale des ponts et chaussées, ESMP: Ecole des Mines - (post-graduation for the best X students); the different backgrounds are not mutually exclusive: some CEOs could be alumni of X + ENA and began their career at a ministry (usually Finances or Economy or Industry or Transports) before they were recruited to manage a firm.

Source : A&C Alcouffe and Sihem Chaabani's Phd

On the importance of strategic thinking at government level

Quite recently industrial policy has been gaining new currency in economic and political debates. The discussion was fuelled by a growing concern about European integration and globalisation[78]. This concern is very different from the mild appreciation we can find in documents by the European Commission on deindustrialisation, such as in European Commission (2004G).

Some milestones of the controversies can be given: Cohen and Lorenzi (2000) stressed that European industrial policies will be difficult to implement as the Maastricht treaty has enhanced the part played by competition policy so that any industrial policy is at risk of being discarded as contradictory to the latter. Moreover, as strategic trade needs a powerful government able to conceive and implement strategies, it is not compatible with EU legislation. Consequently Cohen and Lorenzi recommend to foster innovation and R&D. Three years later, Bernard Carayon present himself as a guardian of French national interests. He deplores the blatant lack of strategic perspective. In evidence of his assertion, he offers the yearly list of key technologies prepared by the Ministry of Industry without consulting other ministries and without any follow-up. Consequently the French government has never defined strategic industries from the point of view of sovereignty, employment, influence, nor pertinent technologies nor the gaggle of French firms operating in these industries. In this situation, Bernard Carayon finds only two positive initiatives: the first one stems from the Ministry of Defence which has begun to think about technological dependence on the Ministry of Finances and industry.[79] The second was developed by the agency responsible for diffusing

[78] Such a process of industrial change (relative deindustrialisation) is, generally, beneficial if it is properly anticipated, identified and fostered. It should not be confused with absolute deindustrialisation. The latter, a much more alarming prospect, would imply industrial decline characterised by consecutive reductions in employment, output and productivity growth, exacerbated by a trade deficit.

[79] The French doctrine considers that the existence of a competitive and efficient industry is a major asset for any defence policy. It is considered an important stake, as France should have at its disposal an industry which can conceive, realise and maintain army equipment. It strategic autonomy depends on controlling key technologies. Besides, the defence industries is an important player in the national economy, with a turnover of € 14 billion and 170,000 employees. But this stake concerns Europe too, as it is well understood that the defence industry can no

technological information which has undertaken to scrutinise the sovereignty technologies and the risk of French "décrochage".

Eventually Bernard Carayon presents a proactive industrial policy under the cover of economic intelligence. He concludes that, at first, thinking should take a prospective turn: defining priorities for research and innovation, key sectors, and eliciting partnerships. For him, "such an exercise made it possible in the past to realise Concorde, TGV, Ariane and Airbus.[80] If it is possible to identify technological items as symbolic, the prospect of developing strategic domains, such as information technology, environment or nanotechnologies, should identify not only the dependencies, but also the opportunities – possibly not so symbolic but equally important."

Nevertheless, we also find advocates who are highly sceptical about the feasibility of industrial policies in an age of European integration and globalisation. Convergence is also to be found with regard to improving the attractiveness of regions.

1.5.2.6 Recent evaluations and proposals

Proposals by Levet and DATAR

Two reports are worth mentioning here. The first one, Levet (2003), is critical of subsidies and the part they could play in an industrial policy and even for the interests of the relevant stakeholders. He stresses the lack of knowledge even as to the extent of subsidies at local, regional and national level.[81] The opacity begins with the budget documents related to subsidies by the Government, and there are not even any specific rules at the regional level. Consequently the regional authorities are left without any idea about the consequences of subsidising regional development.

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longer be considered within the national framework. Considering the huge spending by the US and the strength of American defence industries and firms, the only option for European states to choose their defence equipment is to structurise a European defence industry. See annex on the defence perspective.

[80] The same nostalgia is to be found in F. Grignon, June 2004: "This group encourages the European Union to facilitate the creation of champions in the field of industrial programmes, able to reinforce the Union's pre-eminence where it enjoys a comparative advantage. The goal is to come back to the framework which allowed for achievements like Ariane or Airbus. A political voluntarism with a mid-term vision is necessary to launch grand programmes of industrial development in the sunrise economic sectors (biotech, computer, information technology, semi-conductors), as it was done 20 years ago. In order to go ahead determinedly in this way, despite the difficulties of a European union with 25 members, the Franco-German axis could be a motor for such a renewed European industrial policy, which other states could join later. Therefore the commission is pleased to note the mobilisation on May 13 exhibited by the President of the Republic and the Chancellor in order to give birth to the industrial champions which Europe is expecting."

[81] "There is no exhaustive census." (Levet, 2003).

Table 1.18: Subsidies in relation to GDP, employment and government expenditures

		France	EU 15
% GDP	1992–94	1.2	1.5
	1995–97	1.46	1.43
	1997–99	1.38	1.16
Euros/employee	1992–94	641	631
	1995–97	790	656
	1997–99	772	563
% budget	1992–94	-	-
	1995–97	2.64	2.82
	1997–99	2.55	2.40

Source: Levet (2003).

This situation is a matter of concern as total subsidising is far from negligible, amounting as it does to € 15 billions, or 1 % of French GDP solely for national subsidies affected by the EU rules.

Levet proposes two improvements for the French system. First, yearly reliable data are needed at the national and regional levels in order to evaluate the efficiency of subsidies and to identify best practices. Secondly, an industrial policy should provide economic players with strategic thinking tools; (i) forecasting exercises about the production system, the needs of firms, the subsidising procedures taking into account the varieties of businesses; (ii) defining national and European perspectives and priorities for the chief markets in the future; (iii) improving the attractivity of regions.

Last but not least, Levet suggests that technological policies should be reoriented from their traditional focus on technologies towards a positive attitude vis-à-vis learning and the development of competences. The environment should be made friendlier for co-operation and co-operative projects; SMEs should be more involved in networks and co-operation ventures. Consequently subsidies should be reoriented from an individual basis to a project logic embracing groups of firms which aim to co-operate.

Box 1.5: Types of public aid

As Levet (2004) notes, it is difficult to describe public aid to firms in all its dimensions. The data of the office of statistics on research distinguish six structures of public aid for industrial innovation, together amounting to 14 % of research undertaken by firms in 2002, or € 3.1 billion. The figure underestimates public expenditure because aid coming from local authorities, such as repayment of local corporate tax, is not taken into account. In 2002, the breakdown of public aid for these six types of financing was as follows:

1. Defence financing represents € 1.5 billion. It has fallen since the early 1990s and tends to be focussed on purely military applications developed by a limited number of very large firms, with little fallout in the civil area.[82]

2. Large-scale programmes of the 1970s and 1980s continue to receive financial support, in aeronautics, space research, nuclear energy and the micro- and nano-electronics sectors, which constitute the continuation of the old components plan, with subsidies (€ 575 million) and ad hoc aid (repayable advances for Airbus, regional aid for the Crolles project). The only recent programme involves micro- and

[82] R&D and industrial policy implemented by the French Defence Ministry are given in an annex.

nano-electronics, a field enjoying particular support from the Ministry of the Interior. Thus, the DIGITP devotes 80 % of its € 158 million in R&D aid to the nano-technology sector. € 60 million are allocated to the Crolles II project, € 60 million to different thematic networks (clusters) such as MEDEA+, PIDEA+ and EURIMUS II, which form part of the Eureka project.

3. Ministerial actions (€ 200 million) outside large-scale programmes are of greater benefit to SMEs and are characterised by their geographic and sectoral sprinkling: budgets for the principal initiatives are distributed across a multitude of fields (16 RRIT, 19 CNRT, Eureka, etc.), and skill centres are dispersed (seven oncology poles, eight genetics poles).

4. ANVAR funding is directed towards SMEs and works on the basis of a subsidy system (€ 80 million) and repayable advances (€ 190 million, with a 60 % repayment rate).

5. The Research Tax Credit (€ 489 million) because of its ceiling mainly favours SMEs . It is scheduled to reach € 1 billion in 2008.

6. Finally, France benefited from approximately 10 % of the financing for the 5th European R&D Framework Programme (ER&DFP), of which 45 % went to firms (€ 122 million within the framework of the 5th ER&DFP). European funding of firms increases in the ER&DFP budget (+17 %from the 5th to the 6th ER&DFP) where the focus is increasingly on development and SMEs.

Defence-related public aid and historic large-scale programmes (aeronautics, space research, nuclear energy, and the nano-electronics sector) represent nearly 80 % of all public aid allocated to innovation.

Improving the attractivity of regions

The Datar Report suggests implementing a regional EU policy devoted to industry and regions. This policy should aim at networking for competences and innovation throughout Europe, a policy to cope with the great American poles. Datar quotes the transborder projects which have developed in biotechnologies (Medicon Valley between Denmark and Sweden, BioValley Alsace-Fribourg-Basel). Such policies should be directed to achieve, at cluster level, the same performance which has been attained for great global firms such as EADS, creating true industrial partnerships between European firms and networks.

Datar suggests that networking could be organised around large-scale programmes, as it was the case with the Ariane project. Such programmes could be launched not only for high-tech industries but also in more traditional ones where specific European competencies and know-how are available (luxury goods, cars, clothing).

This report, as well as the BEFFA report discussed below, needs to be seen against the disappointment of France with European policy. As Cohen (1992) put it, France tacitly accepted the liberal programme of 1983 for Europe's sake, on condition that this Europe would deliver growth and safeguard welfare benefits, but is about to conclude that these objectives have not been met. This view was strengthened by the decisions of the Commission in the EDF and Alstrom cases. The Commission's complaints against EDF for the shortcomings of its liberalisation process nurtured Euro-scepticism. The same holds in the Alstom case where the Commission first rejected the rescue plan for Alstom and later requested important concessions.

In both cases, nostalgia could flourish in the direction of a French industrial policy favouring of grand projects and sectoral strategies and policy. It pervades all reports and debates, including the Beffa Report.

As this report is the more ambitious of the two and has begun to be implemented it is worthwhile to present it at length.

The Beffa report and the National Agency for Innovation

The BEFFA Report starts with pleading the importance of industry, which is larger than its share in GDP may indicate. France is the fifth largest industrial country in terms of exports. Industry is generally in good shape. Firms are first-rate and gain market shares, e.g. the chemical and steel industries, cement and glass industries, aeronautic and automotive sectors and the railway infrastructure sector. French industry has been able to rely on high-quality research in numerous fields. It has an excellent research base, and is strong on public research. Franc ranks second in scientific publications and patents.

Nevertheless the industry does suffer from enfeeblement, the challenges of deindustrialisation and globalisation are discussed more intensely than in other countries, (Fontagné, 2004, Académie des Technologies, 2004, Levet, 2004). There are perceptible problems of employment creation, in the contribution to added value, as well as in the contribution to the balance of trade.

Among industrialised countries, the share of French industry in value added is declining. And France is specialised in mature industrial sectors rather than new and high-tech industries. This is due to inadequate research expenditure. Although not lower than in other countries, French industries of a low research intensity are more important than elsewhere.

Currently 14 % of business research is financed by government, Box 1.5 shows how such money is channelled. Specific problems in France are:

- Tax incentives for research are capped at € 8 million per firm, thus providing some incentives for small firms, but granting next to no assistance to larger firms.

- Large firms and risky projects used to be supported by the large projects. This was considered as appropriate due to co-ordination problems which could not be solved by market forces alone, secondly because of the externalities created, and thirdly because of the large initial costs of new technologies.

Consequently BEFFA proposes to start "Mobilising Programmes" in eight areas (see Box 1.6).

Box 1.6: The Beffa report in a nutshell: eight Mobilising Programmes

Weak R&D efforts, specialisation in low-tech industries and dispersion of means outside defence and the "historic" large-scale programmes appear to require a more focussed industrial policy. It should involve large enterprises with significant volumes of R&D spending which can co-ordinate and underwrite the specific investments of SMEs.

The Mobilising Programmes (MPs) are targeted at large risky projects which need a state contribution for their financing, where the state should play the role of guarantor and incentive provider, diversifying the risks across different projects. They enable the co-ordination of private and public agents – entrepreneurs, subcontractors and public research agent – involved in a production project.

Public aid would guarantee partial funding of R&D expenditure while mobilisation and close co-ordination of entrepreneurs are hoped for. MPs will be designed in order to guarantee transparent management of public money. The commercial objective should be to reach sales of approximately € 1 billion, in a total market of up to € 10 billion, i.e. an important share in a significant market. The programmes should be pre-competitive by nature and provide a guard against windfall effects.

The high level of entrepreneurial involvement guarantees that the products made possible by a Programme will satisfy a significant demand and be competitive. Entrepreneurial commitment is established by their funding of half the R&D costs. They also undertake co-ordination with public research laboratories to generate the vertical chain in a co-operative manner.

Intervention by the public authority may prove necessary to co-ordinate the project agents, in particular private agents with public organisations such as research laboratories. This co-ordination may be geographical or thematic. Public intervention concerns also direct financial support for research and development. The concrete modalities of this support depend on the specific programme, but reimbursable aids are privileged. The public authority may also intervene downwards either by public contract (order placement) or by enacting regulations.

The Mobilising Programmes are by definition European – all European firms can participate in an MPII – but they are distinct from the European R&D Framework Programmes because they are far more focussed and cover simultaneously research and development right up to the pre-competitive stage.

Eight domains are suggested for these programmes:

infectious diseases and degenerative illnesses	photovoltaic solar electricity
fuel cell and hydrogen technology	capture and sequestration of CO_2
clean economical cars	automation of air traffic control
energy: bio-fuels	secure high-speed networks

The industrial innovation agency will sustain large scale projects under the leadership of large firms. The challenge for this renewed national policy is to find its place between local institutions (every region is now creating its own innovation agency) and the European ones.

In evaluating the prospects of these new programmes we have to keep in mind that government as well as the authors of a new proposals have limited knowledge as to the prospects of new technologies, and also that programmes initiated by government may give rise to governance problems. These problems are addressed by specific characteristics of the proposal:

The Programme involves private agents and responds to an expected demand in a European or global market. The choice of sectors and products is based on economic arguments and allow evaluating the programmes.

It fosters R&D leading to a demonstration model in which a strong technical component is present; it must bring solutions to major scientific and technological questions.

It should bring together private agents right from project conception in order to make full use of existing industrial capacities. The project should be based, from the start, on an evaluation of the potential in manpower, production capacities and the research of public and private agents.

The programme should be organised within a medium to long-term horizon, in order to obtain the best possible benefits from the role of guarantor. The scale of the projects must enable a sustainable contribution to improving French industrial specialisation.

Mobilising Programmes in the European context

Three characteristics distinguish MPIIs from other structures existing in France and Europe. The first feature is the highly downstream character of the programmes which extend right to the pre-competitive stage. The second feature is the existence of one or more entrepreneurs being in control. The third feature is the significant amount of funding. For these reasons the MPIIs might interconnect easily with other structures, such as RRITs, CNRTs or European Framework Programmes.

RRITs and CNRTs are networking structures which mobilise low funding for different topics. The thematic areas of RRITs or CNRTs may overlap the technologies covered by MPIIs. Firms mobilised within an MPII can then draw on the experience and strengthened co-operation of RRITs and CNRTs. Thus, MPIIs contribute to the valorisation of co-ordination between RRITs and CNRTs. Finally, the technological domains of the European Research and Development Framework Programmes are in general further upstream than those of MPIIs. The European Research and Development Framework Programmes can therefore provide support for firms which develop upstream technological solutions necessary to realise MPIIs.

The MPIIs are distinct from the European R&D Framework Programmes in two ways. First, MPIIs have a far more focussed mission than the European R&D Framework Programmes, which organise tenders in relatively broad technical fields. Second, MPIIs cover simultaneously research and development right up to the pre-competitive stage. They are thus further downstream than the European R&D Framework Programmes, which often organise European research at a level further upstream. However, a recent inflexion in the framework of the 6th European R&D Framework Programme should be stressed. The MPIIs and the European R&D Framework Programmes are not contradictory and can show numerous complementarities.

Finally, the Industrial Innovation Agency should be co-ordinated with the intergovernmental EUREKA initiative. This latter encourages co-operation between firms and research institutes, in the framework of market-oriented research projects, where the research property rights belong to the entrepreneurs. Thus,

implementation of a European MPII could be based on EUREKA initiatives when the technological fields of the MPII and of a EUREKA project intersect.

It may prove more relevant to posit an intergovernmental framework for MPII policy, rather than a direct Community initiative. Other European countries may be interested in MPII funding, with co-operation among participant countries authorising access to their public resources and thus serving as a co-operative voice for European extension.

Some European countries may have a special interest in MPIIs, since they share similar industrial problems. That is probably the case in Germany, whose industry is specialised essentially in high-tech sectors and which faces relative standardisation of its industrial goods. The MPIIs might revocalise in an original way the voice of Franco-German co-operation, provided that the programmes are jointly defined and selected in line with the German system of innovation.

The Industrial Innovation Agency (IAA)

To implement the Mobilising Programmes, a new agency devoted to industrial innovation is about to be set up and should be operational by June 2005. It will be charged with identifying and sustaining large-scale innovative projects. It will be clearly oriented towards large firms, taking into account the strengths and weaknesses of the French industry. Its activities will be linked to the "poles de competitivité". The connections between IIA and the poles de competitivité should be defined by a framework law on the development and funding of the French economy. Its budget will be € 2 billion for the next three years, funded by the sale of state-owned stocks. Drawing some lessons from the historical large-scale programmes as well as from European integration, the IAA will provide reimbursable aids in order to sustain federative projects organised around large firms.

1.5.2.9 Conclusions

Eventually, the industrial policy design will be reorganised in France along three lines:

A research agency which will fund projects involving public research and non-targeted technological research.

A new structure which consists of the SME Bank (BDPME), the ANVAR (national agency for the valorisation of research) and the SME branch of Caisse des dépôts et consignations. It is called OSEO and will promote the development of innovative SMEs.

The IIA will promote large-scale projects under the leadership of large firms.

The rationale of this new organisation is the following: the French industrial policy needs to be more focussed and has to take into account the part played by large firms. The challenge for this renewed

national policy is to find a place between the local institutions (every region is now setting up its own innovation agency) and the European ones; the danger is that this will bring additional players into a crowded game.

During the ten last years concerns vis-à-vis industrial policy have grown in France. Probably this is tied to a French tradition which stresses the government role in economic matters and includes specific institutions (Grands corps) and corporate governance. It is also nurtured by a growing feeling that France sacrifices important assets (like social coherence and a proactive industrial policy) for deceptive liberal dreams. The various attempts to reform French industrial policy take into account the European framework and recommend European partnerships at the European level between firms, research centres and policies. Great attention is paid to procedures. The traditional command system in which the government decides through its "grands corps" is clearly discarded in favour of incentive frameworks (contracts instead of control).

Is it enough to convince the advocates of pure "laissez-faire", or in other words, is there a third way between laissez-faire and interventionism? The future of European integration could be at stake if the answer is no.

1.5.3 Finnish industrial policy[83]

1.5.3.1 Introduction

1.5.3.1.1 Background

The Finnish experience in the 1990s represents one of the few examples of how knowledge can become the driving force behind economic growth and transformation. In less than one decade, Finland transformed its industrial structure from one that was raw material-, energy-, capital- and scale-intensive into one that is primarily knowledge-intensive.

During the first years of the 21st century, Finland has been ranked three times at the top of the World Economic Forum's (WEF) competitiveness studies. Finland is the home of one of the most developed IT economies, and is also ranked number one in the OECD's PISA (Program for international Student Assessment) studies of youth learning skills and educational attainment [84]. In addition, the country was able to produce entrepreneurial success stories like Linux and Nokia, which achieved a global scale during the 1990s.

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[83] Prepared by Christopher Palmberg and Pekka Ylä-Anttila.

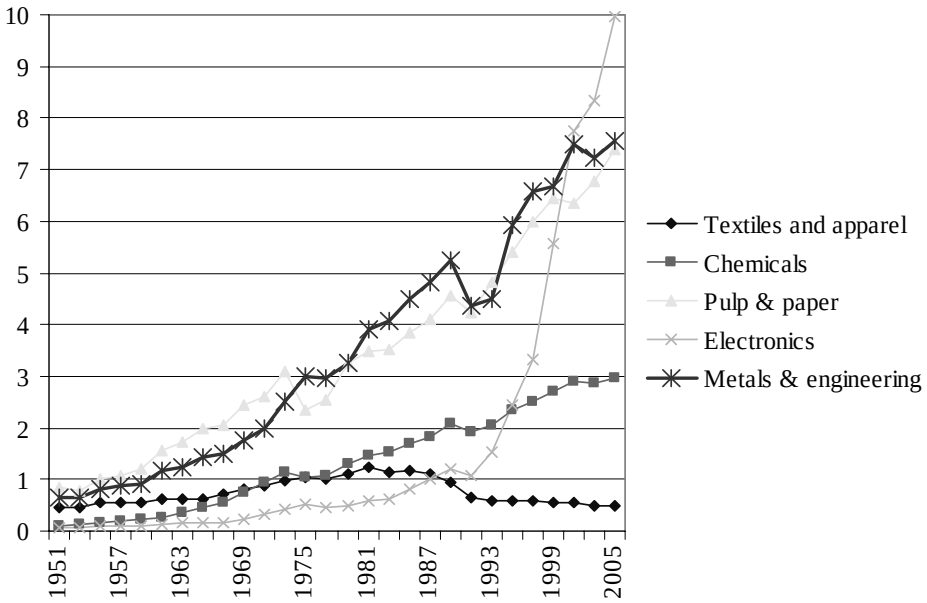
[84] The PISA index measures educational attainment among 15 year old students.

At the beginning of the 1990s, Finland's prospects seemed much gloomier. The country was hit by the most severe economic downturn experienced by any OECD country since World War II. GDP fell by 10 % in just three years and unemployment rose from 3 to 17 %. But the recovery was fast and based on major industrial restructurings. The most important factor was the phenomenal growth of ICT (information and communication technologies) production. In addition, some of the more traditional industries – like pulp and paper and engineering – were renewed through rapid globalisation and more intensive use of ICT.

The economy experienced both *between-industries* and *within-industries* structural change. In between-industry transformation the immense growth of electronics – i.e. the telecommunications equipment industry – was the key. Within-industry change was that of creative destruction – in almost all industrial sectors a large share of low productivity plants was closed down (see Rouvinen and Ylä-Anttila, 2004). As a consequence, by the end of the 1990s the productivity level of manufacturing was among the highest in the world, and the ICT sector played a major role in the economy. Finland went from being one of the least specialised countries in information and communication technology (ICT) to becoming the sole leader. This is exceptional. In ICT laggards rarely catch up, let alone leapfrog the leaders.

Finland's remarkable recovery from the recession and its stellar performance are in considerable part attributable to ICT production and manufacturing as a whole. Policies played their role, as discussed below, but it was private enterprises, Nokia and others, which made the biggest difference. Although it might appear otherwise, there was no master plan that fostered the profound structural change and expansion of the ICT sector.

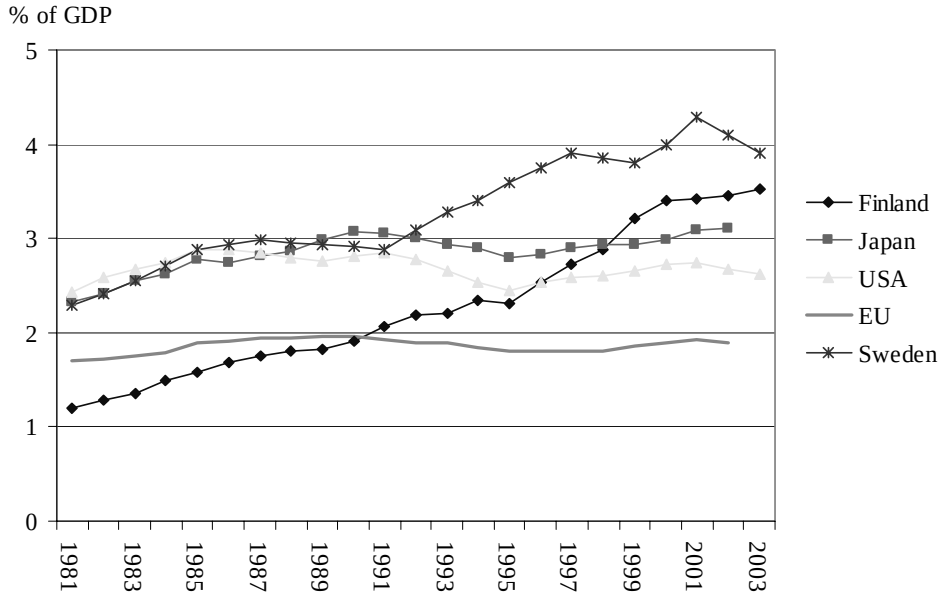
Graph1.23: Finnish manufacturing production volume by industry (billions of euros in 2000 prices)



Source: Statistics Finland (2005)

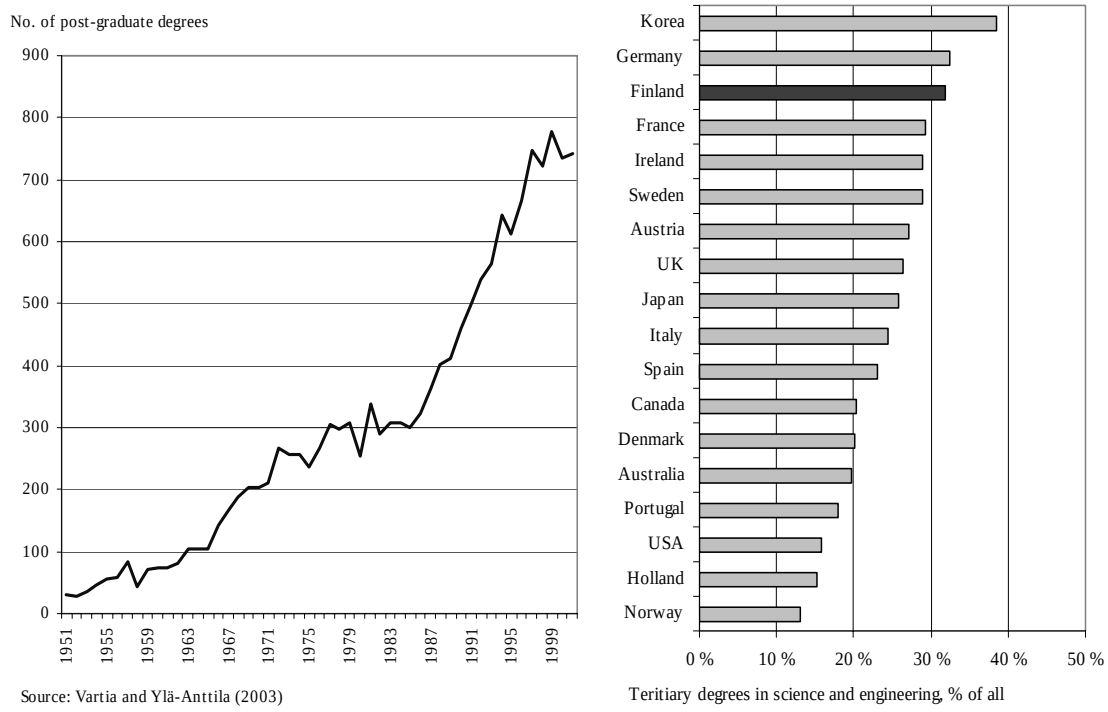
To put it briefly, the ideas behind industry policy in Finland have gone through substantial changes during the last couple of decades: from the separation of science and technology policies to their integration, from macro-oriented structural policies towards long-term micro policies, from selective and target oriented policies to policies aimed at providing the best general conditions, and finally, since the 1990s, Finland has been moving towards a systemic view in policy making by putting education, R&D, and innovation at the centre of industry policies, and taking the concepts of a national innovation system and industrial clusters as basic policy frameworks. Graphs 1.24 and 1.25 highlight the changes quantitatively.

Graph 1.24: R&D expenditures in selected countries



Source: OECD Main Science and Technology Indicators

Graph 1.25: Higher-level education in science and engineering



Source: Vartia and Ylä-Anttila (2003)

1.5.3.1.2 Aim and scope of paper

In light of the profound structural transformation and outstanding industrial performance, the aim of this paper is to discuss the role played by industry policies, particularly during the most recent period. We

look in greater detail at the factors which caused the changes in policy priorities and assess the consequences. Acknowledging the difficulties of international policy comparisons, we seek to identify the specific features of industry policy making in Finland.

In accordance with the conceptual changes in Finnish policy, we take a broad view of industrial policies. Industrial policies are defined here as policies designed to provide the necessary conditions, i.e. measures for influencing the quality of the business environment. Industrial policies in Finland have in recent years assumed a pro-active role rather than simply reacting to problems induced by changes in the international economic environment.[85]

The changes in policy priorities are well in line with the widely acknowledged view that national competitive advantage today is created to a larger extent by decisions made at the micro level – in firms, financial institutions, and various innovation policy agencies. Hence, enhancing competence, technological change and innovation are the core of today's industry policy. We argue that the speed and determination with which this new industrial policy is realised are prime examples of the specificity of industrial policymaking in Finland. Accordingly, we focus on these aspects, while leaving aside the others, which are less unique to Finnish industrial policy (such as competition and energy policies, public enterprises and procurement etc.).

The paper is organised as follows. In Section 2 we take a closer look at the 1990s and the new industrial policy approach in Finland. In Section 3 we move to the specifics of Finnish industrial policies in more detail. Section 4 concludes by attempting to assess the successfulness of policies from today's perspective, and in light of future challenges.

1.5.3.2 The establishment of new industrial policies in Finland

1.5.3.2.1 Structural pressures and industrial policy responses

The institutionalisation of industrial policy in Finland dates back to the 1970s, even though the government played an important role much earlier, e.g. through state-owned companies, trade, monetary, and exchange rate policies. During the first decades of Finnish industrial policy in the 1970s and 1980s, the emphasis was on macro-economic measures with the ultimate goals of

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[85] See the most recent policy document by the Ministry of Trade and Industry (MTI Publications 9/2001), which defines industry policy as "business environment policy". That is further defined as "…*composed of a wide variety of measures for influencing the quality of the business environment of enterprises".* See also Georghiou, Smith, Toivanen and Ylä-Anttila (2003) that includes an evaluation and short overview of shifts in policy thinking.

securing growth and employment. These measures were compatible with the regulated nature of Finnish markets and typically covered subsidies to ailing industries, infant-industry protection, and frequent devaluations to boost export industries – wood, pulp and paper in particular. The shift towards new industrial policies in the early 1990s can be interpreted as a response to the structural pressures that characterized the Finnish economy at the time. The main feature of this new industrial policy was a stronger emphasis on longer-term microeconomic policies, combined with the strong integration of technology and industrial policies.

Box 1.7: The severity of economic recession in the early 1990s

The structural pressures that Finland experienced in the early 1990s had their origin in the vulnerabilities created during the previous decade. Despite exceptionally robust economic growth throughout the 1980s, the Finnish economy was largely dependent on forestry-related industries, which had been favoured through devaluations, and capital and export credit provisions. The robust economic growth of the 1980s had also coincided with a deregulation of financial markets. By the early 1990s, it became evident that this deregulation had been poorly timed and too rapid, as evidenced by excessive foreign debt and subsequent crises in the banking sector. The emerging crises were further compounded by the collapse of trade with the Soviet Union. As a result, a decade of robust growth and relatively successful, but short-sighted, macroeconomic policies had now turned into a period of exceptionally severe economic recession with a decline of GDP of 10 percent during 1991-93, and a drastic rise in the unemployment rate from 3 % to 17 % during the same period.

The industrial policy discussion of the early 1990s was largely flavoured by the prospects of a severe economic recession and the one-sidedness of the Finnish industrial structure, even though engineering, electronics and ICT had become increasingly important fields. Furthermore, negotiations for EU-membership were now underway and had been endorsed by large parts of society. Under these conditions, the limitations of shorter-term macro-oriented industrial policies became evident, especially since these would be constrained by common EU regulations governing monetary and trade policies that had constituted important policy elements in the past. Policymakers were now forced to shift their focus and elaborate on new policy models and practices (Jääskeläinen, 2001).[86]

[86] There was a shift in policy thinking towards microeconomic policies, which emphasised factors affecting long term economic growth – as opposed to short term macro policies with the aim of improving the cost competitiveness of the economy. Hence, R&D, education, and technological infrastructure received more attention in policy practices. New policies also recognized that national competitive edge is, after all, created at the firm level. The role of policies is to provide a favourable business environment for internationally competitive firms.

The traditional policy of subsidising, i.e. supporting ailing industries or “backing the losers”, is only of marginal importance to current policy making in Finland. Nevertheless, “picking the winners” turned out to be more than difficult when technological advances accelerated and globalisation started to change the international market place in the early 1990s. Consequently, the emphasis in industry policy moved towards improving the overall operating conditions of business enterprises, i.e. implementing conducive rather than interventionist policies. Locational competition played an important role in industrial policies. Due to the increasing international mobility of production factors, the basic policy aim was to make the country an attractive location for internationally competitive firms (see Ministry of Trade and Industry, 1993), and Hernesniemi, Lammi, Ylä-Anttila, 1996).

1.5.3.2.2 Innovation systems and industrial clusters form the basis of industrial policy

A unique characteristic of the Finnish model has been the early application of a systems view on industrial policy. The systems view could be described as an acknowledgement of the importance of interdependencies between research organisations, universities, firms and industries due to the increasing importance of knowledge as a competitive asset, especially in the case of small, open economies with well-developed welfare systems.

However, it is important to stress that the implementation of the systems view does not imply that Finland has followed a ‘master plan’, in which the government played a strong leading role. Rather, the systems view was made concrete through an emphasis on responsive, long-term policies to improve the general framework conditions for firms and industries, especially in terms of knowledge development and diffusion, and the innovation and clustering of industrial activities. It was formulated through various public-private partnerships involving economic research organisations, and industry federations and firms, and anchored in broader economic policy circles (Jääskeläinen, 2001).

The first definition of the systems view on industrial policy is found in the 1990 Review of the Science and Technology Policy Council, which made the concept of a national innovation system an important cornerstone for science and technology policy. The concept of a national innovation system originated from evolutionary economics. Its application in Finland thereby marked the introduction of new theoretical approach to policy practices, which largely found their relevance in mainstream economic notions. However, the more significant and concrete the consequence of this new systems view on industrial policy was, the higher the priority given to R&D investments (Lemola, 2003). In hindsight, setting this priority appears to have been bold,

particularly given the severe economic recession that Finland was enduring at the time. It also exemplifies, again, the strong integration between technology and industrial policy.

In spite of relying on ideas from evolutionary economics, the conventional market failure argument has remained the main justification of industry and innovation policies. The argument has been widely adopted in the Finnish policy documents and statements. It is, however, not always clear to what extent market failure has served practical policy design and implementation. Most often, policy makers refer to financial market imperfections, and less frequently to technological spillovers or externalities in general.

Box 1.8: The Science and Technology Policy Council of Finland

The Science and Technology Policy Council is a high-level council chaired by the Prime Minister. The main task of the Council is to draw general guidelines for the design of Finnish S&T policy. However, the more detailed implementation is delegated to the Ministry of Trade and Industry (MTI), and further down to the National Technology Agency (Tekes) and the Academy of Finland. This decentralisation of S&T policy formulation is specific to Finland. In addition, members of the council include the Minister of Education and Science, the Minister of Trade and Industry, the Minister of Finance, and several other ministers. In addition to them the membership includes ten other members well versed in science and technology. Other members are representatives of the Academy of Finland, the National Technology Research Centre of Finland (VTT), universities and industry, as well as employers' and employees' organisations. The Council of State appoints the members for a three-year term. The Science and Technology Policy Council was established in March 1987. The triennial policy statements made by the council are listed below:

1987: Science and Technology Policy Review 1987

1990: Guidelines for Science and Technology in the 1990s

1993: Towards an Innovative Society: A Development Strategy for Finland

1996: Finland: A Knowledge-based Society

2000: Review 2000: The Challenge of Knowledge and Know-How

2003: Knowledge, innovation and internationalisation

The availability of capital has, however, become a less severe problem since the early 1990s, as a consequence of the rapid development of the capital market. The remaining shortcomings in finance relate to very early stage of funding and still relatively undeveloped private venture capital industry (Hyytinen and Pajarinen, 2003). Hence, the issue of technological spillovers is now increasingly becoming an outspoken guide for industry policy intervention. That is in line with the central role given to innovation policy in overall industry policies. However, this externality-based policy justification is more intuitive than based on studies and exact knowledge of the magnitudes and significance of external economies (see Georghiou, Smith, Toivanen and Ylä-Anttila, 2003).

Although the Science and Technology Policy Council – alongside the Economic Council – has played an important role in formulating broader guidelines, the more detailed content of new industrial policy is defined by the Ministry of Trade and Industry (MTI). An important White Paper in this context was the "National Industry Strategy for Finland", published in 1993. This White Paper was significant, since it redefined industrial policy along the lines of 'industrial clusters', as introduced by Michel Porter (Porter, 1990). The Porterian framework found widespread appeal in Finnish economic policy circles for various reasons. Despite the heterodox theoretical foundation of cluster thinking, it was widely compatible with new growth theory in emphasising the importance of human capital and knowledge spillovers. It provides a broad framework which emphasises the creation of advanced production factors, well in line with the national innovation system (NIS). As a matter of fact, the early adoption of the NIS concept as a basic framework of S&T policy facilitated the rapid diffusion of clusters and cluster analysis in industry policy.[87] Thirdly, and as a corollary to the first and second points, public expenditures on R&D, education, and technological infrastructures are considered to be the most important channels for industrial policy.

This White Paper drew on ongoing research on industrial clusters in Finland, undertaken by the Research Institute of the Finnish Economy (ETLA) and various other national economic research organisations (see Hernesniemi, Lammi, Ylä-Anttila, 1996). It included guidelines for improving the framework conditions for business firms by increasing public R&D funding, communication infrastructures, and the education system. The White Paper also included a short review of existing and future competitive industrial clusters in the Finnish economy, in order to identify areas of importance for the allocation of R&D funding and the design of other industrial policy measures. ICT and health-care were identified as clusters with the potential for strong expansion, while forestry-related clusters were recognised as being relatively stable. Other significant industrial clusters in Finland included the basic metals, construction, energy and transport clusters.

It is noteworthy that the new industrial policy acknowledged the potentials of ICT, even though the breakthroughs of Nokia and other Finnish ICT firms occurred some years later, in the mid 1990s. In the triennial review of the Science and Technology Policy Council in 1996, the recognition ICT and its potential were made more explicit through references to the concept of

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[87] In the review from 1990, the Science and Technology Policy Council introduced NIS as a basic framework for science and technology policy; this was earlier than in any other country. Cf. Romanainen (2002), Jääskeläinen

the knowledge-economy. The review drew on ideas presented in the so-called OECD Jobs Study, which underlined that macroeconomic policies alone would not ensure adequate preconditions for knowledge-intensive growth (Lemola, 2003). The unusually rapid development of the ICT-related industries in Finland – not least due to the breakthrough of Nokia – strengthened further the dedication to R&D funding, in the context of the knowledge economy. Furthermore, the OECD Jobs Study also discussed the favorable linkages between knowledge-intensive growth and employment. This was considered to be an especially important issue in Finland, where economic recovery from the severe recession had not yet boosted employment (the unemployment rate in the mid 1990s was around 15 percent).

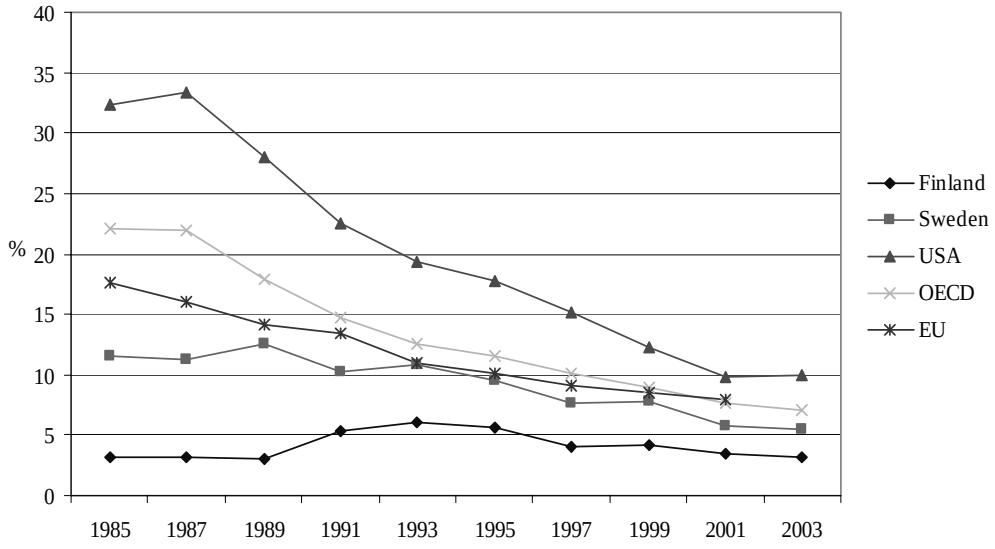
1.5.3.2.3 The organisational landscape of industrial policy in Finland

The increasing emphasis on R&D funding also implied that complementary R&D funding to firms from public sources increased in absolute terms throughout the 1990s, even though the share of public funding in the total R&D expenditures of Finnish firms has remained significantly lower than the OECD average (Graph 1.26). The absolute increase in public R&D expenditures throughout the 1990s is illustrative of the shift from macroeconomic to microeconomic industrial policies of a longer-term nature. It also complemented the increasing levels of R&D expenditures in industry, and was on par with the rapid emergence of ICT, as it became the third pillar of the Finnish economy by the late 1990s. [88]

(2001) and Miettinen (2002).

[88] As shown by recent studies, increasing public R&D funding has not crowded out private R&D. On the contrary, it clearly has had a complementary effect. See Ali-Yrkkö (2004) for a micro-level econometric analysis.

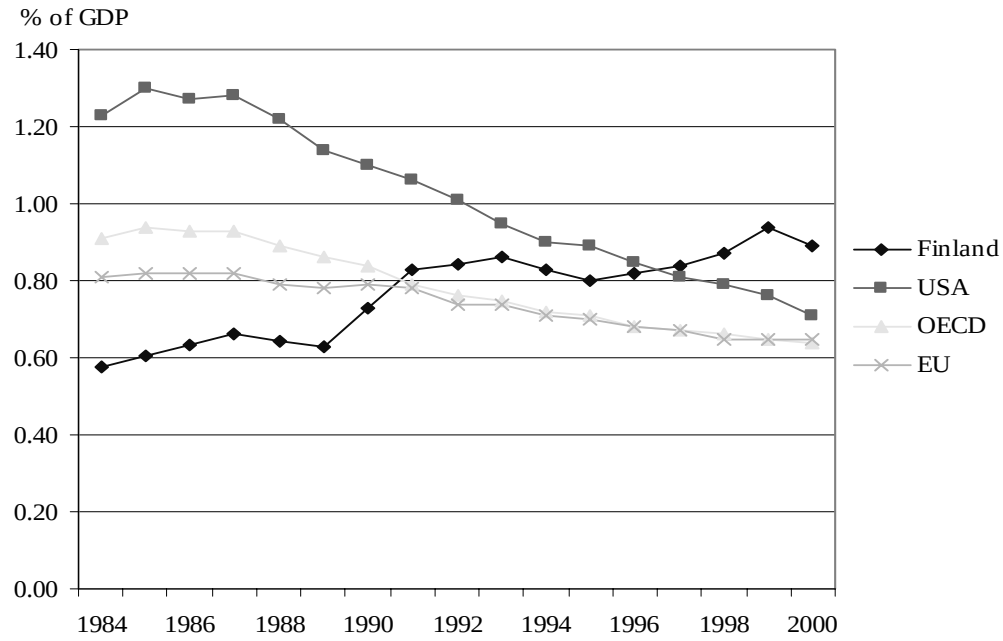
Graph 1.26: Share of public funding in corporate sector R&D



Source: OECD Main Science and Technology Indicators

The organisational landscape of industrial policy in Finland has remained relatively intact since the 1990s (see the Appendix 1.5 for the key public organisations involved in the new industry policy formulation and implementation). The most noteworthy change is that the role of the National Technology Agency (Tekes) has grown in importance along with the increase in public R&D expenditures. Tekes is directly subordinate to the Ministry of Trade and Industry, but enjoys relative autonomy in setting up technology programs and in commissioning the R&D funding that it receives from the state budget. The role of Tekes became particularly pronounced following the 1996 governmental decision to increase public R&D expenditures by a total of €250 million for the years 1997-1999. This implied an increase of about 25 percent in the state's annual R&D budget from the 1997 level. The outspoken aim was to raise the GDP-share of R&D expenditures in Finland to 2.9 percent. These developments during the 1990s are visible in Graph 1.27 as the significant increase (also by international standards) in intramural governmental R&D spending.

Figure 1.27: Government-financed expenditure on R&D (GERD)



As Graph 1.27 shows, the government – and the Science and Technology Policy Council – kept their commitment to increase R&D funding even during the period of economic crisis in the early nineties, although practically all other public expenditures were cut. The activities of Tekes benefited most, although the Academy of Finland also received additional funding for basic research at the universities. Other important industrial policy organisations in Finland include Finnvera, Finnish Industry Investment, regional TE-centres, and Finpro, which provides business support services for internationalisation. The Finnish National Fund for Research and Development (Sitra) was also an important public actor during the development of the venture capital industry in the early 1990s. These major players in industrial policy are introduced in Box 1.9.

As far as volume is concerned, this substantial increase in public R&D expenditures has been the single biggest industrial policy initiative during the ongoing era of new industrial policies in Finland. Nonetheless, the changing content of the policy should also be stressed. The clearest example of the new systems view of industrial policy was the initiation in 1997 of the so-called cluster program. The cluster program was jointly commissioned by the five main ministries (Ministry of Trade and Industry, Ministry of Education, Ministry of Transport and Communication, Ministry of Agriculture, and the Ministry of Labor), with the main aim of enhancing the international competitiveness of firms within the industrial clusters identified in Finland. This aim was to be realised through the promotion of networks between the public and

private sectors. The program ran between 1997-99, although some activities have been extended until today. Altogether it accumulated costs of some €100 million, it was an important policy initiative of the 1990s (Lemola, 2001).

Box 1.9: Major industrial policy players in Finland

Finnvera is a state-owned company, specialised in financing, and administered by the Ministry of Trade and Industry. It is also Finland's official Export Credit Agency and acts as an intermediary between the European Union's financing programs and Finnish SMEs. It focuses on the promotion and development of SME operations, as well as on the internationalisation of firms and export operations, by offering financing services. Finnvera's business financing includes loans, guarantees and export credit guarantees.

Tekes is the main financing organisation for R&D in Finland, established in 1983. Tekes provides funding and expert services for R&D projects to companies registered in Finland and to Finnish research institutes and universities. Tekes also promotes national and international networking; its services are available via the network of TE-Centres. In addition to funding, Tekes provides various expert services and organises technology programs in selected strategic areas.

Finnish Industry Investment (FII) is a state-owned equity investment company administered by the MTI. Its task is to improve the conditions for SMEs by investing equity into venture capital funds. FII can also make equity investments directly into target companies, particularly in business ventures requiring long-term risks. Regional funds target companies in various growth stages in the fund's regions. FII also engages in direct investment together with other investors and financial institutions.

TE-Centres are public offices under ministerial supervision, consisting of a network of 15 regional offices with business departments, whose task is to serve the needs of SMEs by providing business support services, consultation and advice, as well as financing. In addition, they serve as a regional network for the other organisations and channel their services into the regions. Close to half of the aid comes from EU Structural Funds and is directed to the EU objective areas.

The Foundation of Finnish Inventions supports and promotes the development and exploitation of inventions. FFI's services and funding provide a chain of support for individuals and micro enterprises throughout the invention process up to commercialisation. Free information on the development of inventions, patenting, and commercialisation is offered through FFI's invention agents, and also through various invention fairs and events, where FFI provides general advice. FFI can also help establish links with businesses locally and abroad, as well as provide legal and contractual assistance.

Finpro is an expert service organisation, partly financed from public funds, providing business support services for internationalisation, as for example market information and advice, business development, consulting and marketing services, and the organisation of innovation programs. Firms can purchase services for their international marketing needs from the recently incorporated Finpro Marketing Ltd, which functions as a private corporation and does not receive government support.

The Finnish National Fund for Research and Development, *Sitra*, is an independent public foundation under the supervision of the Finnish Parliament. Sitra's tasks include providing research information on Finnish society for the basis of decision-making, organising innovative operations to create new cooperative networks and training for decision-makers, media representatives and professionals, as well as providing corporate funding for the technology companies in the their early stages of existence

The Academy of Finland is an expert organisation in research funding and science policy. Its object is to promote high-level scientific research through long-term quality-based research funding, science and science policy expertise and efforts to strengthen the positions of science and scientific research. *The Academy of Finland* covers all scientific disciplines, and it is subordinated to the Ministry of Education.

The cluster program is also evidence of a more significant shift towards the increasing regional emphasis of industrial policies. This shift stemmed from a new industrial policy rationale, which called for the creation of a critical mass on the regional level to thereby enhance the

competitiveness of Finland as a whole. The consequence of this shift is increasing emphasis on active regional initiatives, whereby the relevant authorities were urged to support the development of competence centres and clusters based on the unique competitive strengths of the respective regions. This is compatible with the philosophy of the EU's Lisbon strategy for enhancing the competitiveness of the EU in global markets, and marks a partial change in previous policy in Finland, which primarily defined industrial policy at the national level. In 1995, Finland's membership in the EU also provided access to the Structural Funds, whereby the regions had strong incentives to formulate policy strategies on their own.

Nonetheless, this is not to say that the increasing regional emphasis of industrial policy in Finland has shifted the attention of policymakers away from the challenges of competitiveness, economic development and growth at the national level. Since the turn of the millennium, it seems fair to say that the enthusiasm towards cluster-oriented policies has been fading slightly. Despite the quick recovery from the severe recession of the early 1990s, the rapid growth (especially in ICT-related industries), and Finland's recent high ranking in various competitiveness reports, new industrial policy challenges now hover over the horizon.

1.5.3.3 What is specific to Finnish industrial policy?

Looking at the shifts in Finnish industry policy since the 1990s, and at its current specificities, one can pick out three or four main elements which deserve a more detailed discussion. The first one is the strong integration of science, technology, and innovation policies. The second is the early adoption of a systemic view of industry policies. The third, which is a corollary to the second, is the Finnish way of realising cluster policies – not by picking the winners or creating and planning clusters, but rather by thinking broadly in terms of clusters when devising national industry policies.

In all these respects, the policy practices are typically Finnish and are quite different from those of most other countries. All three are briefly discussed below.

1.5.3.3.1 Early integration of industrial, science and technology policies[89]

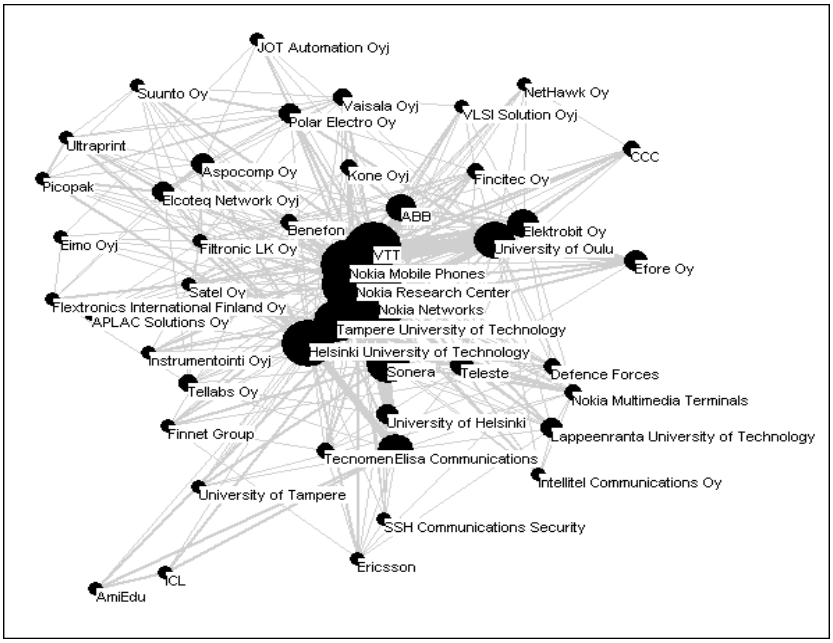
One of the strengths of Finnish industry policy is undoubtedly the strong linkages between industrial, science and technology policies, and the dense interaction and networking among business firms. In terms of policies, this is reflected in the establishment of the Science and Technology Policy Council in 1987, as well as in closer collaboration between Tekes and the Academy of Finland during the design and implementation of specific measures and programs. Collaboration is also institutionalised through the so-called 4DG meetings between Tekes, the Academy of Finland, Sitra and the Technical Research Centre of Finland (VTT), which are held regularly.

Furthermore, technology policies can be characterized as having an "industry-pull" focus as opposed to a "science-push" which was typical of policies pursued in the 1960s and 1970s. The main instruments used in technology policies are technology programs commissioned by Tekes that have a strong problem and industry orientation (technology programs account for roughly 40 percent of the total R&D budget of Tekes).

In technology programs, a common practice has been vertical collaboration and the networking of universities, research organisations, and SMEs, with large firms as the industrial engine. An example of this is given in Graph 1.28, which illustrates the collaborative linkages in two electronics technology programs (ETX and TLX) commissioned by Tekes. In these programs Nokia has been the industrial engine.

[89] In this paper, we use the concepts of science policy, science and technology policy, technology policy, and innovation policy. However, the use of innovation policy has only recently become common. Science policy has its roots in the 1960s, and S&T policy started to show up more frequently in policy discussions during the 1970s and 1980s. Establishing Tekes in the early 1980s, emphasised the role and concept of technology policy. However, as discussed below, the practical integration of science and technology policy has been the most important feature of policy making.

Graph 1.28: The collaborative linkages

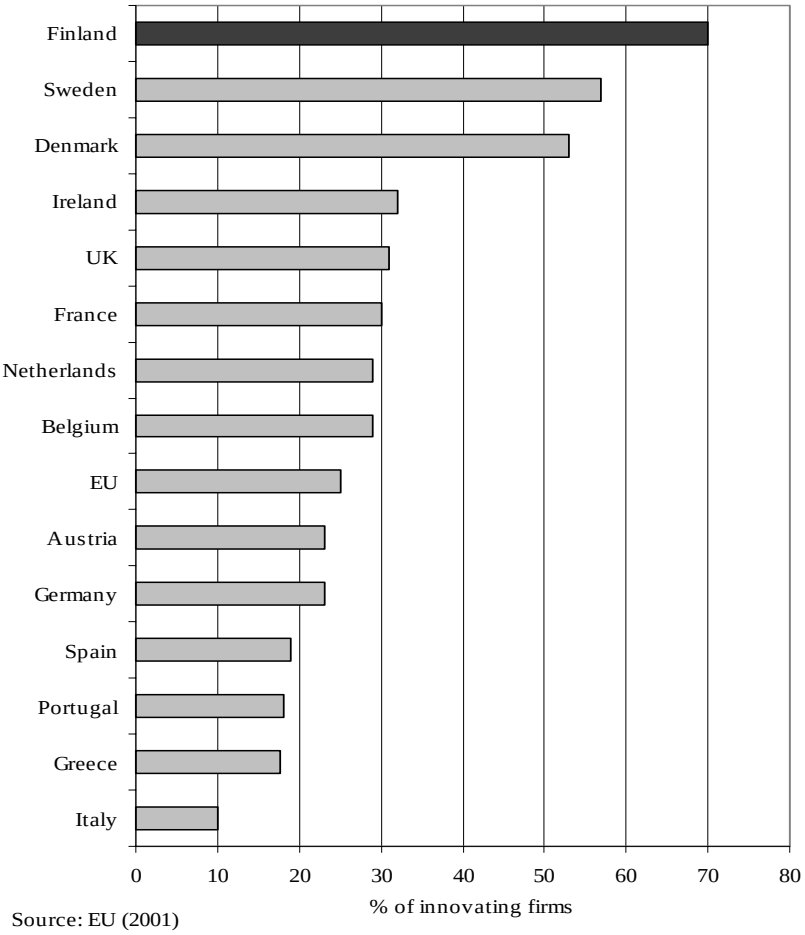


Note: The figure includes both company ventures and larger research projects. Included are partners with a minimum of three projects with the Nokia Corporation. Information is based on the end reports of ETX and TLX programs. The figure is to be interpreted as follows: the more projects the organisation is involved in, the larger the circle and the closer it is to the centre. (Source: Ali-Yrkkö and Hermans, 2002).

While emphasising collaboration in R&D, it is important to note that funding both from Tekes (applied research and development) and the Academy of Finland funding (basic research) is competitive. Research institutes and firms are competing for funding in open bidding. That has had a major impact on the allocation of funding and the efficiency of publicly funded research and development, and underlines further the "industry-pull"-nature of technology policies.

Furthermore, the Finnish economy and industry can be described as open, specialised and networked. Networking and collaboration in the business sector, and between industry and universities, have proved to be important in developing ICT (Romanainen, 2002), and Paija, 2002). In periods of rapid technological change, the smallness of the economy has proved to be beneficial to the creation and diffusion of new knowledge in specific areas (Palmberg and Martikainen, 2005). This is further evidenced by CIS (Community Innovation Survey) data, which indicates that firms from small open European countries, and from those heavily specialised in ICT, are more likely to collaborate in their innovative activities than firms coming from larger countries, as shown in Graph 1.29.

Graph 1.29: Extent of collaboration with other firms and universities during innovation



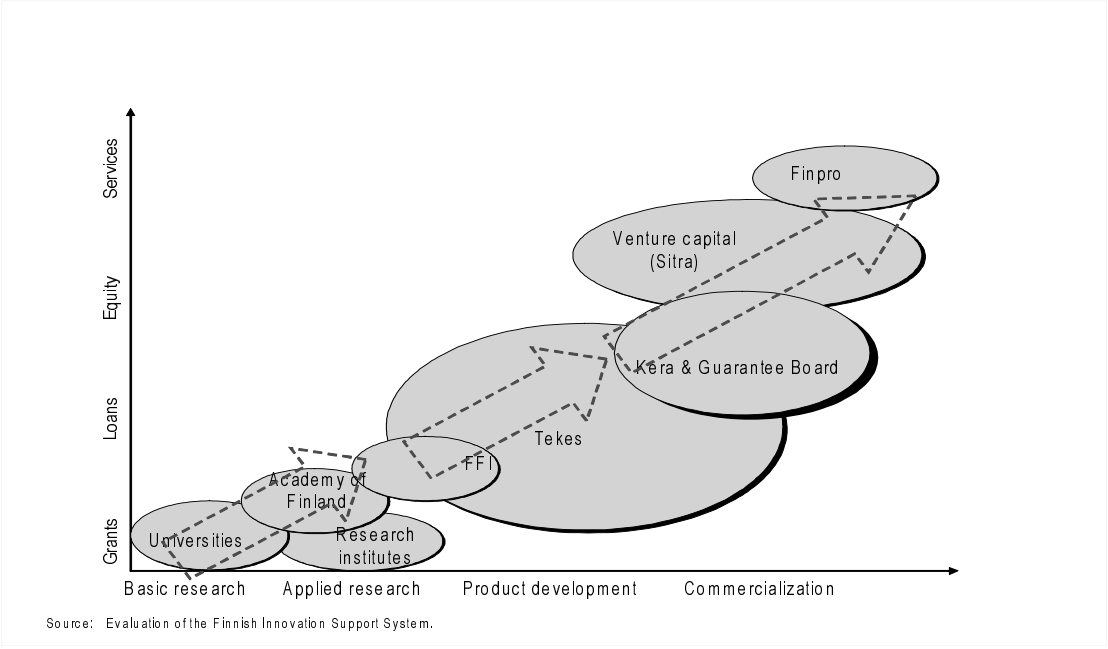
Source: EU (2001)

1.5.3.3.2 Early adoption of a systemic view on policy

The concept of the national innovation system was adopted in the policy discussion and its actual design in the early 1990s, only a couple of years after it was introduced in the literature (see Freeman, 1987 and Lundvall, 1992). However, policies emphasising the research system as a whole, and interaction amongst the policy agencies, have their origins in the late 1980s. This also fits well with the new policy approach of shifting from intervention to facilitation. New policies and national strategies were called for in the midst of a deep recession and rapidly increasing globalisation of the world markets. Technology policy became the most important part of industrial policies, where the focus was on enhancing specialisation and the international competitiveness of firms through innovation. The policies clearly took a longer term view, which was motivated by structural problems underlying the recession.

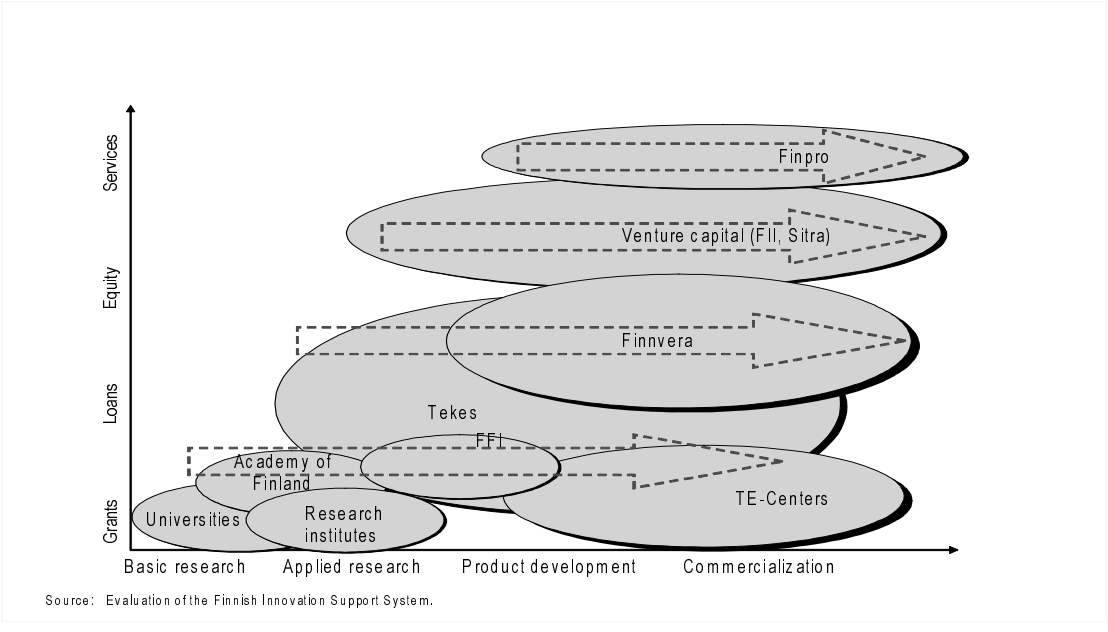
There was also a shift in innovation policy thinking due to rapidly advancing technological change and the ever shorter life cycles of products and technologies. Policymakers started to move away from the old linear model towards a systemic one, i.e. the phases of the innovation process were seen as increasingly simultaneous, rather than sequential. Correspondingly, policy organisations started to co-ordinate their activities in new ways (Graphs 1.30 and 1.31).

Graph 1.30: Organisations supporting innovation in the 1980s



Source: Evaluation of the Finnish Innovation Support System.

Graph 1.31: Innovation supporting organisations – the current system



Source: Evaluation of the Finnish Innovation Support System.

Graphs 1.30 and 1.31 depict, in a stylised way, how the policy organisations have perceived their functions over time. The division of work in the 1980s reflected the linear innovation model and associated policy rationales and objectives. Today, innovation is seen as having a systemic character, which means that policy agencies, while serving their own specific function in the system, take into account the functions of the others. As an example, Finpro (an organisation which promotes commercialisation) has been establishing closer collaboration with Tekes, whose basic function is to support R&D, and vice versa. This is especially important in industries where product life cycles have become very short (like ICT), and R&D and the launching of new products is taking place almost simultaneously.

Industrial clusters accord well with this new systemic view on innovation policies. Cluster-based policies were introduced a couple of years after the adoption of NIS thinking in S&T policy. This is probably one of the reasons why clusters and cluster analysis were used differently in Finland than in many other countries.

1.5.3.3.3 Implementing cluster-based policies

The basic idea of cluster-based policies is that there is a growing interdependence of firms and industries due to the increasing knowledge intensity in all economic activities. The knowledge economy is characterized by technology spillovers, innovation linkages, value chains in production, and network type organisations. All of these call for policies promoting collaboration and networking, and enhancing the internalisation of external economies within the relevant technological or geographical entities.

Industrial clusters can be used as a conceptual frame work and policy tool when coping with challenges arising from the increasing role of knowledge spillovers and technological externalities. Industrial clusters can be defined as an agglomeration of producers, consumers, and competitors that increases specialisation, promotes efficiency and is a source of competitive advantage. The key is simultaneous collaboration and competition – collaboration is needed to enhance specialisation, but rivalry is necessary for continuous innovation and the upgrading of products and processes. The policy challenge is to promote both competition and networking. Again, the technology programs of Tekes can be taken as an example – collaboration and networking are prerequisites for the receipt of funding from the program. In many cases, such networking creates advanced intangible factors of production and common knowledge bases. Both are characterized by external economies and, hence, public policies are justified and are often successful (OECD, 2001).

The Porter model and cluster approach include important industrial policy conclusions which have been adopted differently in various countries. Due to the preceding ideas stemming from the innovation system approach, cluster-based policies took a very broad view on clusters and also on policy making itself, as discussed above. Unlike many other countries, Finland has had a relatively narrow scope of cluster-specific policies, which often have been used as substitutes for previous policies based on the "picking the winners"-approach. National priorities (for example, in formulating technology programs) have certainly played a role, but the basic idea has been that of creating framework conditions for new technologies and lines of business. The notion of government failure is clearly acknowledged in policy documents.

Knowledge on national strongholds and interdependencies across industries and industrial agglomerations is certainly needed. Hence, part of the goal of industrial policies is to create a clear vision of potential competitive advantages and restructuring requirements, and to communicate that vision to all actors in the economy.

1.5.3.4 Concluding remarks and future challenges

1.5.3.4.1 The success of industry policies – policies matter

In hindsight, the policy choices made in the early 1990s have been evaluated as highly successful (see Jääskeläinen, 2001, 2005, Georghiou, Smith, Toivanen and Ylä-Anttila, 2003). The developments towards a knowledge-based economy have further signified the role of policies focused on the creation of optimal conditions. In the current stream of thought, industrial policies are understood as measures to enhance industrial growth and improve the microeconomic business environment, rather than to subsidise ailing industries or to pick the winners. It recognises the freer movement of production factors and the significance of locational competition – and hence the role of policies in improving the business environment. These ideas are well in line with cluster analysis, which – despite its factor-endowment flavour – emphasises the role of business firms themselves as the creators of their own competitive edge in the product markets.

The economic turbulence of the 1990s in Finland exemplifies this. The industrial development proved to be quite different from what was originally expected in the mid-1980s. Rapid reactions of firms were needed, but at the same time policies responded through supporting the development of a strong knowledge infrastructure and a highly educated labor force to meet the demands of the emerging knowledge economy. The rapid increases in public R&D funding in

the 1990s, have also turned out to be successful. They have been clearly complementary to private R&D and the estimates of the rate of return on R&D investment as a whole seem relatively high (see Ali-Yrkkö, 2004), and Georghiou, Smith, Toivanen and Ylä-Anttila, 2003). One of the factors explaining the high returns is the simultaneous increase in educational inputs that have been complementary to R&D investment.

An indisputable lesson from the Finnish experience is that industry policies must have a long-term strategic perspective. Hence, policies must be consistent over the long-term and not dictated by short-term cyclical or political considerations. It is our overall judgement that the Finnish policies were able to find a proper balance between activism and non-interference. The role of government was to act strongly enough where the market was failing – i.e. in R&D and education – and to create and communicate a common vision of future national strongholds without intervening too much in the functioning of markets. The restructuring of industries and the knowledge-driven growth of the Finnish economy during the past 10 – 15 years has undoubtedly been a European success story. It certainly was difficult to attain the top position in international competitiveness, but it will probably be even harder to stay on top. In addition, it seems that competitiveness rankings do not necessarily predict the future growth of economies (Rouvinen, 2004).

There is also the consideration that Finland might be over-dependent on ICT and Nokia. Hence, the central policy challenge is to find a proper balance between high specialisation in ICT production on the one hand, and the diversification of industries on the other. Pro-active policies and new instruments are needed.

1.5.3.4.2 New challenges in a globalising economy

The knowledge- and R&D-oriented, “high-road” strategy that Finland has pursued is now coming under increasing competitive pressure due to similar strategies in emerging economies, such as those in Central Eastern Europe or Asia. Recent research has revealed that Asian countries like Taiwan, South-Korea, and to some extent China, are specialising their exports in the same product groups as Finland. This is particularly the case for ICT products. China has already become a bigger exporter of mobile hand sets than Finland, and South Korea is catching up rapidly.

As suggested above, the issue of globalisation has now come to dominate the industrial policy discussion in Finland. There is general recognition that the present phase of globalisation differs from that of the past particularly due to the pervasiveness and rapidity of technological change, and the removal of barriers to trade and financial transactions. This presents specific

challenges to small open economies with limited absolute resources, such as Finland, which have to compete on the global level as a location of industrial activities. This applies in particular to ICT. Finland certainly enjoyed the advantages of early entrance to the network industry, and, at the same time, of its position as a setter of standards. These advantages have lost part of their significance. There is also increasing concern about the comparatively low level of entrepreneurship in Finland, the unfavourable demographic structure of the population, and continued imbalances in foreign direct investments.

The issue of globaliszation took centre stage in the most recent triennial review of the Science and Technology Policy Council from iin 2003 entitled “Knowledge, innovation and internationaliszation”. This review emphasiszed that internationaliszation has to proceed at the level of the Finnish innovation system as a whole. This emphasis is in line with the observed increasing internationaliszation of Finnish firms. The main guidelines provided in this review concern the increasing utiliszation of technological and social innovations in business enterprises, with a view towards acceleratinge the renewal of the traditional industries, further increaseing of the R&D resources budgeted to Tekes and the Academy of Finland, the promoting utilization of research at the universities and , education in the natural sciences, and the internationaliszinge of the public R&D system. These broader guidelines are made more concrete concretized in the recent report by the Science and Technology Policy Council published in November 2004, and entitled “Internationaliszation of Finnish Science and Technology”.

The most recent and significant globaliszation initiative stems from the Prime Minister’s Office and the Economic Council. The Prime Minister’s Office commissioned a large project which started in January 2004 under the title “Finland in the global economy”. The aim of this project was to assess how the ongoing transition in the world economy will affect various sectors and their employment prospects in Finland and what challenges the changing business environment will create in various areas of social policy. The final report of this project was published at the end of 2004 and is entitled “Finland’s competence, openness and renewability”. The project is intended to feed into ongoing work for the formulation of a globaliszation strategy for Finland.

Box 1.10: The report on "Finland's competence, openness and renewability"-report

The aim of this project was to assess how the ongoing transition in the world economy will affect various sectors and their employment prospects in Finland and what challenges the changing business environment will create in various areas of social policy. The final report of this project was published at the end of 2004 and is entitled "Finland's competence, openness and renewability". It is based on numerous background studies commissioned from national think-thanks and experts, over 20 sectoral dialogues conducted between employers´ and employees´ organiszations, and the work of the high-level steering group appointed for the project. The project is intended to feed into ongoing work for the formulation of a globalisation strategy for Finland. It proposes a compendium of measures towards this end, of which the main ones are the following:

Improving the *quality of the education system* through increasing the attraction of vocational education, enhancing the financial autonomy and incentive-based funding of universities, increasing the efficiency and international attractiveness of polytechnic education.

Strengthening *innovation policy* through catering to shortcomings in competence in the early -stage of productization and commercialiszation, increasinge public R&D resources by at least 7% per annum during the current decade, increasinge allocations to capital investment funds for pre-seed and start-up activities, and facilitatinge the further shift from S&T policy to innovation policy.

Increasinge the attractiveness of the *business environment* through further easing further of the taxation on labour in all income classes, increasinge employment-based immigration, developing new networks in emnerging technology centres such as China, South Korea and Taiwan, increasinge the exportation of public-sector welfare services and culture, and developing further domestic and international transport connections.

Strengthtening the *renewability of Finland* by raising the employment rate, developing a long-term business environment policy strategy, putting tendering public services out to tender, improveing the productivity of the public sector, and increasinge the efficiency of the stock exchange.

Developing the *ground rules of the labour market* through by enhancing working time the flexibility of the workday, narrowing the tax wedge, with an emphasis oin the low-incomes end, and developing further the unemployment benefit system so that re-employment is encouraged through new incentive schemes.

1.5.3.4.3 Promotion of entrepreneurship - tax incentives as new policy instruments?

The lLow level of entrepreneurship has been identified as one of the key weaknesses of the Finnish economy. The innovation support system, as which is a central part of to industry policies, should address in particular the problems of potential R&D-oriented entrepreneurs. This is all the more important, since poor performances in the commercialiszation of technologies and shortages in business skills are seen as major bottlenecks of in the Finnish innovation system. Hence, increasing the number of start-ups could facilitate the further commercialiszation of technological innovations and thereby enhance the overall performance of the innovation system.

To In responsed to these challenges, tax incentives as new policy instruments are proposed by the report "Finland in the Global Economy" report (Prime Minister's Office, 2004). In Finland, tax incentives have been used relatively little in innovation and industry policies. In thisat sense,

the policy proposals of in the report represent a new opening are suggestive of a new direction. In doing so, the report acknowledges the tax competition as a potential source of re-shaping the European and global industrial landscapes. However, tax instruments are just now entering the policy debate, and it may take a long time before any of them are adopted in actual policy making.

If the Finnish industry policy took a broad widened its scope and started to adopt a systemic view in the 1990s, systems competition will demand a new, and, and perhaps even broader scope is needed in the 21st century in systems competition (see Sinn, 2003). Countries and regions are likely to compete for increasingly mobile factors of capital and production, also with including their social systems and economic institutions. In the case of Finland, as a small open economy, this type of systemics competition will require a further continued focus on centrers of excellence policies in research and education, i.e. concentrating high levels of education and R&D to in yet fewer locations to create critical mass. The justification is simply that in a globalised world economy, a small country can be competitive only in a couple of areas in of science and technology. To facilitate technology transfer and new entrepreneurship, more emphasis will also be put placed on the IPR (intellectual property right) system. Increasing the economic and administrative autonomy of universities is also high on the new policy agenda. Here, again, putting offering the right incentives right, is the key.

The systemic view and collaboration between different policy actors will remain the central feature of Finnish industry policies. Thisat is also seen as one of the means to of encouraginge entrepreneurship, but by incorporating new measures – like tax incentives – into the system. The emphasis has also been moving – although somewhat slowly – from technology to innovation, and even further to the commercialiszation of technologies. This will call for more collaboration and, especially, co-ordination among the industry policy actors. Collaboration and the co-ordination of activities between policy actors, that have originally been established to serve their specific functions in industry policies, is hard to implement. Building up such a co-ordinated system – without creating bureaucracy – has a high priority in the policy makers' agenda of today.

1.5.4 Industrial policy in the new member countries[90]

1.5.4.1 The main approaches to industrial policy as compared to the "mainstream" in the EU and the world

Each of the transition economies of Central and Eastern Europe had suffered from overcentralised and inefficient industrial policies prior to 1990. These ranged from the relatively liberal Hungarian (and also to some extent Polish) practice to the extremely interventionistic schemes of industrial development regulation in East Germany, Czechoslovakia and Romania. Yet even the Hungarian industry was subject to very serious structural distortions due to Socialist industrial policies. Most of its capacities were found to be unable to compete and therefore became redundant when the country opted for import liberalisation and opened up its markets to all kinds of foreign competition in 1989–1991.

The Hungarian example of import liberalisation was followed by all transition countries of Europe in the first half of the 1990s. The COMECON was dissolved in 1991. Both GDP and industrial output declined dramatically: certain transition economies (mainly those from the former Soviet Union, including the Baltic republics) lost more than 50 percent of their pre-1989 GDP during the first years of transition. Even the more advanced transition economies admitted to the EU in 2004 were able to return to their pre-1989 GDP levels only in the late 1990s. Between 1988 and 1993, industrial output dropped by more than 40 percent in Hungary and Poland (and even more in less developed economies of the region).

The "transitional recession" called for completely new approaches to economic policy in general, and industrial policy in particular. As a rule, the transition economies of Central and Eastern Europe[91] (CEECs for convenience) more or less hesitantly adopted the "Washington Consensus" most of the elements of which were regarded as prerequisites for the support by the international financial community for the transition process. These principles and guidelines were also understood as requirements for later admission to the OECD and subsequently to the EU[92].

Industrial policy thinking of the early transition governments was characterised by an outspoken liberal approach, leaving structural change entirely to the market (cf. Biesbrouck and Jackson, 1995). For

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[90] Prepared by Adam Toeroek.

[91] We use the terms CEECs (Central and Eastern European Countries) and New Member Countries interchangeably. It should be noted, however, that the CEECs include countries which are not members of the EU-25 (Romania and Bulgaria) and that some of the New Member Countries had not been CEECs (Cyprus and Malta). Since the CEECs had not yet been member countries in the 1990s, those parts of the report describing industrial policies in the 1990s might prefer using “CEECs”, while paragraphs looking ahead may use the term “New Member Countries”.

[92] They included (not in order of their importance): privatisation; trade liberalisation, deregulation in factor markets including liberalisation of foreign direct investment and giving up the political responsibility of governments for maintaining full employment; elimination of government controls on prices; comprehensive fiscal reforms with the introduction of direct and indirect taxes in conformity with EU standards and widespread cuts of state subsidies; effective competition policies; more efficient and market-oriented education, pension and health care systems; and decentralisation of a range of former government tasks of economic co-ordination.

example, a very strict bankruptcy law was adopted in Hungary in 1992. The example of the European Union was also quoted in support of this liberal set of arguments (Török, 1995, p. 105), where it was pointed out that the Treaty of Rome did not contain any element permitting industrial policy. The idea of "implicit" industrial policy packaged in technology policy, competition policy and regional policy measures and using a strong horizontal approach was not shared by the majority of decision-makers in those countries at that time. Basically any government role in industrial development was challenged as a return to former policy practices, and a "hands-off" pattern of industrial policy seemed to prevail in most CEECs.

The actual policy mix, however, was a bit different. The Hungarian government gave up its extremely liberal approach to industrial policy already in 1992–1993 when it found that it could not remain a passive observer of the collapse of a string of manufacturing firms which were important in exports and employment. Further arguments for government intervention in this respect included corporate debt burdens inherited from pre-1990 times and poor chances of privatisation for indebted firms.

Box 1.11: Crisis management in the Hungarian industry

At the start of 1994, the consolidation package of the Hungarian “Dirty Dozen” (12 industrial firms in the engineering, aluminium, fertiliser, rubber and glass industries, to which three more companies were subsequently added) carried the following price tag: USD 700 million in debt cancelled, USD 30 million in debt rescheduled, and USD 500 million in debt swapped for equity. Furthermore, USD 300 million in tax arrears were rescheduled and USD 510 million from privatisation revenues rechanneled to these firms (Török, 1995, p. 108). To compare: the expenditure side of the state budget amounted to about USD 23 billion in 1994. Basically all of these firms could be privatised in the second half of the1990s, but revenue from such privatisation was not much higher than the bill of the consolidation package.

Poland has had some kind of industrial policy only from September 1993 onwards (e.g. Lipowski and Kulig, 1995, p. 241). Slovenia’s policy for the restructuring of manufacturing firms to be offered for privatisation was carried out by the Development Fund (Stanovnik and Lapornik, 1995). Bulgaria had a policy package for "marketisation" in the early 1990s, but industrial policy remained utterly passive due to political changes in 1992 (Dobrinsky, 1995). The Romanian government introduced an ambitious industrial restructuring programme in 1993 (Mihaescu with Biesbrouck, 1995) but this programme was basically a failure (Balla, 2002).

Independent Czech and Slovak industrial policy followed the lines of Czechoslovak demonopolising and restructuring efforts between 1990 and 1992 (Flek, 1995). The Czech government was, at least in the early 1990s, the only one in the former CEECs which openly diverged from the neo-liberals approach still dominant in the region at that time. Elements of implicit industrial policy could rather be observed in Slovakia: thus Slovak competition laws (similarly to those in Hungary, Romania and Slovenia, e.g. Kravtseniouk, 2002) included exemptions from otherwise strict cartel regulation and merger control where greater domestic market power was considered helpful in increasing the export competitiveness of Slovak firms.

The first industrial policy packages in the transition process served a double purpose. The rhetoric was more or less that of the "pure mainstream" borrowed from standard international macroeconomics (e.g. Krugman-Obstfeld, 1991, 2000), with a straightforward rejection of any kind of industrial policy. The practice was much more coloured when the industry restructuring process had to be launched as a prerequisite for privatisation. Whilst no explicit industrial policy packages were announced, governments became increasingly more active in directing structural change.

Industrial policy thinking in the New Member Countries gradually began to change from the late 1990s onwards when it became evident that "competition policy" in the European Union has been, at least in part, a code name for industrial policy since Maastricht. Two sets of ideas may be identified at this point.

First, the stronger profile of strategic thinking in the European Union which emerged with the Lisbon Strategy made it plain to economists in the CEECs that modern economic policy thinking is not necessarily in line with the "Washington consensus"-based set of ideas, and that rejecting (or having reservations on) some elements of the "consensus" does not mean a return to Communist economic policies. Second, the works of Nobel Laureate Joseph E. Stiglitz and his followers recently gained some ground and reputation among the economic and intellectual elites of most CEECs. Parts of these elites became convinced (or at least aware) of the fact that governments need not necessarily be incompetent, bureaucratic and corrupt, and that increases in competitiveness and welfare may potentially also be expected from well-designed government policies.

Industrial policies of the CEECs in the early 2000s definitely carry the hallmark of changes in approaches and come up with modernised toolkits. Still, it would be exaggerating to think that these industrial policies can be really effective in helping countries to fulfil their own convergence-related objectives. An attempt towards their balanced assessment is set out below.

1.5.4.2 Profiles and performances of industrial policy in the New Member Countries

During the 1990s, rhetorics and content were not necessarily in accord in Central European industrial policies.

1.5.4.2.1 The way from liberalism to innovative industrial policy through sectoral crisis management

Hungarian industrial policy started with a marked neo-liberal approach around 1990. It switched to crisis management between 1992 and 1995, and took a more strategic character based on (but not going much beyond) an elaboration of long-term development scenarios between 1995 and 1998. Hungary was also the first country in the region pioneering a technology outlook in the second half of the 1990s, but this work was not translated into industrial policy action. As a matter of fact, the Hungarian industrial policy of the 1990s was relatively successful in introducing a number of tools for promoting innovation,

supporting SME development and attracting foreign direct investment, but a marked industrial policy profile was missing most of the time. A spectacular turn towards active industrial policy was taken in 2000 under the code name of "Széchenyi Plan".

Box 1.12: The Széchenyi Plan and its successors

This plan was an ambitious version of supply-side economics with a great deal of government support for development projects in tourism, R&D, the SME sector and subcontracting networks. Its strength was, however, not in the amounts of state aid provided to the supply side since it was basically an umbrella for diverse support programmes which had existed before in a loose and not well-co-ordinated structure. The Plan was excellently marketed and created the impression that the government had decided to become active in industrial policy which was an important message for domestic entrepreneurs. It also included sectoral support schemes in fields where Hungary was considered traditionally strong but underfinanced (e.g. health tourism, bioproducts from domestic materials, and the historic buildings restoration programme in order to create high-level restaurant facilities). The Plan was based on non-reimbursable state aid granted on a discretionary basis, not in conformity with EU rules. It was terminated in 2002, but was succeeded by some industrial policy programmes.

Successor 1: the Széchenyi Programme for Enterprise Development is a preferential credit line mainly designed to help domestic firms. The total amount of such credits to be offered by the state-owned Hungarian Development Bank is in the range of EUR 8 billion.

Successor 2: the "Smart Hungary" programme features two new elements of investment support: tax credits based on EU rules, and the option for firms to create tax-exempt financial reserves to be used for later investment.

The focus of Hungarian industrial policy is increasingly on innovation, at least as far as really new elements of industrial policy are concerned. The government's technology policy agency (OMFB) introduced a series of innovative tools of innovation promotion increasing BERD (BERD is Business Expenditure on Research and Development) and also having network-building effects.

Box 1.13: Promoting networking by innovation policy

One aspect of the networking approach is represented by the "Integrator" funding scheme. Launched in 1999, it offers government subsidies to such manufacturing firms as conclude long-term subcontracting agreements with at least two domestic R&D firms or suppliers of high-tech components.

A different kind of policy tool to promote network-building is the "Joint Research Centres" scheme (not to be confused with the funding scheme known under the same name in the EU Framework Programmes). A Joint Research Centre may be established by a major foreign investor in Hungary at a cost of no less than EUR 2 million, and creating at least 30 R&D jobs. If these conditions are fulfilled, the Hungarian government foots 25% of the bill, but normally no more than EUR 0.5 million will be paid. This incentive lured important R&D capacities of Audi, Nokia and Knorr-Bremse to Hungary.

Activation of Hungarian industrial policy after 1998 included a shift towards such a horizontal approach which involved less direct expenditure by the government but made life considerably easier for SMEs.

Box 1.14: Fiscal innovation as a tool of SME policy

A truly innovative element of Hungarian SME policy is the "Simplified Corporate Tax" (SCT) introduced in 2003. This tax is levied on the gross sales of firms below a certain level of turnover (approx. EUR 100,000 in early 2005). Paying the SCT replaces corporate tax, VAT and personal income tax payments (plus a string of other special taxes, but not social security payments). The SCT amounts to 15 percent of

gross turnover. The firms opting for this kind of taxation need to have only a very simplified bookkeeping system registering only the revenues (e.g. the tax base) of the company. As of February 2005, close to 20 percent of Hungarian SMEs (mainly ones with low material costs) belonged to this fiscal scheme which was declared to be in conformity with EU rules by the Commission on February 23, 2005. The SCT is an effective and simple tool of SME support while its contribution to the budget is positive.

Changes in *Polish industrial policy* were characterised by ups and downs similar to the development of industrial policy in most CEECs in the 1990s (with Hungary as the most marked example). Yet, the Polish case is quite special due to the traditionally strong role of smokestack industries in the economy.

In 1993, the Polish government decided to pursue an active industrial policy picking up potential or future winners. The time period of sectoral industrial policy in Poland (from 1992 to approx. 2000) showed the influence of politically strong sectoral lobbies from the defence and energy industries, and industrial policy was basically hijacked by them. Domestically owned big firms became the major beneficiaries of subsidies while their competitiveness lagged more and more behind that of the Polish subsidiaries of TNCs and some well managed smaller Polish-owned companies.

The toolkit of the Polish industrial policy has been based on fiscal tools. Discretionary application of these tools was much more widespread in the 1990s. For instance, some handpicked firms were allowed by the government to postpone their social security payments indefinitely.

Box 1.15: Fiscal tools of Polish industrial policy

Investment by the private sector is stimulated by corporate tax cuts for new firms in the first two years (pre-tax profits enjoy a tax exemption of 35 percent in the first year and 20 percent in the second year). Firms investing in SEZs (Special Economic Zones) had full tax exemption for the first ten years of their existence, but this window was closed with Poland's accession to the EU. Discretionary tax exemptions can be enjoyed by firms investing in areas hit by high levels of structural unemployment. The latest available data (provided by *András Bakács*) from 1998 show that only 2 percent of domestically owned firms benefited from corporate tax exemptions while the corresponding share of foreign owned firms amounted to 20 percent.

The new period of Polish industrial policy since 2000 includes elements which may be considered innovative in the given context. Its focus is clearly on SMEs, which means a marked shift away from the former policy approaches built around such vague concepts as "structural change", "favourable framework conditions for industrial development" or "active trade policy".

The main elements of Polish SME policy have a clearly indirect character with only minimal direct flows of funds from government to business. These elements include the creation of a legal system simplifying the creation and management of SMEs (with a simpler tax regime and with government support for venture capital), facilitating their access to innovation, supporting their exports through marketing information services, and fostering networking between them and large firms.

The Polish government removed the main line of SME promotion from its policy portfolio. Tax reform continues to by handled by the Ministry of Finance and the management of state-owned firms is the

responsibility of the Ministry of the Treasury, and an Agency for Enterprise Development (Polska Agencja Rozwoju Przedsiebiorczosci) has been created for defining and implementing SME policy.

1.5.4.2.2 The conflict between rhetoric and policy practice

The *Czech industrial policy* of the 1990s was implemented under various political banners, but its underlying character has been that of a "dormant" or "invisible" industrial policy, with a number of "ad hoc" elements (Kreuzbergová, 2003). Industrial policy action was made the responsibility of players outside the government, mainly state-owned financial institutions.

The programme of firm revitalisation pursued financial rather than structural objectives in the first place. It was beneficial to certain firms which were probably selected on the basis of political considerations. Access to documentation about the non-transparent Czech industrial policy in the 1990s is difficult in government institutions as much as with the key players of the restructuring process (KoB – *Konsolidační banka* and ČKA – *Česká konsolidační agentura*). These latter institutions together with other players of the transition process such as the National Assets Fund (a kind of privatisation agency, FNM – *Fond národního majetku*) and the Czech Financing Agency (ČF – *Česká Finanční*) were used by the government to channel subsidies including debt relief programmes, debt-equity swaps and preferential credits to ailing state firms. The Czech governments of the period were reluctant to reveal the existence of an industrial policy in the country (cf. again Kreuzbergová, 2003).

Assuring a low level of unemployment was more or less a must owing to the strong political influence of trade unions, quite unparalleled in the region. *Management of inherited debt* similar to the Hungarian treatment of the "Dirty Dozen" was also an element of the Czech line of subsidy-oriented industrial policy, but amounts and exact beneficiaries are not known in this field either. *Strategic interests* played a decisive role in determining the future of those sectors such as the aircraft industry which were based on high levels of Czech know-how but faced uncertain prospects on international markets.

1.5.4.2.3 Liberalism without a market

Romanian industrial policy in the 1990s was characterised by procrastination and lack of strategic perspective. Apart from Bulgaria, this was the only potential EU candidate in the region where industrial production did not grow steadily during the decade (the downturn occurred in 1997). A naïve mistake was also made in Romania: in the early 1990s, the government thought that no industrial policy would be the best industrial policy. Their belief was that trade and price liberalisation would suffice for putting the economy and industry on a path of long-term growth.

Some important factors of industrial development were neglected. Market failures proved to be very important in the Romanian economy and the poor condition and technological backwardness of the industrial base also became evident. A "hands-off" kind of rhetoric was coupled with a vague "strategic

trade policy" (e.g. red-tape barriers to foreign competitors to the most influential domestic firms) and the non-transparent selection of national industrial "champions" which received most of the subsidies. The result of this policy choice (or rather: non-choice) was dramatic and points at a crisis of the Romanian industry in the early 2000s[93].

1.5.4.2.4 The reconversion orientation

It can be considered a rarity in the region that explicit priority was accorded to the development of traditional sectors sunk in crisis in the first years of the transition process. This was the case with *Latvia's industrial policy*. Latvian GDP was falling for three years in a row between 1991 and 1993, and the country's only important economic asset appeared to be its stock of human capital. Accordingly, the slogan of creating a "knowledge-based economy" also became a trademark for Latvian industrial policy, but the promotion of innovation did not prove to be a straightforward success (e.g. Lankhuizen, 2000). The real strength of Latvian industrial policy turned out to be its sophisticated understanding of the crisis sectors.

The *Leitmotiv* of its industrial policy has been reconversion (Republic of Latvia Ministry of Economics, 2004): the main elements of this strategy were specifically sectoral in character, and it looked for structural change not between, but rather inside the sectors already well established in the economy. For example, the upgrading of forestry, textile or shipbuilding industry products is an integral part of Latvia's industrial policy similarly to the complex approach to developing the food industry by using local materials, bio-production and tourism. Therefore Latvia's industrial policy is the best example in the CEECs for trying to identify local (micro-regional) competitive advantages without any explicit effort towards emulating structural development in much more competitive and affluent economies.

1.5.4.2.5 The shift from crony privatisation to the active horizontal approach

Slovakia may well be the transition economy in Europe with the most positive record of rethinking and reshaping industrial policy during the 1990s. The country inherited most of the obsolete smokestack and defence industry capacities from former Czechoslovakia. Even its viability as an industrial economy was questioned by some. Its situation was further aggravated by the politically motivated privatisation of the

[93] To name but a few of these: 1. the volume of output of Romanian industry in 2002 reached only 65 percent of the 1990 level whereas the same indicator was 91 percent for the Czech Republic, 180 percent for Hungary and 195 percent for Poland; 2. the percentage share of high-tech sectors (such as the aircraft industry and electronics) within manufacturing output declined from 6 percent in 1990 to 5.6 percent in 2002; 3. Romania's relative share of worldwide manufacturing exports stagnated between 1990 and 2000 while the similar Hungarian indicator more than doubled. Romania's industry lost much of its competitiveness and attractivity for foreign investors during the 1990s as a result of a decade lost for industrial policy.

mid-1990s ("crony privatisation"). Slovakia's structural adjustment was greatly helped when transition-related economic reforms co-incided with the activation of industrial policy.[94]

Slovak industrial policy took on a markedly horizontal character after 1998 when an industrial policy package was announced as part of the country's strategy to prepare for EU accession (MHSR, 2003). Key reform measures, such as the new privatisation act of 1999 and the comprehensive tax reform of 2003,[95] along with substantial incentives for FDI did not have a strong sectoral character. In addition to these measures, the promotion of inward FDI also included state aid within the limits of EU rules.

Box 1.16: Direct state aid to promote inward FDI in the Slovak car industry

The Slovak policy for FDI promotion made extensive use of direct state aid in conformity with EU rules (no more than 15 percent of the value of total investment in a project). In this framework, free land was provided, and subsidies for construction and the training of skilled labour were granted along with tax breaks. In all, total Slovak state aid to two investors in the car industry, Hyundai and PSA, is estimated to have reached USD 284 million (UNCTAD, 2004A, p. 71).

A pronounced Slovak industrial policy priority along with direct incentives for FDI curbed labour costs compared to competitors (both in goods markets and for FDI) in the region (cf. OECD, 2004B). This was achieved through the introduction of a 19 percent flat rate for the personal income tax and a cost-cutting reform of the social welfare system.[96] Slovakia is currently considered the Central European country offering the best incentives for FDI.

Box 1.17: The Slovak adaptation of the Lisbon Strategy

The new Slovak industrial policy document defines four fields where enterprises can obtain policy support: 1. efforts to increase competitiveness (e. g. in easing the administrative burdens of firms and providing consulting services to them); 2. SMEs; 3. innovation; 4. environment. The legal part of the package explicitly limited sectoral subsidies to new sectors/industries with good perspectives in terms of competitiveness (MHSR, 2003; MHSR, 2004).

Rapid structural change in the Slovak industry caused unemployment and regional imbalances to grow, yet the country is considered the European equivalent of the "Asian tiger" in 2005. This comparison is based on Singapore or Taiwan as reference cases rather than on the example of China.

Apparently, Slovak industrial policy is keen to avoid the pitfalls of the growth path based on low-cost labour, an idea that is gaining ground in Polish and Hungarian industrial policy as well. For example, consecutive Hungarian governments attempted to stay (if not prevent then perhaps block? Is "stay" correct

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[94] It should be remembered at this point that most if not all other CEECs undertook fundamental economic reforms first and activated their industrial policy only years later.

[95] The strategic thinking of the Slovak government deserves praise here: the politically sensitive elements of pro-competitive reforms such as the introduction of the new tax and social security regimes were postponed until 2003, i.e. after the government managed to win two consecutive parliamentary elections.

here?) the loss of labour-intensive industrial capacities (e.g. in the footwear or clothing industry) to lower-cost locations such as Romania, Ukraine or China. These efforts were given up when policy-makers realised that the country's locational advantages were shifting from labour- to skill-intensive activities, and keeping footloose industries temporarily in the country at a high cost could easily become a venture with negative political payoffs.

Slovak industrial policy represents a quite linear approach towards industrial policy-making in the horizontal sense, intended to rapidly catch up while correcting the serious market failures inherited by an economy that was structurally weak at the time of the country's gaining independence.

1.5.4.2.6 Neo-liberalism in small, open economies

Correcting former market failures was also a high priority when *Estonia's* government made its fundamental policy choices, including which industrial policy line it should take. Estonia opted for a very low-key industrial policy approach, apparently because the country's political elite deliberately wanted a complete break with any kind of interventionist tradition (e.g. Kilvits, 2002).

Estonia has a very small and extremely open economy in which most of the former Soviet market oriented capacities could not have survived even if it had been granted generous subsidies by the government.[97] This is why each of the successive governments with quite different political profiles adhered to an ultraliberal understanding of industrial policy. Key elements of this policy line included fast privatisation, duty-free imports of all kinds of goods, and a complete lack of sectoral or regional priorities. Privatisation was also a must because the government staff supervising state industry remained in Moscow, and the Estonian government lacked the requisite funds to carry out industrial policy based on the state sector.

Estonian industrial policy as formulated in 2001 is built around general strategic objectives such as: 1. increasing export competitiveness; 2. accelerating innovation and technology development; 3. improving the services offered by the government, and 4. developing human resources. Strictly speaking, this is hardly more than a list of measures to improve competitiveness but not a proper industrial policy as such.

The case of *Slovenia's industrial policy* is similar to that of Estonia, but backgrounds differ. The Slovenian transition process was quite slow due to the fact that this was by far the most developed economy in former Socialist Europe. There was no pronounced economic or political philosophy underlying industrial policy in practice, and little was talked about it. The years 1991 to 2004 brought a

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[96] For a quick comparison: an employer in Hungary pays more than double the employee's net income in total labour costs. A Slovak employer pays less than 50 percent more.

[97] The Estonian economy experienced two "transformational recessions", both provoked by too much exposure to the Soviet or Russian market (in 1991–1994 due to the collapse of former trade patterns between the Soviet republics, and in 1998 as a result of the Soviet economic crisis with a dramatic impact on Estonian food exports).

change of emphasis from sectoral subsidies to horizontal ones, and a marked shift to the promotion of innovation. Industrial policy does not seem to have been a topic in Slovenian political or economic discourse, and it has hardly been any more active than in Estonia.

1.5.4.3 Policies versus statistics

For a balanced view of the various industrial policy regimes applied in the CEECs it is necessary to survey growth performances, although an analysis of competitiveness would be advisable in order to obtain a really reliable policy assessment.

Table 1.19: The real growth of industrial production in the CEECs (per year, in percent)

	1990	1995	1998	1999	2000	2001	2002	2003	2004
BG	-16.7	4.5	-7.9	-8.0	8.2	1.6	0.6	15.3	16.8
CZ	-3.3	8.7	1.6	-3.1	5.4	6.5	4.8	5.8	10.0
PL	-24.2	9.7	3.5	3.6	6.7	0.6	1.4	8.7	13.4
HU	-10.2	4.6	12.5	10.4	18.1	3.6	2.7	6.4	8.3
RO	-19.0	9.4	-13.8	-2.4	7.1	8.4	6.0	3.1	4.5
SK	-4.0	8.3	5.0	-2.7	8.6	6.9	6.5	5.3	5.1
SVN	-10.5	2.0	3.7	-0.5	6.2	2.9	2.4	1.4	4.8
EE						9.0	8.3	9.9	8.3
LV						6.9	5.8	6.5	6.2
LT						16.0	3.1	16.1	10.5

Source: WIIW (2004): Countries in transition 2003 (compilation by András Bakács and Gábor Túry); http://economicresearch-e.ba-ca.com

The growth picture shows diverging trends after the transformational recession which hit all the CEECs in the early 1990s. In the late 1990s, this type of recession revisited those countries, albeit to a lesser degree, which either did not choose the route of a determined economic policy, and also industrial policy reform, or were too dependent on the Russian market.

In fact, the five most developed economies of the sample, Hungary, Poland, the Czech Republic, Slovakia and Slovenia, showed a quite straightforward industrial development since the mid-1990s. Yet there were only two of them (Hungary and Poland) which experienced no industrial recession at all during the last ten years. Both Hungary and Poland were ready to enter the international debate on industrial and competitiveness policies while the Czech government ostensibly refrained from doing so.

The data also speak of an evident link between the level of economic development and the rate of industrial growth, regardless of the policy component of the latter. Fast industrial growth (close to or above 10 per cent per year) could be registered in less developed CEECs, i.e. in Bulgaria, Estonia and Lithuania, for at least two years in a row, while Romania seems to be still struggling with the legacy of the

years lost in terms of industrial restructuring. Slovakia is a good candidate for spectacular industrial growth in the years to come, but the bulk of its new FDI-based manufacturing capacities still have to start production.

Both Estonia and Slovenia have a population of less than 2 million and lack any significant natural resources. Such resource endowment patterns may, quite apart from the political convictions of their elites, also explain their relative reluctance in adopting an industrial policy. They are on top of the lists of countries developing a "New Economy" in the region (e.g. Piatkowski, 2003). These two small and open economies are likely to take the road of "post-industrial" development and may be successful without massive industrial modernisation – an option evidently not open to Poland, the Czech Republic, Slovakia or Hungary.

1.5.4.4 Policy conclusions

Most of the CEECs changed their approaches to industrial policy during the fifteen years of transition. One such change occurred in the early 2000s, when the idea of an industrial policy permeated the EU in its Lisbon Strategy, which in turn exerted a strong influence on the CEECs. From the late 1990s onward, more and more governments of the region have appeared to accept that industrial development cannot be left completely to market forces in economies suffering from inherited structural deficiencies and considerable market failures.

Policy priorities

A clear focus of all industrial policies in the region has been ways and means to attract FDI. This made for a proliferation of Export Processing Zones (EPZs) in most CEECs which amounted to a marked success in targeting FDI (cf. UNCTAD, 2002A, p. 170). State agencies for FDI promotion were also set up, but their efficiency or success (perhaps with the exception of the Slovak case) is far from evident. No explicit industrial policy lines were formulated in support of domestically owned firms, but they were effectively helped (on a discretionary basis) by Czech, Hungarian and Polish industrial policy mainly in the first part of the 1990s. The underlying understanding was that an improvement of competitiveness and access to new markets can be provided mainly by foreign investors while industrial policy measures aimed at strengthening (or rather: helping) domestically owned firms often had an outspoken political or social character.

Box 1.18: SME policies

Promoting SME development was often called a priority, but without much success. Many SMEs in high income taxes countries such as Hungary have a seemingly broad SME sector but most of them were created as "forced entrepreneurship", e.g. in order to channel tax payments to the more favourable and flexible corporate tax system. Most SMEs in the CEECs are financially weak and unable to provide any reasonable funds for collateral or other financial guarantees, and the legal environment in some countries

is still not entirely transparent. Therefore industrial policy tools improving SME financing are used sparingly, for fear of simple waste of government money.

Further industrial policy tools are still rarely utilised. For example, effective retraining programmes are rare, programmes for attracting skilled individuals to these countries are practically nonexistent, and even the relationship between industrial and education policy is weaker than would be necessary. The boom in higher education has doubled to quadrupled the number of students in higher education since 1990 in all CEECs, but their labour markets have considerably suffered from this trend. Currently, the Hungarian and the Czech labour market has an inadequate supply of skilled workers and technicians (which is becoming an impediment to the further massive inflow of FDI) while there is an abundance of people with university degrees in a number of professional categories.

Choices for industrial policy

In 2005, most of the New Member Countries are in the stage of forming an active industrial policy. They have been encouraged to do so by the EU's Lisbon Strategy. This also outlined the policy mix to be used for catching up while avoiding an inadmissible distortion of competition. Before 2000, policy-makers in the then candidate countries received mainly such signals from Brussels as rejected most kinds of government intervention in industry. The change of policy line in the EU is, clearly enough, motivated by its effort to catch up with the United States. If, however, an effort to catch up constitutes good grounds for an active industrial policy at EU level, then the new member countries should not be blamed for their policy measures (e. g. their involvement in "tax competition") which could help them catching up *within* the EU.

The development of industrial policies in the New Member Countries may be described as a shift from crisis management to horizontal industrial policy, with an increasing emphasis on supporting innovation, SME development and the levelling off between regions. These objectives have to be co-ordinated with the strategic priority of increasing FDI. A number of recent examples (mainly that of Slovakia) show that this priority has strongly shaped the practice of industrial policy. There is increasing competition for FDI in the region, and one success indicator of national industrial policies is the amount of FDI attracted. It has been shown that industrial restructuring and improving competitiveness has come significantly faster in those New Member Countries which were able to receive important amounts of FDI (UNCTAD, 2002A). Hungary, the Czech Republic and, to a lesser extent, Poland belonged to these countries in the 1990s, while Slovakia is the best performer of the early 2000s in this respect.

The ultimate question is what kind of industrial policy development can be expected in the EU's New Member Countries. In a mid-term approach (until at least 2012), the focus on FDI will certainly remain strong since competition for inward foreign direct investment will not become weaker, and domestic sources for technological modernisation will remain scarce in most New Member Countries (perhaps with the exception of Slovenia). An increasing priority will be innovation policy, and also SME promotion

within the constraints of eligibility of firms. Greater emphasis will be given to labour market related tools and training, also with regard to the problem of low activity rates and ageing which is more serious in most CEEC than in the majority of the EU-15.

The role of sectoral priorities will diminish further. A marked difference between the currently new and the expected new member countries from the region will be that crisis management will have to play a special role in Romanian, Bulgarian and also strongly in Ukrainian industrial policy as it did in Central Europe in the early 1990s.

To summarise, industrial policy in the New Member Countries will be slowly aligning itself to the European mainstream. The main difference will be in the relative strength of the modernisation effort in the New Member Countries, generating further competition for FDI among them. This modernisation has already made factor prices somewhat converging with EU-15 levels. The increase of their productivity and also labour cost levels will increasingly dissuade the New Member Countries from trying to prevent footloose (and labour-intensive) industrial capacities from moving further east. Although the Lisbon Strategy appears to enjoy less than unanimous political support in the "old" European Union, the New Member Countries seem to agree that it provides useful guidelines for their industrial policy efforts.

1.5.5 Industrial policy outside the European Union: United States and Japan[98]

1.5.5.1 Introduction

The European Union and it member countries are not alone in pondering an effective approach to industrial policy. Other countries are acting as well, and their activities and experiences are important in at least two respects: First, experience with specific policy initiatives in other countries provides guidance in designing policies in Europe. Second, activities in competing economies will affect the competitive environment in which European policy takes place.

In this section, we will describe the situation in the United States and in Japan, focusing specifically on more recent policies or policy announcements. The discussions will follow roughly the same structure for each country: After a short introduction discussing the general state of the country-specific industrial policy debate, the first part looks at its recent economic performance. The market position of a country's industries is critical to assess the overall effectiveness of its policies but also to understand the political context in which these policies are being designed. The second part discusses the actual policies adopted, taking both a vertical (industry-specific) and a horizontal (cross-industry) perspective. It also addresses the institutional structure in which these policies are being implemented. The third part reflects on the

[98] Prepared by Christian Ketels.

effectiveness and overall consistency of the industrial policy pursued. It also includes comments on the policy direction most likely in the near future.

1.5.5.2 United States of America

The United States has a long history of strong denials that industrial policy is part of its overall economic policy tool kit:[99] "We don't do industrial policy".[100] Given the narrow definition of industrial policy often applied in the US which views industrial policy as an interference in the market process with the objective of fostering an industry that would otherwise not succeed, this self-assessment seems roughly accurate. But given the broader definition of industrial policy as all economic policies directed at industry, the answer is different: the United States clearly engages in policies that are targeted at specific industries or sectors, and it does use horizontal policies that have differential effects across industries. The discussion of whether or not the United States engages in industrial policy is relevant only in terms of politics; it provides no guidance to understanding actual policies.

1.5.5.2.1 Recent economic performance

Following a short recession in 2001, the US economy bounced back in 2002 and has since delivered healthy real growth rates. Corporate profits have developed positively and private investment rates are solid. While the growth in GDP had a positive impact on the labour market, overall job growth has been lacklustre and hard-pressed to recoup the job losses of the recession. Of major concern are the country's macroeconomic imbalances: A high public deficit and low private sector savings are mirrored by a large current account deficit that has so far not fallen despite a significant devaluation of the US dollar.

Underlying the resilience of the US economy in the face of significant macroeconomic challenges is the high level and growth rate of labour productivity. The high level of GDP per employee is driven mainly by higher total factor productivity, while labour force skills and capital stocks are comparable to or below leading OECD countries (O'Mahoney/de Boer, 2002). In the last five years, GDP per hour worked has increased significantly more than GDP per capita (CAGR of 2.8 % versus 1.8 %),[101] in line with the notion of "jobless growth". The US economy, traditionally relying as much on high labour input (hours worked per employee) as on high labour productivity, has since 2000 registered a rate of growth in GDP per hour

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[99] For a description of the discussion in the United States until the end of the 1990s see Gurbaxanti (2000).

[100] John Sununu, former White House Chief of Staff and current US Senator for New Hampshire, quoted in Fong (2000).

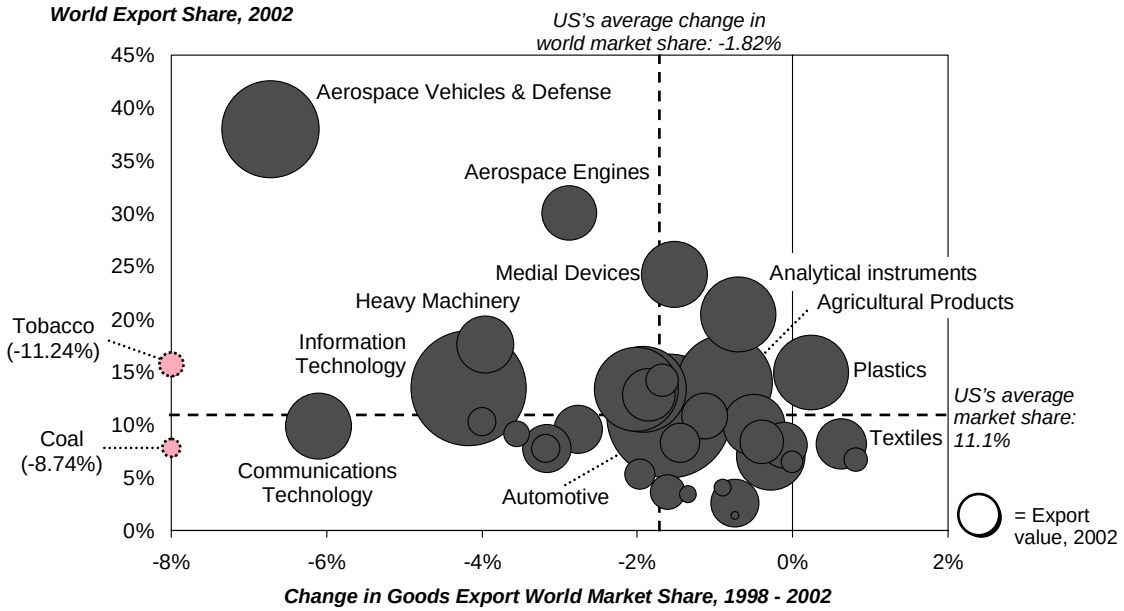
[101] Groningen Growth and Development Centre and The Conference Board, Total Economy Database, January 2005, http://www.ggdc.net

worked that exceeded all other OECD countries with the exception of Ireland and Iceland. In the process, it has overtaken Austria, Germany, Denmark, and Italy on the level of GDP per hour worked.[102]

A key factor associated with the high level of labour (and total factor) productivity is the strong commitment to research and development in the United States. Scientific publications, patenting, R&D spending and the share of researchers in the labour force are among the highest in the OECD (2004D). Recently, however, an increasing number of observers have started to point out that the US is in many of these areas falling behind key competitors (Broad, 2004, Council on Competitiveness, 2004, Task Force on the Future of American Innovation, 2005). One of the most visible signs has been the dramatic drop in private sector R&D expenditure between 2000 and 2003.

The competitiveness of companies in specific locations ultimately shows up in their success on the market place. Between 1998 and 2003, US-based companies increased their exports annually by 1.8 % (WTO, 2004). Given the faster growth in world trade overall, especially driven by Chinese export growth, the world export market share of the US dropped by 2.7 % in goods (now 9.7 %) and 1.7 % in services (now 16 %). The significantly stronger position in services is a reflection of the large share of services in the US economy.

Graph 1.32: United States' Goods Export Portfolio, 2002



Source: Institute for Strategy and Competitiveness, 2004

[102] This fact sheds further doubts on the argument made by Oliver Blanchard and others that Europe's less dynamic economic performance relative to the US has nothing to do with productivity and reflects a choice for more leisure. NBER working paper #10310.

Market shares dropped across most industry clusters (see Graph 1.32) in the last few years for which detailed cluster-level data are available.[103] Even in industries categorised as "high-tech", the US market share fell from 31 % in 1980 to 18 % in 2001; the US trade balance in this category has been negative since 2001 (Task Force on the Future of American Innovation, 2005). A final danger sign is the recent drop in inward foreign direct investment to the United States, which for the first time ever placed the US on global rank two behind China in terms of FDI inflows (UNCTAD, 2004B).

1.5.5.2.2 Government policies

The United States employs a large array of policy instruments affecting the competitive position of specific industries or activities. These policies are designed and executed by an equally large set of government agencies and institutions at the federal, state, and local level. The traditional view has been that there is little overall consistency and no industrial policy "strategy" to speak of (Fong, 2000).[104] Instead there is a tendency for ad-hoc policies with limited scope that react to current political pressures and a diverse set of often inconsistent goals.

Industry-specific (vertical) policies at the federal level

This overall characterisation is reflected in the examples of specific policy tools being used with respect to individual industries: direct financial subsidies have been used specifically in agriculture (see the Farm Security and Rural Investment Act of 2002) and in the airline industry (a response to the 9/11 terrorist attacks). Trade barriers have been used in agriculture, textiles, forest products, and steel (WTO, 2003). Restrictions toward foreign ownership remain in areas such as airlines and media. Foreign companies, at least when part government-owned, for example Deutsche Post World Net, have faced barriers in their activities on the US market. All of these policies have been reactions to political pressure from specific groups, not part of a long-term strategy to improve the underlying competitiveness of the companies and sectors concerned.

Trade policy in particular has been the favourite instrument to provide short-term economic relief to industries under pressure from foreign competition. The United States is, alongside India, the most prolific user of anti-dumping and countervailing duty measures, although filings have declined significantly since 2001. According to the Byrd amendment, the revenues raised through such measures were to be distributed to the affected companies; payments amounted to $840m between 2001 and 2003. In 2001, an anti-dumping investigation led to the imposition of higher tariffs and an import quota on steel, a decision that triggered significant protests from foreign trade partners and domestic steel users such as the

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[103] For additional data on the US and other countries see www.isc.hbs.edu

[104] The US Congressional Research Service in a 1992 report described US industrial policy in the early 1990s as "ad hoc and uncoordinated".

automotive industry. Both the Byrd amendment and the steel tariffs were the subject of WTO investigations that led to decisions against the policies. The steel tariffs were removed in 2003/2004, after the government claimed success in improving the economic health of the US steel industry (and securing political support for the passage of the Trade Promotion Authority Act of 2002,[105] the ultimate political goal of the steel tariffs). Another bone of contention, the Foreign Sales Corporation tax credit,[106] viewed as an unfair export subsidy by the European Union, was removed after a WTO ruling in 2002. The Byrd amendment, however, is still in place and the EU has recently retaliated by imposing tariffs on specific US goods.

Defence policy is the second area often associated with industrial policy, especially in its implications for overall R&D spending and the aerospace industry. The total R&D spending of the Department of Defence in 2004 is estimated at $65.5bn (defence-related R&D spending is also included in the budgets of the Department of Energy ($8.8bn) and the Department of Homeland Security ($1bn)). The vast majority (>90 %) of these funds is related to weapons development and testing. The second defence-related spending item with potential for industrial policy use is the procurement budget, estimated at $75bn for 2004. The spill-over effects for the civilian aerospace industry have often been discussed in the past. While this debate continues there have been no major shifts in US policy in recent years. The European defence industry has been very worried about the inclusion of a "Buy American" clause in the defence bill but so far the US government (including the highly critical Defence Department) has been able to resist such demands from Congress. Finally, under the Exon-Florio amendment to the Defence Production Act of 1950, foreign acquisitions of US companies are subject to a review by the Committee on Foreign Investment in the United States (CFIUS). Acquisitions can be blocked, if they are perceived to create a threat to national security, for example through critical technology being accessible to other countries.

The US government also tries to exert its influence on the behalf of US companies in large procurement decisions by foreign governments or government-owned companies. The most obvious examples can again be found in defence procurement but the practice also extends to civilian uses, e.g. the pending decision by LOT Airlines to acquire either Boeing or Airbus aircraft to modernise its fleet. Industries in which these practices are most common are defence, aerospace, energy, public transportation equipment, and construction services. Others are airlines (use of bilateral agreements to open markets for US airlines), agriculture (opening markets for genetically modified food), and telecommunications (pressure to adopt technology standards developed by the US company Qualcomm). There are no laws governing these activities and the behaviour of the US government in this area has not changed significantly in recent

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[105] The US Trade Promotion Authority Act grants the President of the United States "fast-track" authority to enter into and conclude trade negotiations with other countries. It also restricts the role of Congress to either approve or reject such treaties, within 90 days of signature, without the possibility of amending them. The current TPAA expires in 2006.

[106] See Hufbauer (2002) on its historical background.

years. The practice is, of course, widespread in other countries as well, and it is not obvious that the United States is in general more active or aggressive in this respect than other countries. For political and economic reasons, however, it is more powerful than most other countries in supporting the interests of its companies in this way.

The broadest recent initiative to address competitiveness in a specific sector was the Manufacturing Initiative launched in March 2003 (US Department of Commerce, 2004 and www.manufacturing.gov). As a reaction to the significant losses of manufacturing jobs since 2000 the federal government organised roundtables with a broad cross-section of private-sector executives to discuss a policy response. This process led to the creation of a new government position, the Assistant Secretary of Commerce for Manufacturing, and the establishment of the Manufacturing Council, an advisory group of key business leaders from manufacturing companies on sector-specific policies. The initiative developed recommendations on a number of cross-sectoral policies, such as strengthening R&D tax credits, reducing health care and legal costs, investing in R&D and skills, and opening foreign markets, which were announced in January 2004. Interestingly, no demands were made on financial support or regulations benefiting manufacturing relative to other sectors were made.

Cross-cutting (horizontal) policies at the federal level

The federal government affects competition through a number of cross-cutting policies not specifically targeted at any individual sector. We look at broad priorities in the administration's economic policy, traditional economic development policies, and innovation policies.

Since 2000, the economic policy agenda of the Bush administration has been dominated by a few key priorities: In the first term, the focus was on lowering taxes and supporting K-12 education through the "No Child Left Behind" Act, setting performance standards for schools tied to sanctions in the case of failure, and limited health care reform (prescription drug benefit). The government also put significant efforts into trade policy, including achieving "fast track" authority through the Trade Promotion Authority Act (see above) and launching and finalising a number of bilateral FTA agreements. For the second term, the administration announced the reform of social security, tort reform, and further steps on taxes and health care as its key priorities.[107] None of the policy instruments traditionally associated with industrial policy made the list.

In terms of *traditional economic development policies*, the programmes of the US government can be broadly distinguished by their focus on the size of the companies at which they are directed (small- and medium-sized companies (SMEs)), their owners (women and minorities), or their locations (rural regions, inner cities, other regions in economic distress). This general approach has changed little in recent years.

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[107] These priorities are also broadly in line with the issues covered in the 2004 Economic Report of the President.

The programmes addressing these three areas cut across a number of different government agencies, including the Small Business Administration (SBA), the Economic Development Administration (EDA), the Department of Agriculture (DoA), and the Department of Housing and Urban Development (HUD). An example of these policies are the Empowerment Zone and Enterprise Community (EZ/EC) and the Renewal Community (RC) programmes. These programmes are targeted at communities in economic distress that pass specific conditions in terms of business-friendly policies (GAO, 2004). They provide block grants to the communities as well as certain tax benefits to companies located there.

The Small Business Administration (SBA), founded in 1953, has central responsibility for SME policy, focusing on the provision of loans and credit guarantees, export financing, and technical assistance (OECD, 2002B). More recently the SBA has also branched out into programmes for SMEs owned by minorities and women. While the SBA is the main instrument for SME policies in the US, other agencies such as the Department of Defence and the Department of Energy also have significant SME and minority-owned company programmes. The SBA's programmes were last reauthorised in 2002; there has been no major shift in its programmes in recent years (OECD, 2002B).

The Economic Development Administration (EDA), founded in 1965 and operating as a part of the Department of Commerce, is charged with economic development efforts across US regions. The focus of this work has been on regions that are in economic distress. An important element of the EDA's work are programmes to help communities which are undergoing structural change (Economic Adjustment Assistance) or which struggle with international competition (Trade Adjustment Assistance). The EDA is also heavily engaged in rural regions through its regional offices and programmes, an area where the Department of Agriculture also has a broad array of support programmes and local offices for technical support (Porter *et al.*, 2004).

The Bush administration's 2006 budget proposal includes a new $10bn (stretched over 10 years) tax incentive programme to create Economic Opportunity Zones in areas faced with structural change. The other major new proposal in the budget is a plan to consolidate 18 of the 35 existing grant, loan, and tax incentive programmes for economic and community development efforts with a total budget of $16bn that are currently spread across seven federal agencies (White House OMB, 2005A, B). The new unified grant-making programme with a budget of $3.71bn is to be assigned in its entirety to the Economic Development Administration. The greater part of this money would be made available to communities according to eligibility standards based on recent job losses, unemployment rates, and the extent of poverty. The remaining part would be made available as challenge grants to a small number of communities that have taken the most impressive steps to improve and have the clearest strategy on how to employ the federal funds in their economic development strategies. Political observers expect this proposal to face significant opposition in Congress because it not only consolidates the programmes into one large facility but also cuts a number of programmes considered to be ineffective. Among individual programmes the Bush administration is targeting for significant cuts is the Manufacturing Extension

Partnership (MEP), administered by the Commerce Department's National Institute of Standards and Technology. Through 350 locations around the United States the MEP provides technical support for manufacturing companies in order to upgrade their technological efficiency (Shapira, 2003, and http://www.mep.nist.gov/). The current budget proposal plans to cut spending on this programme from $109m in 2005 to $47m in 2006.

In terms of *policies directed at innovation and technology***,** the main channels are funding for universities and research institutions, funding or incentive programmes for companies, and rules and regulations affecting the innovation system. For 2004, total federal spending on science and technology[108] was estimated at $60.7bn, with the largest individual budget of $27.9bn going to the National Institutes of Health (NIH). Other institutions with significant budgets are the National Aeronautics and Space Administration (NASA, $9.3bn), the Defence Department ($5.8bn), the National Science Foundation (NSF, $5.6bn), and the Department of Energy ($5.5bn). The Department of Commerce through its Technology Administration (TA) has a total science budget of $965m, most of which goes to major government laboratories (National Institute of Standards and Technology, NIST). The largest increases in spending since 2001 have been appropriated to the NIH (+10 % annually), NASA (+7.4 %), and the NSF (+6.7 %). Cross-agency priorities are Networking and Information Technology R&D ($2bn in 2004), the Climate Change Science Programme ($2bn), and the National Nanotechnology Initiative ($864m).

A key concern for the administration is how to improve the effectiveness of R&D spending. The Office of Management and Budget has started to evaluate R&D programmes using the Program Assessment Rating Tool (PART); of the 58 programmes evaluated in preparation for the 2006 budget 45 % were rated effective, 34 % moderately effective, and 17 % were rated as "results could not be demonstrated" (White House OMB, 2005B, C). A practice considered particularly problematic is the increasing use of "earmarks" that allocate funds directly to specific institutions rather than distributing them according to a merit-based performance review system.

Direct government funding of business R&D in the US dropped from 0.44 % of GDP in 1991 to 0.18 % in 2003 (OECD, 2004C). And this trend continues: The Department of Commerce's Advanced Technology Program (Hill, 2003), a long-running effort to fund basic research in cooperation with private companies ($170m in 2004), barely survived the 2004 budget process and is now again targeted to be scrapped by the administration. Despite this dramatic drop, the relative US funding level in this area is, according to the last comparative data available from the OECD, second only to Sweden (0.19 %). Other countries that score high on government-financed business R&D are Korea (0.14 %), France (0.12 %) and Germany (0.11 %; OECD, 2004E).

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[108] The Science and Technology budget does not include weapons development and testing and is thus a better estimate of spending on R&D with potential civilian applications.

Federal agencies with R&D budgets are part of the Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (SBTT) programmes that ensure the participation of small- and medium-sized companies in government sponsored research projects. These programmes are viewed positively by many observers: SMEs have increased their share of R&D spending by US companies from 12 % to 18 % in the 1990s (OECD, 2004D, p. 31). There are, however, limited quantitative data that systematically test the effect of these programmes on small companies, and for the last years up to 2002 such data do not indicate a disproportionate increase of R&D by SMEs (NSF, 2003).

Indirect government funding of business R&D through tax subsidies is up from 1995 and has remained stable at an effective rate of 7 % since the early 2000s (OECD, 2004D, p. 214).[109] The current Research and Experimentation Tax Credit expired in 2004; after a one-year extension last year, the 2006 budget proposal again aims to make the tax credit permanent. Tax savings for companies under this bill were estimated to be $5.1bn in 2004 and would rise to $7.8bn by 2009 if the budget proposal is passed unchanged.

In terms of the regulatory environment for science and technology a number of topics have dominated the debate: First, universities and technology transfer are becoming ever more important in regional economic development. The differentiated system of institutions for higher education in the US has always provided a fertile ground for economic development to be an important concern for them (Ketels, 2004). Many colleges in rural regions, for example, were land-lease institutions specifically charged from their establishment with promoting technology in areas dominated by agriculture. Private universities such as the Massachusetts Institute of Technology (MIT) have long been known for their effective programmes of technology transfer and start-up support. And more recently state universities, like the Georgia Institute of Technology, have also gained a strong reputation for technology transfer to the economic community in their region (Paytas *et al.*, 2004). These developments have been going on for a while, hugely pushed by the Baye-Dole Act of 1980, which allocated property rights for patents to research institutions instead of individual researchers who in most cases did not have the capabilities to patent and negotiate licence agreements, and are still gaining momentum. Also important was the Stevenson-Wydler Technology Act of 1980 which included technology transfer in the mission for federal laboratories such as NIST.

Second, there is a strong concern that the government's science policy has been too focused on the life sciences, while other areas, engineering in particular, have suffered. This view is based both on an analysis of government R&D funding and of the patterns of graduates over the past few years. The

[109] The greatest relative tax subsidies are available in Italy (45 %, but only for SMEs), Spain (44 %), and Canada (32 % only for SMEs, 17 % otherwise), while Germany and Sweden provide negative tax subsidies according to this OECD calculation.

administration has launched a number of efforts within its funding for the NSF to address the problem but it seems likely that this imbalance will stay for some time.[110]

Third, concerns about the effectiveness of the US patent system are growing. The number of patents granted in the US has increased significantly in recent years, but there are indications that their quality seems to decline, their legal status seems to deteriorate (many are deemed unenforceable), and that the existing patent pool actually hinders new innovations by creating legal uncertainty and barriers. A key driver is that US courts have taken an increasingly lenient approach to what qualifies as a patent (Quillen, 2002).[111] Most controversial was the 1998 US appellate court decision in "State Street Bank and Trust v. Signature Systems" which permitted granting patents for methods of doing business. Another factor might be that, since the early 1990s, the US PTO has become a "profit centre" for the Treasury Department, generating up to $200m a year, and is therefore potentially more interested in serving the needs of applicants by granting patents than in keeping high standards of patent quality (Jaffe and Lerner, 2004).

Fourth, the implications of visa regulations and procedures post 9/11 have created serious concerns about the future ability of the US science system to attract and retain foreign talent (Task Force on the Future of American Innovation, 2005). The administration has recently announced significant reductions of visa processing times but complaints by US universities indicate that the damage has already been done.

State-level policies

US states have a significant amount of autonomy in many policy areas that affect the competitiveness of companies and have developed a broad set of policy tools to try to strengthen the competitiveness of their communities.[112] The main spending items of relevance are higher education (2003: $123bn on running costs plus $10bn on infrastructure for the sum of all states) and transportation infrastructure ($40bn; NASBO, 2004). Given the fiscal situation in many states, the general trend of these efforts has gone towards mobilising private-public co-operation in clusters and moving away from costly financial incentives and infrastructure investments to attract large individual investments.

The examples from two states in different regions of the US are indicative of state-level efforts to improve the conditions for economic growth. In Massachusetts, serious efforts to improve the competitiveness of the regional economy started in the late 80s/early 90s when the state faced a severe crisis due to its dependence on two declining industries: minicomputers and defence. Governor Weld enlisted the support of Professor Michael Porter and launched "Choosing to Compete", an economic strategy build around a new private-public dialogue and key clusters. One of the results of these efforts was the formation of

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[110] See Romer (2000) for an analysis of the supply-demand failure in graduation patterns.

[111] Cecil Quillen is the former General Counsel of Eastman Kodak Company.

[112] See NGA (2005) for a recent overview.

MassMEDIC, a cluster organisation for the companies in the region engaged in manufacturing medical devices. This cluster has since become one of the key engines of the regional economy, based mainly on co-operation among the participants and with little involvement from the state government beyond the initial phase. Current efforts concentrate on mobilising the regions outside the dominating Boston metropolitan area and key clusters of the state's economy. The governor has launched regional competitiveness councils led by business leaders from the state's regions that have developed action agendas with responsibilities for the state government, local government and the private sector. Other efforts have been concentrated on the life sciences cluster located mainly in Cambridge and neighbouring areas in Boston. In its "Jobs First" Strategy, the state government has focused on providing low-cost housing in the Boston area to enable medium-level technicians and hospital personnel to remain in the area, on workforce training and community colleges to increase the supply of medium-skill employees, and on reducing the barriers for life sciences companies to locate manufacturing test facilities in regions outside of the Boston metropolitan region by streamlining regulations and giving access to limited tax relief. The tax measure – companies receive a 50 % refund for the state income tax they collect for the state from new employees – is, however, very narrow and initially piloted in the life sciences cluster only. In Ohio, the focus has been on upgrading the technological capabilities of the established manufacturing base. A key element is the Ohio Third Frontier project, a ten-year $1.1bn investment in technology research launched in 2002. Funds have been awarded to university-based research centres, to company-university collaboration projects, and to start-ups through a venture capital fund.

The quality of state-level strategies differs significantly but tighter budgets have in recent years had a somewhat disciplinary effect. While in the past significant financial incentives to attract large investments were not uncommon, especially in the southern, less prosperous parts of the United States (Gadzey *et al.*, forthcoming 2004), this is now changing: many current efforts aim to engage the private sector, and rather than raising new public funds the focus tends to be on better regulation and prioritisation of existing state-level programmes. States have significant leeway in setting tax rates on top of the federal level, but differences in such rates are becoming relatively less important as a factor for attracting business.

Institutional structures that cut across groups of US states, following the model of the Tennessee Valley Authority, are also active in economic development. New structures are the Denali Commission (Alaska), the Delta Regional Authority (Mississippi Delta), the Northern Great Plains Authority (Iowa, Minnesota, Nebraska, North Dakota and South Dakota, and the Canadian provinces of Manitoba and Saskatchewan). Others that have been proposed include the Southwest Border Authority and Southeast Crescent Authority. The role of these structures is to better co-ordinate efforts to spur economic development in these regions.

Despite these and other efforts to create a more stringent overall policy, the complex overlap of state and federal programmes for economic development and technology remains a problem (Shapira, 2001). The

system of programmes is hard for companies to navigate and there is significant doubt about the overall effectiveness of these policies.[113]

1.5.5.2.3 Evaluation

The United States are using a number of policy instruments that in Europe usually are associated with the term "industrial policy". However, there are few signs that these policies are part of an overall strategy for economic development or have been instrumental for the country's impressive economic record. They can be more readily understood as the natural outcome of the political process in the United States. In fact, given the lack of a strong integrating industrial strategy and the splintered responsibilities across different branches of government the policy process in the United States is probably more responsive to pressure from specific interest groups than most European countries. The absence of an integrated industrial policy does not imply a small role of government. The US government invests heavily in science and technology, with strong benefits for science-driven industries such as the life sciences and aerospace, as well as in education and physical infrastructure. The differences in the size of government between Europe and the US are tied to differences in social policies, especially transfer systems, not to policies directed towards business.

A central element of industrial policy in the United States is the division of labour between the federal government and the US states that has emerged over time. The federal level focuses on large investments in infrastructure and basic science and technology. And it has the responsibility for keeping markets open and creating favourable conditions for business (low taxes and costs of doing business: health care, tort system). At the same time, however, the federal government is also taking the lead in "defensive" policies to support/shelter regions and industries in economic distress. The US states focus on smaller physical infrastructure investments, education, and universities. And they have become very active in setting up co-operations with business to mount joint actions to improve the business environment. These "active" policies try to leverage existing strengths in local companies by creating networks and prioritising the use of public funds rather than building new industries from scratch.

Industrial policy in the United States is likely to continue on the trajectory described. There is a strong fundamental stability in the philosophical view of industrial policy; the debates across party lines focus much more on macroeconomic and social policy issues. The necessary attempts to control the fiscal deficit will put a tight lid on discretionary spending, as the current budget proposal indicates. Industrial policy investments most likely will be limited to a few areas considered critical for the future (life sciences) or politically charged. Collaborative efforts with business that require less or no new spending are likely to spread further, as is already visible at the state level. The federal government will also remain aggressive in using other non-financial tools to further opportunities for US companies. Trade policy will remain a

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[113] See Porter et al. (2004) on economic development policies for rural regions as an example.

key part of that strategy, and in both this area and in other situations where the US government is lobbying on behalf of US companies the administration is more likely to step up its efforts rather than reducing them. Predictions on US policy in this field are complicated, however. In a number of cases, for example China, the administration seems to have put foreign policy objectives first and either looked at economic interests second or used economic policy as a tool to achieve foreign policy goals.

There are a number of things to learn for European policy makers from the US experience. First, the combination of strong government investments in public goods with fierce rivalry on competitive markets seems to be critical. Many other industrial policy measures supporting R&D, SMEs, or specific industries may or may not have been helpful but they appear marginal in their influence relative to these basic policy decisions. Second, a new type of co-operation between the public and private sector focusing on leveraging the existing resources of both sides to address microeconomic challenges is critical to upgrade competitiveness. And, as the US example shows, it can even help to retain microeconomic strengths in the face of serious macroeconomic risks. Third, in terms of specific policies that could be interesting for European policy makers, three stick out: cluster and regional competitiveness efforts on the state level; the regulatory environment for universities, beyond narrow technology transfer rules; and the support system for small businesses.

1.5.5.3 Japan

Japan is probably the country most closely associated with the traditional industrial policy approach of nurturing sectors through preferential treatment. But the role played by these policies in supporting the impressive economic growth during the post-war period has come into disrepute in the last years (Porter *et al.*, 2000). And the recent economic problems have added to a willingness in Japan to seriously reconsider its approach to industrial policy.

1.5.5.3.1 Recent economic performance

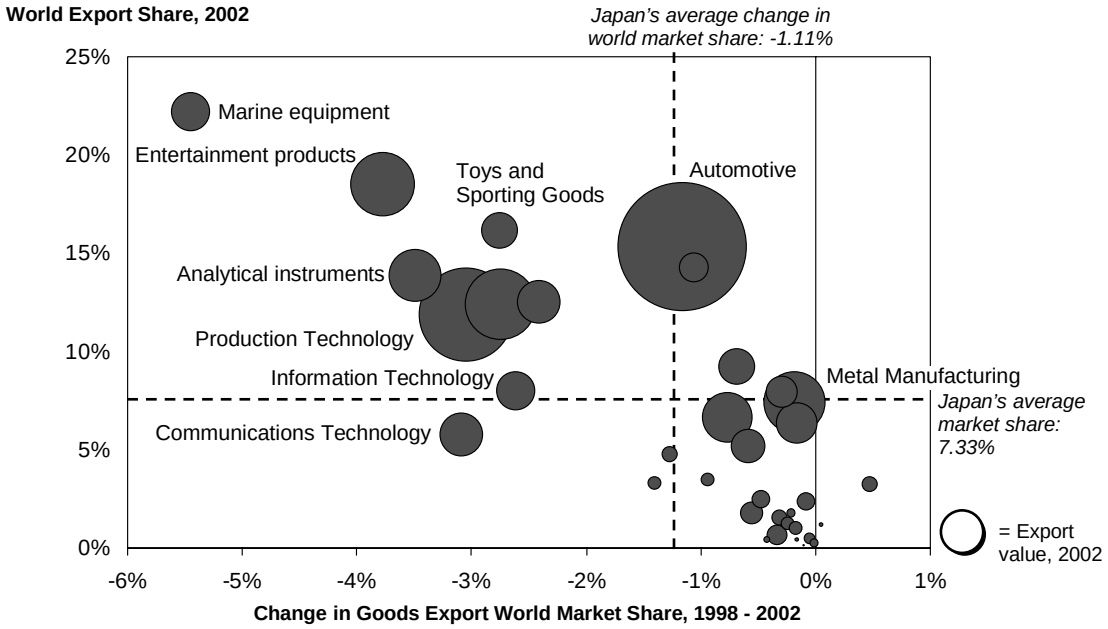
After a decade of economic stagnation, the Japanese economy started to grow again in 2003. Growth rates are expected to remain positive in 2005 although at lower levels than in 2003 and 2004. The increased profitability of the business sector does point towards greater resilience towards external shocks.

Underlying the continued weakness of the Japanese economy is the low level of labour productivity. Between 1980 and 2000, growth rates of both labour and total factor productivity declined consistently (IMF, 2004). Despite comparatively strong and rising growth rates of real GDP per hour worked since then (CAGR of 2.4 % between 1999 and 2004), Japan still lags behind most OECD peers in labour

productivity.[114] As in the United States, GDP per hour worked has since 1999 increased significantly more than GDP per capita; labour productivity growth has been achieved through reducing the relative level of labour input.

Japan has made significant headway in terms of its innovative capacity. R&D spending in 2002 reached 3.12 % of GDP, mainly driven by significant growth in business R&D (OECD, 2004D). A unique feature of Japanese business R&D is the dominance of large companies, even higher than in other OECD countries, and the almost total absence of foreign companies. Government R&D spending has increased somewhat as well but remains at a lower level than in many OECD peer countries. The share of researchers in the Japanese labour force is high (third highest in the OECD) and continues to rise. Finally, Japan registered a strong increase in scientific publications in recent years.

Graph 1.33: Japan's Goods Export Portfolio, 2002



Source: Institute for Strategy and Competitiveness, 2004.

Between 1998 and 2003, Japan-based companies increased their exports annually by 2.7 % in goods and 3.1 % in services. Their world export market share in that period dropped by 3.3 % in goods (6.3 % in 2003) and 1.5 % in services (4 %). Japan still has a relatively large manufacturing sector despite the stronger long-term growth in services. Market shares dropped across most industry clusters (see Graph

[114] Groningen Growth and Development Centre and The Conference Board, Total Economy Database, January 2005, http://www.ggdc.net.

1.33). The country's balance of payments in technology-driven industries remains positive at 0.22 % of GDP in 2003.

A key issue for the Japanese economy continues to be the low competitiveness of its local sectors. Prices for local goods and services remain significantly higher in Japan than in most OECD countries, leading to higher costs of doing business for companies operating from a Japanese base and to lower prosperity for Japanese citizens. High costs in Japan are also one of the reasons that contribute to the extremely low rate of foreign direct investment into Japan (UNCTAD, 2004B).

1.5.5.3.2 Government policies

The economic malaise of the last decade has forced the Japanese government to fundamentally reconsider its approach towards industrial policy. While hailed in the 1980s as the key reason for the country's economic rise in the post-war period, industrial policy was increasingly seen as one of the symptoms if not the root cause of the structural problems the Japanese economy was and still is facing. The initial response to the economic problems of asset price slumps and deflation was macroeconomic. But it soon became clear that fiscal stimuli and an increasingly accommodating monetary policy were insufficient. Reforms at the microeconomic level, including a review of the industrial policy tools used, had to be pursued as well. A visible sign of the new course was the renaming of the Ministry of Economy, Trade and Industry (METI, previously MITI), the main institution controlling industrial policy, as part of the major reorganisation of ministries in April 2001.

A number of recent strategy papers and reports have formulated the outlines of the emerging new approach to industrial policy in Japan. The 2004 White Paper on International Economy and Trade (METI, 2004D) identifies the need to move the focus of policy towards the creation of knowledge assets. This requires investments in research, standardisation systems for employee skills, mobilisation of sub-national clusters, and an efficient division of labour within Asia.

The Nakagawa-Report (METI, 2004C)[115] – also called the New Industry Promotion Strategy – lays out the most comprehensive assessment of the current challenges facing the Japanese economy and the policy priorities following from them. It identifies three groups of industries as central to Japan's economic future: first, industries which can compete globally at the cutting edge of their respective markets – the report identifies fuel cells, digital consumer electronics, robots, and content; second, industries which meet new or growing demands from the domestic market, i.e. health care, environment, energy, and business support services; and third, industries which play a critical role in specific regions within the country, i.e. advanced high tech industries, new manufacturing industries, regional services, and high value-added food products.

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[115] Available at http://www.rieti.go.jp/en/events/bbl/04070101.pdf

The Report then outlines broad policy priorities. For the seven global and domestic industries identified in the first two groups as most promising it suggests a combination of R&D investments, skills upgrading, and regulatory changes, especially the setting of standards. For the regional revitalisation around specific industry clusters identified in the third group it suggests investments in physical infrastructure, regional university-business networks, and the branding of regions. The Report also includes a list of 14 cross-cutting policies that are deemed critical to upgrade the overall business environment in Japan.

Table 1.20: Nakagawa Report – Horizontal Policies

Cross-cutting policy priorities	
1. Upgrading of workforce skills, especially in manufacturing	8. Promotion of start ups and SMEs
2. Protection of intellectual property rights	9. Improved access to risk capital
3. Protection of trade secrets	10. Encourage restructuring of business and industries
4. Establishment of brands	11. Trade policies, especially regional economic partnership
5. Domestic market opening	12. Upgrading of IT infrastructure
6. Global promotion of Japanese technology standards	13. Regulatory reform
7. Investments in research and development	14. Secure supply of raw materials

The FY 2005 budget plan provides a more specific description of the policy measures associated with the Nakagawa Report (METI, 2004C).[116] One key priority is the upgrading of human resources, an area for which ¥23bn (€170m) will be allocated in 2005 (¥13bn in 2004). Also under discussion is a review of the tax system to provide companies with tax incentives for training and skills upgrading expenditures. A new programme will be launched to strengthen study and practice of technology management; the aim is to have 10,000 people trained this way by 2007.

A second key area is science and technology spending: about 50 % of the total R&D budget of ¥250bn will be allocated to programmes within the seven designated target industries of the Nakagawa Report, with the largest individual investment made in fuel cells. The budget also includes new funds for university-business co-operation programmes; the total budget related to university-launched ventures will reach ¥68bn (€500m). The aim is to create 1,000 university-launched ventures by the end of FY 2005 and 100 IPOs from this group by 2010.

The budget also includes a number of measures designed to support specific industries designated by the Nakagawa Report: ¥1.4bn for the content industry (a further ¥5bn for development of the intellectual infrastructure are included in the budget of the Development Bank of Japan), ¥2.5bn for infrastructure to use digital electronic media and ¥5bn for the creation of new services industries.

In order to deregulate different parts of the Japanese economy, so-called "special zones for structural reforms" have been created; in FY 2003 there were over 300 such zones (IMF, 2004). Within each of

[116] Available at http://www.meti.go.jp/english/report/data/gIT04maine.html

these geographic areas, some (often sector-specific) rules in effect nationally are lifted. An example is the permission granted to private institutions to offer vocational courses in some zones, while they are banned from doing so elsewhere. Another industry-specific measure outside the budget has been the creation of the Biotechnology Strategy Council (BTSC) in the Cabinet office to co-ordinate all government efforts directed at this sector (Motohashi, 2004).

An area of policy not featured at any length in these policy documents or other recent initiatives is trade policy. Japan does not actively use for tariffs or other trade policy measures usually classified as non-tariff barriers as part of its industrial policy (WTO, 2002). The country provides no export subsidies, and especially in the manufacturing sectors tariffs are low. Protection remains an issue in agriculture and other domestic sectors. There were no major recent changes in the use of trade policy as an instrument to foster specific industries. Japan has instead started to negotiate regional Free Trade and Economic Partnership Agreements to improve the overall business climate in East Asia (METI, 2005).

Japan has also become much more active in terms of trying to attract inward foreign direct investment. These efforts are led by JETRO, the Japanese External Trade Organisation historically charged with promoting Japanese exports abroad. At the policy level, the Japan Investment Council, a Cabinet working group established in July 1994, has become a central player. The Japanese inward FDI efforts focus mainly on information and promotion as well as on administrative process simplifications instead of financial incentives. They have a strong regional bend, with four Japanese regions being especially active in investment promotion, often tied to the clusters most prominent in these regions. The overall success of the efforts to increase inward FDI from the extremely low current levels seems so far to have been limited.

Cluster development policy

Cluster programmes, mentioned as a key priority in the Nakagawa Report, have been launched by METI and the Ministry of Education, Culture, Sports, Science and Technology (MEXT). METI's FY 2005 budget alone includes ¥74bn (€550m, 2004: ¥49bn) for its New Industrial Clusters Plan. About one-third of the funds will go to new regional R&D consortia. The focus of these cluster efforts has been on the revitalisation of Japanese regions in a concerted attempt to overcome the strong central structure of government policy making.

METI's Industrial Cluster Project is organised around 19 regions. Regional Bureaus of Economy, Trade and Industry work with approximately 5,800 local small and medium enterprises and more than 220 universities to support co-operation between industry, academia, and government, leverage regional knowledge strengths, and train entrepreneurs. A large number of local governments participate in the project and much of the financing within these clusters is from local sources. There is concern, however, that the focus of many of these cluster efforts has been too much on the provision of "hardware", i.e. sites,

office space, and funds, while the critical element of network building within the cluster has been neglected (OECD, forthcoming).

One of the most prominent examples of such cluster efforts is the Technology Advanced Metropolitan Area (TAMA) association outside of Tokyo (Kodama, 2002). TAMA was established already in April 1998 by companies and universities focusing on advanced manufacturing products in areas related to control systems and instruments. Other cluster projects formed with the support of METI include the Hokkaido Super Cluster Promotion Project around IT and biotechnology and the biotechnology cluster in the Kinki region (Osaka, Kyoto, and Nara), involving 36 universities, nine local governments, 14 public research institutes, and about 220 companies. In total, METI's industrial cluster project has a budget of about USD 350 million on its 19 regional projects over a period of five years (National Science Foundation, 2003).

Independently of METI, MEXT has launched a Knowledge Cluster Initiative with a strong focus on university-business relations. MEXT plans to invest about USD 410 million in 18 designated cluster areas over a five year period. This cluster programme was rated as one the 25 most critical among all 275 significant projects in the 2005 budget proposal by the Council for Science and Technology Policy (CSTP), the central institution setting Japanese science and technology policy (see below).

JETRO (2004) has currently started efforts to link Japanese clusters with clusters abroad. The focus of this work has been both on policy learning, i.e. the benchmarking of cluster efforts across countries, and on market development, i.e. the creation of business opportunities abroad for companies located in Japanese clusters.

Small and Medium Enterprise (SME) policy

The legal basis for SME policy in Japan is the Small and Medium Enterprise Basic Law, which was revised in 1998 (OECD, 2002B). The main institution in charge of SME policy is the Small and Medium Enterprise Agency within METI. Activities are focused on providing small and medium-sized businesses with access to capital, improving their innovative capacity, and strengthening their technical and managerial skills.

There are three main government financing institutions that provide capital specifically to SMEs in order to complement offers made by commercial banks: The Japan Finance Corporation for Small Business (2001 lending level of ¥7.5 trillion (€55bn)), the National Life Finance Corporation (¥9.9 trillion), and the Shoko Chukin Bank (¥10.9 trillion). In addition to these lending facilities, the Small and Medium Enterprise Agency provides loan guarantees for SMEs through the Credit Guarantee Association, created immediately after WWII. The stock of outstanding credit guarantees through this system amounted to ¥41.2 trillion in March 2001.

To encourage the commercialisation of new technologies in SMEs, the government in 1999 launched Small Business Innovation Research (SBIR), a system of subsidies and other kinds of support tools. The total budget for these efforts accounted for ¥18bn (€150m) in 2001. As part of this strategy, the Act on Supporting Business Innovation in Small and Medium Enterprises went into effect in 1999, offering lower interest loans and subsidies for investments made as part of government-approved innovation business plans. By October 2001 5,000 such plans had been approved by the national or a regional government.

Japan has a well-developed system of support centres for SMEs around the country providing technical assistance, on-site training, market information, and other related services. By 2001, there were more than 300 such centres at the local, regional, and national level. There is also an Institute for Small and Medium Business Management and Technology that provides more advanced training to about 15,000 participants annually through nine campuses across the country. Japan also has the third highest number of business incubators in the OECD, although there is strong criticism that the focus has been too much on providing office space while other critical services are unavailable, severely limiting the effectiveness of the incubators (OECD, forthcoming).

The 2004 White Paper on Small and Medium Enterprises in Japan provides a detailed description of the policies included in the FY 2004 budget to support SMEs (METI – JSBRI, 2004A). It lists activities in SME financing, support for start-ups, support for established SMEs, and special tax breaks for SMEs. A specific concern in Japan are the measures to support SMEs affected by the increasing efforts of Japanese banks to shed non-performing loans. As a significant policy reform, the capital requirement to register a business were eased in February 2003, allowing companies to pay in their capital over five years with only ten percent due in year one (IMF, 2004). This measure has been credited with the creation of more than 10,000 new businesses.

METI's budget plan for FY 2005 includes ¥18.5bn (€140m) for SME support, a significant increase relative to previous years (METI, 2004B). A new law, the Comprehensive Act on Supporting Business Innovation in Small and Medium Enterprises, will provide the legal basis for these efforts. ¥6.9bn will be channelled through the new Council on Regional Strategy. ¥3.3bn are to be set aside for human resource upgrading in SMEs. About 70 % of these funds will be used for business innovation and similar courses for entrepreneurs (the target is to reach 30,000 individuals and support 6,000 start-ups). The Japan Finance Corporation will also step up a ¥12bn project to ease access to loans and equity for SMEs.

Science and technology policy

Policy design for science and technology is controlled by the Council for Science and Technology Policy (CSTP), headed by the Prime Minister. Ministries with substantial R&D budgets include METI, MEXT, the Ministry of Health, Labour and Welfare, and the Ministry of Agriculture.

In the 2004 budget, MEXT had a R&D budget of about ¥3,600bn (€27bn), followed by METI at ¥600bn (Yoshida, 2004). Budget planning is organised in five-year cycles; the most recent plan for 2001–2006 includes a 50 % increase of the total budget relative to the previous five years, bringing Japanese government R&D expenditures up to 1 % of GDP, which would get Japan in the lead group within the OECD (2004D). Government R&D spending in 2004 related to specific industries were concentrated on energy (33 % of all government R&D expenditures), life sciences (21 %), ICT (8 %), environment (6 %), and nanotechnology (5 %).

The Japanese budget proposal for 2005 indicates an overall decline of S&T spending by almost 1 % to ¥3.58 trillion (National Science Foundation, 2005). The cut is in line with the overall reductions in the Japanese budget and affects most R&D budgets. The strongest reductions are in defence R&D (–22 %), while MEXT, where the largest share of the S&T budget is located, received a 1 % increase. About 12 % of the budget will go to programmes where funds are available in competitive assessments. This is an increase by 30 %, below the goal set by the government initially, but still substantial and indicating the ongoing changes in the overall approach taken for S&T funding.

The 2004 budget included a revision of tax incentives for R&D, making it easier for companies to obtain such tax breaks. The new system gives a tax credit of between 8 % and 12 % of total R&D expenditures, while the old tax credit only applied to a measure of the increase in R&D spending (Motohashi, 2004). To keep some incentive to raise R&D expenditures over time for growing companies, the actual tax credit rates is increasing in the R&D spending to sales ratio (OECD, 2004D). The total amount of the tax credit is expected to be around ¥600bn, roughly equivalent to 12 % of total annual government R&D spending.

In the last few years Japan has made significant attempts to upgrade the rules and regulations surrounding innovation. Technology transfer was strengthened through the Act for the Promotion of Technology Transfer enacted in 1998 (Taplin, 2003). The Act provides financial support for technology licensing offices (TLOs), 43 of which had been founded by May 2004 (National Science Foundation, 2004). TLOs are also eligible for a 50 % rebate on patent application fees; the number of patents filed by them has grown from 691 (2000) to 4,088 (2003). Universities have significantly increased the number of joint research projects with industry, often in the context of specific research centres. Another important institutional change was the transformation of national research institutes into independent administrative institutes (IAIs). These IAIs have significantly more autonomy in their decision-making and have made commercialisation of research and the collaboration with industry their top priority. While all these changes are generally viewed positively, surveys of business executives indicate that the actual impact so far is limited (Motohashi, 2004). A key limiting factor is the need to change attitudes and capabilities of the relevant staff, a process likely to take some time.

1.5.5.3.3 Evaluation

Japan's severe economic problems in the last decade have led to a fundamental review of economic policy in the country. For many years now the focus has shifted to macroeconomic policies as the government attempted monetary and fiscal measures to overcome the deep recession. As these measures alone turned out to be ineffective, the government also engaged in regulatory reforms intended to further open up the Japanese markets and step up the competitive pressure on Japanese businesses. More recently, a third pillar has been added to the policy mix: a revised industrial policy approach. This new industrial policy focuses on strengthening the innovative capacity of the economy by mobilising the potential of companies, universities, research institutions, and regional clusters.

When looking more closely at the rhetoric and the actual programmes currently dominating Japan's industrial policy, the country seems still somewhere between the old model, where government clearly set the agenda and picked specific sectors or industries, and a new model, where government and private sector co-operate as true partners and where the government has important but limited roles in providing a attractive environment for business. The old model was discredited by the last decade of economic stagnation. But the government seems to have a hard time to fully embrace the new model. It tends to remain in control and pick industries for specific benefits. And the changes in policy have resulted in programmes, especially in terms of clusters (OECD, forthcoming), which lack sufficient co-ordination across government agencies. The government still also seems to be overly focused on industries with export potential. Japan's real challenge, however, remains the low level of productivity in its domestic industries. The weak performance domestically has hurt Japanese prosperity and it has also affected the attractiveness of Japan as a location for export clusters (Porter *et al.,* 2000). The government's current approach does to some extent address local industries, but does not make them its priority.

Japanese industrial policy is getting increasingly similar to the approach taken in other OECD economies, including the European Union. While the country has taken a number of interesting – and in its situation useful – policy initiatives, these do not add much new knowledge for European policy makers. The most apparent innovation is the wide-spread introduction of cluster efforts as an attempt to strengthen the linkages between companies, universities, and government agencies. It is still too early to fully evaluate the impact of these initiatives. The impression so far, however, is that most of these cluster efforts are driven strongly by government, with companies being a part of them as participants and recipients of services but not as players that take on a key role in setting the agenda for the cluster (Yoshida, 2004). While a step in the right direction, the Japanese cluster strategy still has some way to go to implement a modern cluster-based economic development strategy.

1.5.5.3.4 Concluding comments

The ultimate test for industrial policies is their overall effectiveness in terms of creating greater prosperity for the overall economy. Taking this benchmark seriously, it is hard not to be intrigued by the US

experience. The traditional view of US industrial policy characterises it as ad hoc, internally inconsistent, and much more prone to market interventions than political rhetorics would suggest. The review of current policies provided here gives at least some evidence in line with this view. But at the same time the performance of the US economy, especially on microeconomic indicators such as productivity and innovation, has been strong. It seems that weaknesses in policies most closely associated with traditional industrial policy are being compensated by a strong commitment to attractive overall conditions for business, to open markets with high levels of competition, and to investments in infrastructure, education, and science. The basic policies in these areas and their reinforcing effects on each other seem to be much more important than the design of specific vertical or horizontal policies for industry. This view does not imply that industrial policy is necessarily bad but it does suggest the need to focus on the fundamentals of economic policy before spending too much money and political energy on an industrial policy that tries to compensate for failure in the basic conditions for businesses.

Applying overall economic performance as the test, it is easy to dismiss the Japanese experience of the last decade as a failure and the recent changes as too fresh to provide any meaningful assessment. But the Japanese attempt to modernise industrial policy, especially their use of clusters, does provide important insights, especially in the context of the US experience in this area. The US focus with regard to cluster efforts has been on processes; on finding new and productive ways for government agencies, universities, companies and others to work together in identifying, prioritising, and addressing the specific barriers that companies in a region or cluster face to become more productive and innovative. The Japanese focus still seems to be more on picking and nurturing industries perceived to have the best chance of succeeding; less on intervening in market competition than in the past but still with significant additional public funds for the clusters identified. What seems a small difference, is in fact of major importance for the overall nature of economic policy. As the European Union is pondering to strengthen the role of cluster-based policies in its tool kit, it should take note of these differences.

For policy makers in Europe it is not only important to understand which instruments have been used in the United States and Japan, and how effective they have been, but also which factors in the political system of these countries have led to the specific policy mix we can now observe. In the political system of the United States, the President can set the political agenda and has a good chance to "force" his views on and invest his political capital in a few high priority areas. But Congress controls the budget, and its members, especially in the House, are driven by the need to serve the particular interests of their constituencies they have to face every other year for re-election. In this context, a mix between a few cross-cutting policies driven by the President and many (individually small) interventions on behalf of local industries is the natural outcome. This makes a national push on behalf of a specific industry hard to

sustain, as it will inevitably raise demands or protests from others.[117] In the political system of Japan, the Prime Minister exerts strong central control and leadership. He is, however, dependent on securing the interests of the majority of his party, traditionally the LDP, which still strongly represents rural interests fearful of opening Japan to competition. The current policy approach combines efforts to increase competition, also from abroad, with policies targeted to provide support to a number of industries in all parts of the country. As a package, the intention seems to be to secure support from parts of the LDP that are opposed to liberalisation. In addition, the more direct policy action in specific industries picked by the public sector is in line with a central government that feels directly responsible to deliver economic growth, and is less willing to remain focused on cross-industry policies, leaving it to the private sector to turn new opportunities into growth. The political structure is, of course, different across the EU but in general more similar to Japan than to the US. Japan thus provides important lessons on the pitfalls even a well-intentioned modern industrial policy is facing.

1.5.6 Airbus and competitiveness[118]

1.5.6.1 Introduction

The goal of this chapter is to analyse factors which made the Airbus a success for its manufacturer and as a flagship of large European trans-national projects (in contrast to Concorde, HDTV, etc.). This chapter does not provide any thorough cost benefit analysis, and neither does it attempt any definite evaluation in terms of European or global welfare nor a contribution to the discussion of WTO procedure. Its purpose is to carve out some determinants of success for very large international projects.

The European aircraft manufacturer Airbus was established in 1970 as the "GIE Airbus Industrie" consortium of the French Aerospatiale and the German Messerschmidt-Bölkow-Blohm (MBB) companies, each holding an initial stake of 50 percent. The consortium was enlarged in 1971 by the Spanish Construcciones Aeronauticas SA (CASA) and in 1979 by British Aerospace (BAe). Since then and until 2000, the French and the German shares amounted to 38 percent each, the British share to 20 percent and the Spanish share to 4 percent. In 2000, the European Aeronautic, Defence and Space Company (EADS) was created by a merger of Aerospatiale Matra SA of France, Daimler Chrysler Aerospace AG of Germany and CASA of Spain. Airbus SAS (a simplified joint stock company incorporated under French law) was formed as a joint venture of EADS (with a stake of 80 percent) and the British BAe Systems (20 percent). It employs some 52,000 staff of over 80 nationalities. Design and production sites are grouped into four wholly-owned subsidiaries, Airbus France, Airbus Deutschland,

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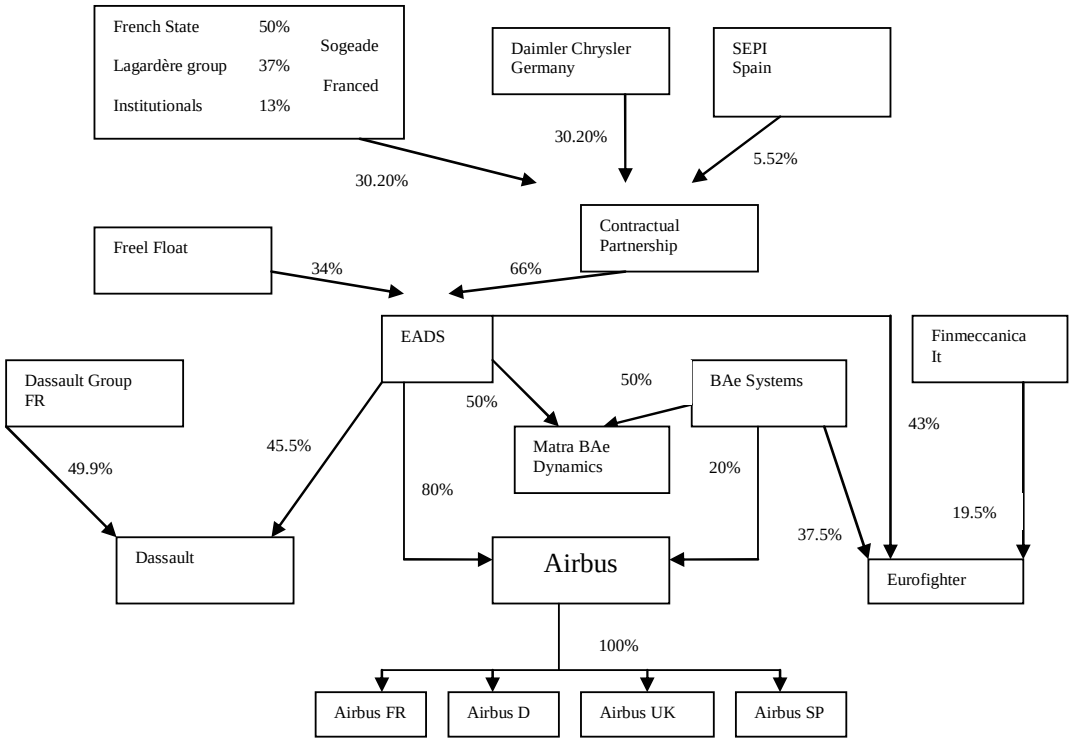
[117] The US administration ran into this problem when users of steel products (and the politicians who represent the communities in which they were located) became very forceful opponents of the steel tariffs.

[118] Prepared by Christiane Alcouffe.

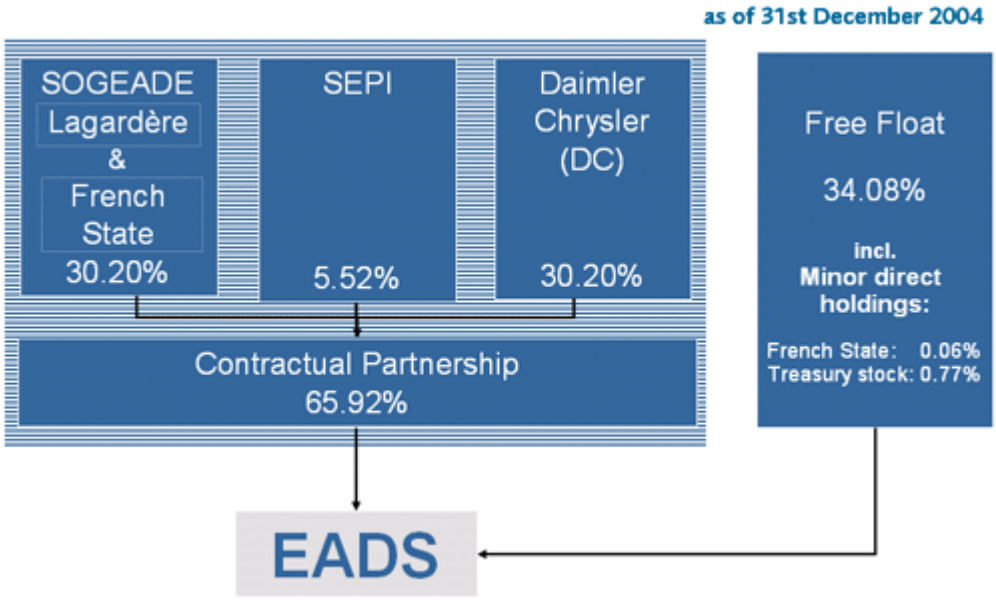
Airbus España and Airbus UK. The two assembly plants of Airbus are located in Toulouse and in Hamburg.

Graph 1.34: Current equity holdings in Airbus and European Aircarft Industry



Source: Atkas *et al.* (2004) http://www.eads.net

Graph 1.35: Detailled shareholding structure EADS



Source: http://www.eads.net

Airbus: A European and international company

Today Airbus has more than 150 sites throughout the world, and maintains 16 development and manufacturing facilities in France, Germany, the UK and Spain, where Airbus aircraft are designed, built, assembled and tested. Worldwide, Airbus operates several subsidiaries, six regional offices, three training centres, five spare parts centres and 120 resident customer service offices. The company utilises a network of some 1500 suppliers in more than 30 countries, including 800 suppliers in the US. Airbus has also established four hubs in North America with its headquarters for Airbus North America and North America Customer Services in Herndon, Virginia, outside of Washington, DC. Its North American spare parts centre is located in Ashburn, Virginia. Working with the spares facilities in Hamburg and Beijing, the Ashburn centre serves customers in the US, Canada and much of Latin America. A $50m, 100,000 ft^2 Airbus training centre is located in Miami, Florida.

The latest Airbus facility in the US, and largest in terms of employees, is Airbus North America Engineering in Wichita, Kansas, which opened (through its Airbus UK division) in the spring of 2002. The facility is the first design and engineering venture for Airbus in North America and comprises some 100 engineers working on the A380 wing design. In line with Airbus policy, human resources and the tradition of aviation activity in the region were key factors for selecting Wichita where there are nearly 45,000 aviation workers and more than 130 aviation-related companies, including Boeing, Cessna, Raytheon and Bombardier Aerospace.

A 380: A European product

Craft components come from 16 different Airbus plants; of these, Hamburg makes the front and rear fuselage sections; the 40-metre wings come from the UK: the metal for the wings is being cut by BAe Systems in Filton, near Bristol; the completed rib set is then sent to the sister plant in Broughton, North Wales, for assembly into the wings; the central fuselage section comes from Nantes in France; the elevators from Spain, etc. Final assembly takes place in Toulouse, France, while cabin fittings are installed and livery painting is carried out in Hamburg. The whole operation represents a huge high-precision jigsaw puzzle with more than four million individual parts.

Box 1.19: Milestones in the development of a European aviation industry and its competitors:

1959: Certification of the Caravelle built by Sud Aviation; the airplane was a large success, with 280 units built in nine versions.

1969: First flight of Concorde and launching of the Airbus A300 programme.

1987: First flight of Airbus A320.

1990: A drawing of a very large Airbus craft is shown at Farnborough.

1991: Boeing approaches DASA and later on BAe concerning a project to jointly develop a large aircraft.

1996: Airbus Industrie sets up a *Large Aircraft Division.*

19/12/2000: The Airbus stockholders (EADS and BAe Systems) agree on the industrial launching of the A380 programme.

15/10/2004: Airbus confirms the demand for reimbursable advances to develop the A350, a thrifty, medium capacity and long range plane which is in direct competition to the Boeing 787.

Future activities include the delivery, in 2006, of the first commercial A380 aircraft and the first A350 deliveries by 2010.

This unique European collaboration has a long history. With certification, in 1959, of the Caravelle built by Sud Aviation, French civil aircraft constructors had been at work for over half a century before one of their products, the Caravelle, became a large success on the (then) narrow market: 280 units built, nine versions.

The end of the 1960s saw the coproduction of the Concorde (1969: first flight of the Concorde). While not a commercial success, the Concorde was most certainly a technical achievement, the by-products of which served the oncoming research for the A300 and following product families. Of similar importance, it was a full-scale experiment for a co-operative venture between two countries, two governments, two companies, two cultures. From this experiment many lessons were learnt, among them the fact that building two assembly lines, one in each country, was probably a waste, even if a much greater number of Concordes had been built.

In 1969, the A300 programme was launched. The GIE (Groupement d'intérêt économique) Airbus Industrie was established as a European consortium of French (Aerospatiale) and German (Deutsche Aerospace) companies (50/50 percent), to which Spanish (Casa, in 1971) and UK (British Aerospace, in

1979) companies were later added as it became clear that it required co-operating for European aircraft manufacturers to be able to compete effectively with the US giants. Two other companies, Hawker Siddeley and Fokker, were also associated with the programme. Initially headquartered in Paris, the GIE moved to Toulouse in 1974.

Helped by the strong political will of European governments and overcoming national divides, sharing development costs, collaborating in the interests of a greater market share, and agreeing a common set of measurements and a common language, Airbus changed the face of the industry and introduced the benefits of enlarged competition to the market.

Airbus' first aircraft, the A300B, was launched at the 1969 Paris air show. It was the first wide-body twinjet and could carry 226 passengers in a comfortable two-class layout. Within two years, Airbus had 133 firm orders and its market share had risen to 26 percent by value. By the end of 1979, Airbus had 256 orders from 32 customers and 81 aircraft in service with 14 operators.

The A320, launched in 1984, was the first all-new design in its category in 30 years. Incorporating new technologies, the aircraft provided better operating efficiency, better performance and greater passenger comfort thanks to a wider fuselage cross-section. In spite of the recession of the mid 1980s, the aircraft anticipated market demand for a modern, cost-efficient aircraft to replace older planes when the economy picked up again.

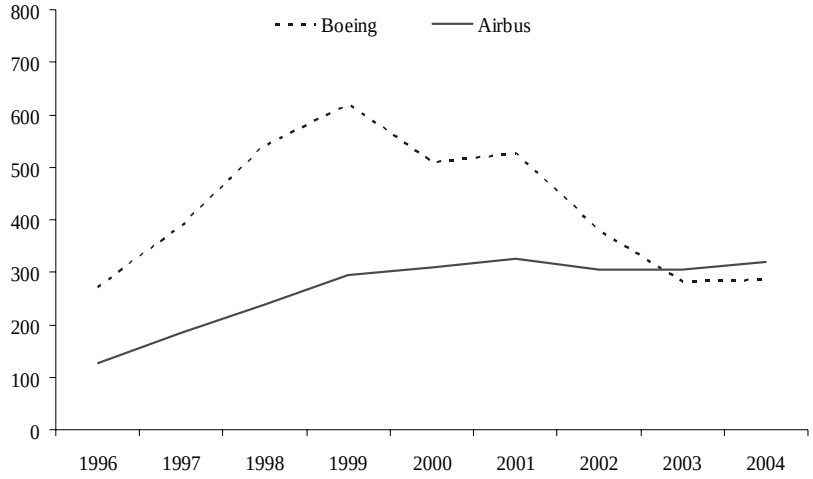
In 1990, a drawing of a very large Airbus aircraft was shown at Farnborough. In 1991, Boeing approached DASA and, later on, BAe, over the project of co-developing a large aircraft project, which was ultimately abandoned.

On 19/12/2000, Airbus stockholders, EADS and BAe Systems agreed to the industrial launching of the A380 programme. This 555-seat all-new double-decker aircraft is the most advanced, spacious and efficient airliner ever conceived, and the solution to growing traffic between major hubs. The A380 will cost 15 to 20 percent less to operate, have a 10 to 15 percent greater range, burn less fuel, produce less noise and lower emissions than the largest aircraft flying today. First delivery of the commercial version of the A380 aircraft is envisaged for 2006.

The basic intention of the consortium was to create a European counterweight to Boeing and other players on the world market of the aerospace business in order to raise the competition intensity in that market. The success of this undertaking is demonstrated by the relative developments of airplane deliveries by Airbus and Boeing (Graph 1.36). The market share and absolute deliveries of Boeing have been significantly reduced since the appearance of Airbus planes; while some of the smaller producers could

not sustain the increased competitive pressures and left the market.[119] The world market is currently dominated by Airbus and Boeing with about 50 percent market share each. In 2003, Airbus for the first time delivered more jet-powered commercial airliners than Boeing. In response, Boeing, with estimated deliveries of 320 airplanes in 2005 and some 375 to 385 in 2006, is determined to close ranks with Airbus by 2006 (Die Welt, 29 March 2005). It should be emphasised that the market shares, in terms of deliveries, are the only reliable indicator to analyse competition. Neither demand, prices, nor costs are known.

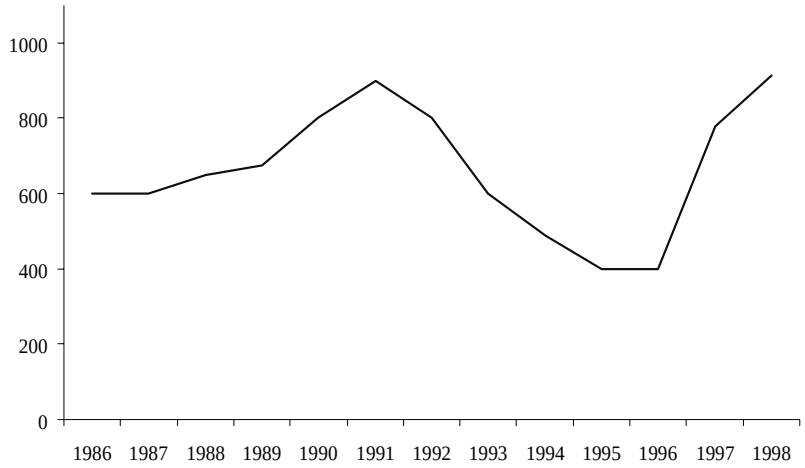
Graph 1.36: Boeing and Airbus deliveries 1996–2004



Source: Airbus, Boeing.

[119] In particular, in 1997 McDonnell Douglas, then behind Boeing and Airbus on third place in the world ranking, was merged with Boeing.

Graph 1.37: The cycle of commercial aircraft deliveries (1986–1998)



Source: Rapport Sénat 1998–1999, No. 414, p . 37.

As a consequence of the duopoly situation on the world market of aircraft manufacturing, fierce competition has developed between Airbus and Boeing. An outgrowth of this competition has been a spell of mutual accusations of unfair practices, in particular through government subsidies. Both sides have requested a decision from the World Trade Organisation (WTO) where the cases are still pending. This quarrel also limits the information contained in the current study, as the parties involved are reluctant to disclose data which otherwise might have been available.

Civil aircraft manufacturing is a business characterised by a number of special features which must be considered when analysing the Airbus case:

The aerospace industry is seen as a high-tech catalyst in the fields of R&D management, materials and electronics.

The industry is faced with high development costs, hence the question arises of funding and when to reach the break-even point or "neutral point".

An aircraft is a complex product: in an average plane, there are over four million parts, most of them of a “high-tech” nature.

Contracts with suppliers usually extend over long time spans, as a plane is in use for 10 to 30 years and large quantities are produced (many types of aircraft sell over 500 units).

The number of significant suppliers is rather small, and they may well deliver to either of the major competitors.

Production activities depend on cyclical demand conditions which cause long-term funding problems.

The following analysis collects information on the prerequisites and basics of setting up an airplane production (Section 1.5.6.2), the functional organisation of Airbus (Section 1.5.6.3), the competitive advantages in supply chain management and cost mastering (Section 1.5.6.4), the competitive advantages in innovation (Section 1.5.6.5) and the competitive advantages in financial terms (Section 1.5.6.6). This section will also report on the arguments raised before the WTO. The paper will be rounded off with a tentative list of success factors for large transnational projects such as the Airbus (Section 1.5.6.7). The data and examples presented will chiefly relate to the Toulouse area which houses the largest of the Airbus production facilities with more than 10,000 employees.

1.5.6.2 Industrial & educational choices and policies

Among the preconditions for developing a cluster of firms engaged in the aerospace industries are the geographical proximity of those firms, an opportunity to exploit local synergies and the development of partnership habits and trust.

With a history of about a century of firms being established in the aerospace and related industries (Latécoère, etc.), the wider Toulouse area features a strong local concentration of suppliers consisting of about 1260 companies, 58,000 direct jobs in the Midi-Pyrénées region and some 85,000 employees if the Aquitaine region is included.

Over 50 percent of France's total aerospace industry is concentrated in the south-west of France. Toulouse is the second largest aerospace industrial site in the world, Boeing Seattle being the largest. In Midi-Pyrénées, 75,000 jobs are (directly and indirectly) linked to aerospace industries, of which 67,000 are placed in Haute-Garonne (Toulouse area). Over the last ten years, the number of jobs has grown by about 50 percent. In the Midi-Pyrénées region, exports in 2002 of products from the aerospace industry were worth around € 14 million (INSEE, 2004A).

The Toulouse area is characterised by a number of factors which contribute to form a cluster-like production environment: proximity of production facilities material exchanges as well as knowledge communication allow firms to work together. For instance, over a quarter of the engineers permanently working at the Airbus Research Department are on the payroll of suppliers/subcontractors. This fact allows them to play a substantial role in the decision-making process for product design. As they know exactly their firm's competencies, they can transmit such information to Airbus and insist on the development of convergent technical choices there and/or conversely can make their firm develop convergent competencies.

This is not to say that every step of the process is done in south-west France, since work is divided between the four partners, but, to give an illustration, of a total of ca. 1500 firms which work *directly* on the A380 production process, *600 are in Toulouse*, 450 in Hamburg, and 220 in the UK. Sub-assembly

takes place at 16 European sites. This division of work was established as early as 1971, as seen above (in the section on historical milestones).

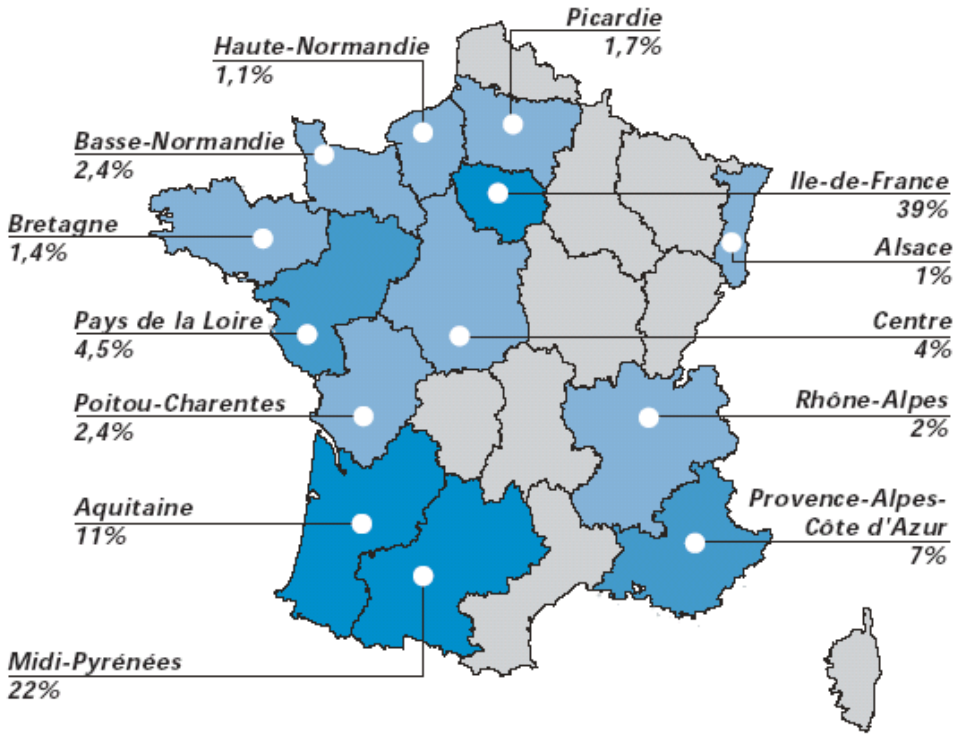
In France, in addition to Midi-Pyrénées and Aquitaine (both totalling 33 percent of industry employees), the aerospace industry is also important in the three following regions (please note that the figures given here below and on the map are for the aircraft and space industry (launchers and satellites) since we do not have a breakdown at sub-sector level):

- Ile de France (39 percent of industry employees);

- Provence-Alpes-Côte d'Azur (7 percent) ;

- Pays de Loire (4.5 percent) with Nantes and St Nazaire sites where 2000 employees work for Airbus and another 2000 jobs are to be created upon the start of A380 production.

Graph 1.38: Breakdown of aerospace industry employees in France



Source: Source: Gifas (2004), p. 34

Comparing Airbus and Boeing, it is found that Boeing seems to rely much less on proximity than does Airbus. The multiple delays (which appeared to take no account of suppliers' geographical proximity) in deciding on the location for 787 assembly, the fact that, for the first time, outside companies have been awarded contracts for major elements of the aircraft structure – this has completely upset the existing network of subcontractors. Consequently, many suppliers who thought they had an advantage by being

located near Boeing's assembly line are now scrambling to get work from big subcontractors. And proximity to suppliers is not only geographical. It relies on strong ties between the constructor and its suppliers. (See below for more about the very strong relationship between Airbus (all national entities) and all its suppliers, whether large or small.)

Other relevant elements which contributed to the evolving cluster of producers and subcontractors in the aerospace industry were state aid and the region's support for investments in the physical infrastructure. Recent local examples are (i) the development of the 220 ha Aeroconstellation site to house the A380 assembly line, (ii) the enlargement of roads between Langon (Bordeaux) and Toulouse to make way for the large parts of fuselage transported by trucks, and (iii) airport development/improvement.

Of similar importance have been the educational and training resources in Toulouse which comprise the Aerospace Lycée for secondary education and a number of institutions for higher education, among them the IUT (Institut Universitaire de Technologie) Department specialised in Quality in Aeronautics, and the National Schools for Engineers (Grandes Ecoles) such as: Ecole Nationale Supérieure de l'Aéronautique et de l'Espace (Sup Aéro), Ecole Nationale Supérieure d'ingénieurs de constructions Aéronautiques (ENSICA), Ecole Nationale de l'Aviation Civile (ENAC). Fully 75 percent of the French aerospace engineers are trained in these schools.

Public research bodies specialised in the aerospace field (laboratories, CERT, ONERA, CEAT, LAAS, CNES, CNRS, just to mention a few) employ 6,430 researchers. The respective co-ordination or promotion structures are based in Toulouse (CNRT: Centre National de Recherche Aéronautique et Espace, Fondation de recherche Aéronautique et Espace).

1.5.6.3 Airbus functional organisation

1.5.6.3.1 Managing production across the four partner countries

Although the production of components is dispersed over the four partner countries, Airbus has remained a relatively integrated company, mastering the supply of critical airframe components (wings, fuselage, centre wing boxes, tail sections, etc.). To be successful, this division of work among different business units must ensure that all components and subsystems interface exactly so that final assembly can be reduced to just joining the components. Overall assembly in aircraft industry represents about 20 percent of production time. With the site-based subassembly system (wings in UK, rear fuselage in Germany, central fuselage in Pays de Loire, etc.) adopted by Airbus, final assembly is reduced to 4 percent of the total time. But, obviously the pieces of the jigsaw puzzle need to fit accurately. Mutual understanding and unified methods are of the essence.

Since 2000, Airbus has been busy harmonising the different cultures and experiences of the national entities. The development of e-business tools and the introduction of new techniques of information and

communication (new to everyone and acting as unifying practices and knowledge) have considerably facilitated this harmonisation which is indispensable from a cost-saving perspective. Among the instruments employed are the following:

extensive use of Enterprise Resource Planning (SAP),

development of e-business portals (sup@irworld: Supplier @nd Airbus World),

E-Sourcing (sourcing management tool),

E-Buy Side (tactical supply operations), and

E-Supply Chain (provision of supplies and collaboration with suppliers), inter/intranet.

1.5.6.3.2. Evolution of purchasing roles over the past ten years

In large companies, purchasing from subcontractors today is considered one of the central functions determining eventual success on the market. Quite in contrast, at Airbus Industry (the former "Aerospatiale" up to the end of the 1980s) purchasing originally did not receive any special attention, but was considered one of the basic functions common to all enterprise organisations. It was therefore allocated to the Production Department.

Around 1990, a Purchasing Department was created, initially with a Director assigned from the Research Department, who was later replaced by a new Director who had an economic and management control background. Purchasing was gradually considered a *strategic function* in the company. By this time, the costs of materials, parts and goods bought from outside the organisation made up approximately 60 percent of the cost of planes. The impact on company assets of purchasing from subcontractors and managing materials became very significant and visible. The Purchasing Department was subdivided into a number of sections: purchasing (with tactical activities such as orders, deliveries and logistics), supply management (involved in broader aspects of the function: selecting sources, managing costs, developing partnerships, etc.), and procurement marketing (including research on new suppliers for future needs). In about 2000, the first procurement organisation was of a largely centralised nature. Then up to 2005, the procurement organisation evolved gradually into the relatively decentralised organisation we know today.

Today equipment, parts and goods bought from outside make up approximately 70 to 75 percent of the cost of planes. Airbus has traditionally given suppliers the responsibility for sub-assembly and acquired complete systems rather than individual parts that require in-house assembly. As a result, suppliers are accorded great responsibility and need to be highly transparent and are therefore required to establish and maintain full trust with regard to all stages of the production planning process.

In all four partner countries (France, Germany, UK and Spain) strategic purchasing groupings have been developed. Twenty-five purchase networks, each run by a Lead Buyer, have been introduced to manage and co-ordinate the activities of various EADS Business Units.

That purchasing is considered of utmost strategic importance as a source of competitiveness is indicated by the constant efforts to restructure these functions, as revealed in the company charts and the information blackout policy (detailed charts are not available and very little communication is allowed on these topics).

Table 1.21 illustrates the actual Airbus procurement organisation which is subdivided into (i) Equipment and propulsion systems, (ii) Airframe procurement, (iii) General procurement of capital goods and services, (iv) Supply chain quality, and (v) Procurement strategy. Note that specialised Operational Excellence Centres have been created within Airframe procurement, each such centre being endowed with a Procurement Department with all transverse competencies.

There are over 1,200 procurement staff in Airbus today, mixed in multi-national teams, scattered all over France (Toulouse central office: team of 100, Meaulte, Nantes, St Nazaire), UK (Broughton, Filton), Germany (Bremen, Buxtehude, Hamburg, Laupheim, Nordenham, Stade, Varel) and Spain (Getafe, Illescas, Puerto Real). Procurement spending (2004) amounts to over € 15 billion.

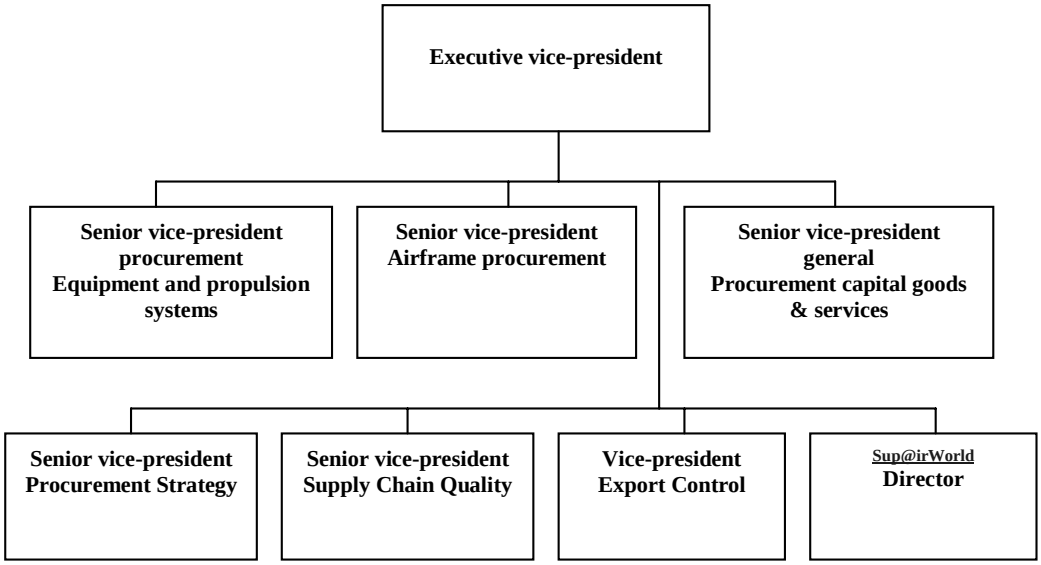
Table 1.21: International composition of Airbus procurement organisation – nationality of the 46 executives referred to in Graph 1.39

	France	Germany	Spain	United Kingdom	Total
Toulouse	14	5	2	8	29
Hamburg		6			6
Bristol	1			4	5
Spain		1	2		3
US	1				1
No indication	2				2
Total	18	12	4	12	46

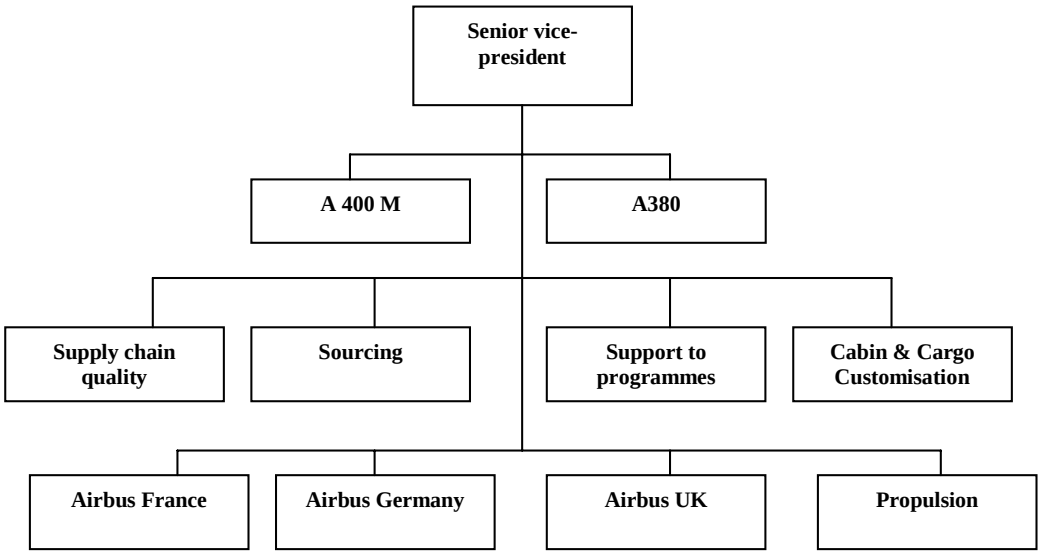
Note: Location is inferred from executives' phone numbers.

Graph 1.39: Chart of Airbus procurement organisation

Airbus procurement[120]



Equipment and propulsion systems[121]

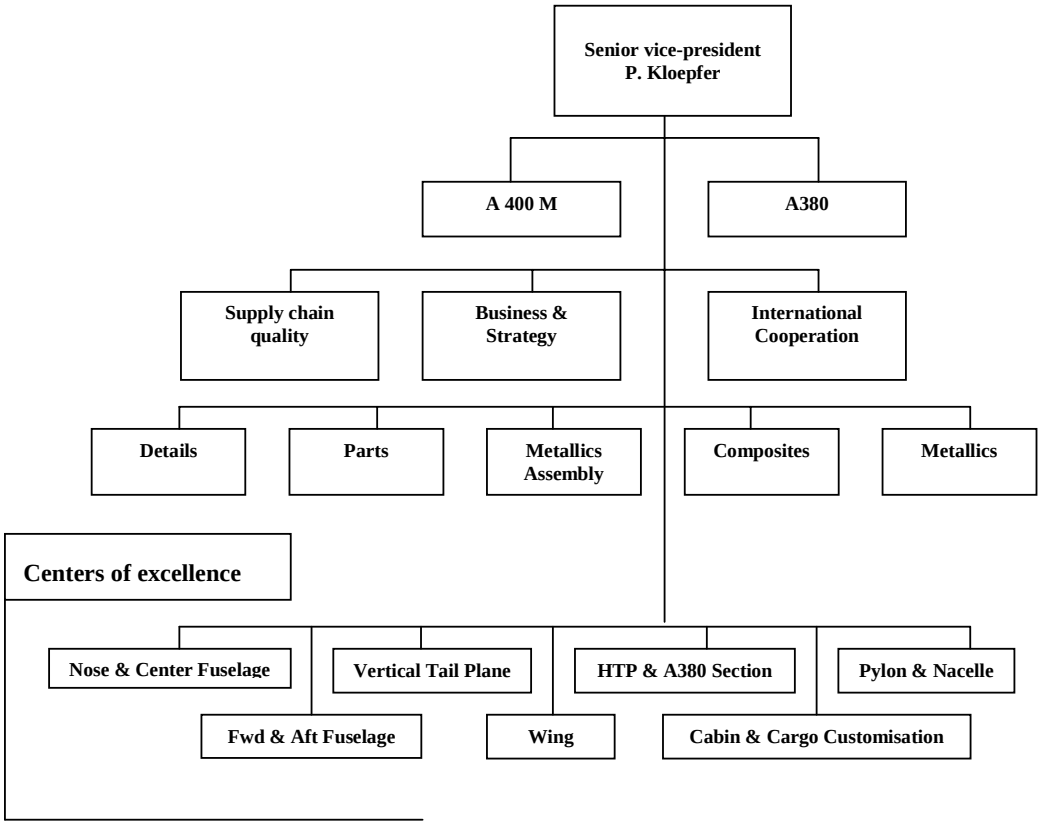


[120] Airbus Procurement is responsible for providing externally sourced goods and services to time, cost and quality as agreed with Programmes and Operations.

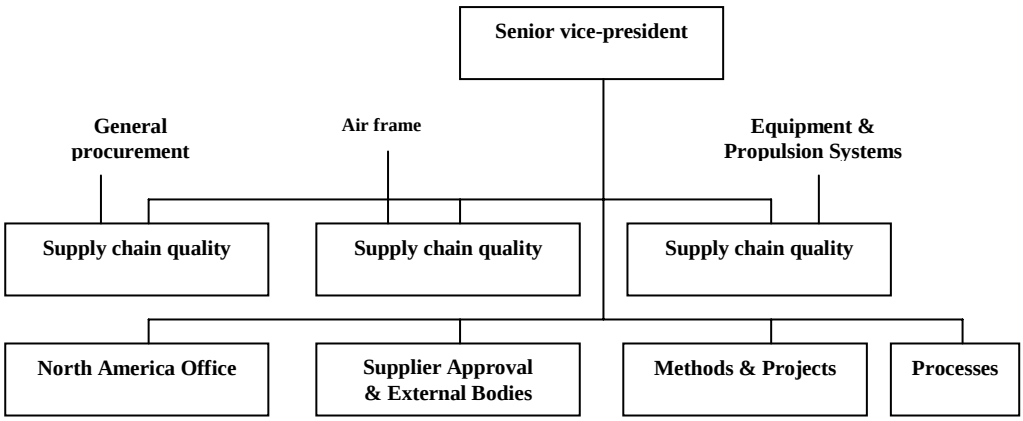
[121] Manages the Sourcing, the quality and Supply Chain of all flying equipments, including Powerplant, for all Airbus aircraft.

Graph 1.39: Chart of Airbus procurement organisation (continued)

Airframe procurement[122]



Supply chain quality[123]

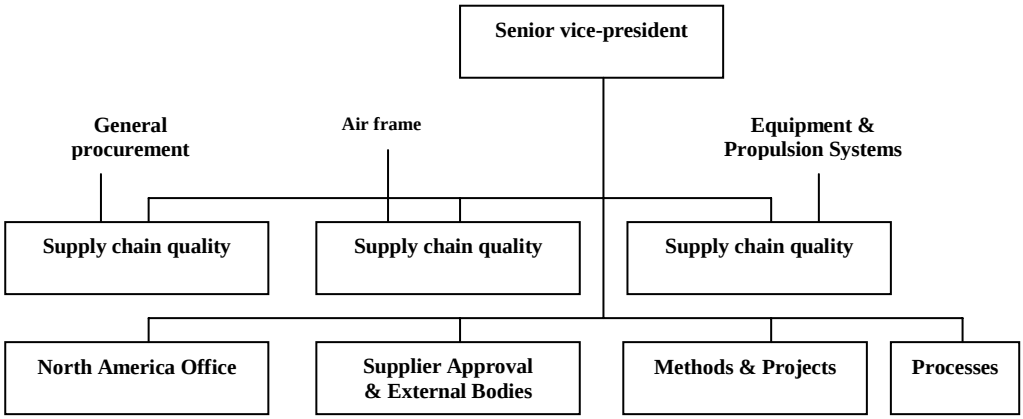


[122] Sources and supplies all materials, standard components and subcontracted assemblies to manufacture Airbus aircraft.

[123] Manages the procurement quality assurance process and develops the actions required to ensure the best performance in the overall supply chain.

Graph 1.39: Chart of Airbus procurement organisation

Procurement strategy[124]



1.5.6.3.3 Cross-functional teams in purchasing, supply management & marketing

One way to increase purchasing efficiency has been to work with cross-functional teams in which the many experts, cultures and nationalities involved in research, development and manufacturing of planes could express their different points of view and contribute to optimal choices. The functional experts retain their identification with their functional area and report the experience acquired to their functional colleagues, ensuring that knowledge is broadly diffused throughout the organisation.

Starting in the early 1990s, Airbus developed a process towards restructuring the organisation by introducing the *supply chain* concept. The supply chain is the upstream portion of the value chain. It is responsible for ensuring the right purchases, from the right sources, at the right time, and in the right quality. The development of *suppliers' partnerships* and strategic alliances is the direct outcome of this way of managing the value chain. It involves strategic sourcing (decision to make or buy and if buy: choice of a number of reliable suppliers), hierarchical organisation of suppliers (first tier, second tier, etc.), special attention to internal structure, productivity and investments of suppliers, and the technical choices made by Airbus through "supplier development" activities.

1.5.6.4 Competitive advantage in managing the supply chain and mastering the costs

Product quality, including related services, and price are the major determinants for a company to gain and maintain a market. The price in turn is a function of productivity and of costs which depend on organisation and management as much as on factor input costs, taxes and exchange rates. For the

[124] Leads, manages and implements the overall procurement strategy for Airbus. It provides all policy, processes, systems, tools and other services to ensure consistent best practice performance on a constantly improving basis.

competitive position of Airbus vis-à-vis Boeing, the US dollar/euro exchange rate is naturally of particular importance.

1.5.6.4.1 Supply chain organisation

In the late 1980s, most Airbus subcontracting was due to in-house capacity shortages, and subcontractors were considered mere underlings. The early 1990s saw the implementation of EDI (Electronic Data Interchange) and (i) the development of a hierarchical organisation of suppliers, (ii) integration of first tier and major suppliers in EDI Greenloop (1992), and (iii) streamlining with the effect of reducing the number of major suppliers from 700 (1993) to fewer than 130.

Greenloop was much more than a group of suppliers exchanging electronic data about orders and invoices. It was a *community* sharing information about activity levels, education, training, organisation, the first steps of supplier development still being at work today.

Over the years, the value produced by the upstream value chain grew, and with it the world market share of Airbus which, in terms of delivered planes, increased from 32 percent in 1999 to 53 percent in 2004. Alongside this development, the suppliers' share increased as well. As already mentioned above, the share of own production in the total production value of Airbus has declined to less than 30 percent.

1.5.6.4.2 Mastering of suppliers costs

Airbus has close commercial relations with over 1,500 main suppliers all over the world. Although Boeing and Airbus share many a supplier for rather similar intermediate products, different ways of handling the relationship may result in significant cost differences.

Airbus uses the concept of "ownership cost" which considers purchases not only on the basis of price, but on all aspects of the acquisition, including quality, supplier risk, integration into the supply chain and total impact throughout the economic life of an aircraft. Airbus has systematically sought improvements in the running of the supply chain through standardisation, reduction of unnecessary customisation, innovative financing, lead time reduction and risk-sharing. The design of contracts plays an essential part in the attempt to strike the right balance between long-term relationships and the consequent lack of competition.

Cost mastering of costs is based on the "Supplier Development" scheme developed by Airbus. It starts out with intensive screening of potential suppliers including scoring, rating, and auditing, and puts much emphasis on reengineering and continuous quality improvements (more than 50 percent of the suppliers have obtained ISO certification). Also of importance are investment plans and the professional qualifications of the workforce; among dependent suppliers, a quarter of the workforce are executives, and in design services the ratio is more than one out of two. A current operation is the so-called *"Route 06"* programme, which presses first-tier suppliers to reduce their prices. Cost savings achieved by Airbus in

that way will add up to € 1.5 billion by 2006, representing 20 to 30 percent less on the cost of suppliers in 2002. This reduction is not designed to slice the suppliers' margins, but is intended to serve as an incentive (supported by Supplier Development) to increase productivity.

Lean manufacturing is the key word, which at Airbus is understood to contribute to sustainable competitiveness over a longer period. When orders for new planes decline during a business cycle, Airbus attempts to keep up its suppliers' activities. The INSEE (2004A, p. 25) shows that, over the years, Airbus has supported the most dependent of its suppliers, sharing with them the consequences of declining orders. On the other hand, the less dependent suppliers see their orders cut disproportionately. This strategy seemed to have paid off during the long slump in 1991—1995,[125] when Airbus gained market shares from Boeing also by keeping its skilled workforce and suppliers, ready to spring to action upon recovery in demand.

1.5.6.4.3 Workforce costs and labour productivity

The 1999 data from a Deloitte report show an overall gap of 20 percent between Airbus and Boeing in terms of physical returns in the aerospace industry. The gap widened when Boeing encountered immense problems in 1995–1997 when confronted with growing demand. Revenues per employee, which were roughly equal in 1991 for both competitors, increased to about US$ 400 in 1998 for Airbus, while remaining virtually unchanged at around US$ 200 for Boeing.

Another indicator of the relative efficiency of airplane production by the two competitor companies is the number of employees required to produce an average aircraft: the figures for 1991 were around 220 for Airbus and some 300 for Boeing. In 1995–1997, that figure soared to 500 for Boeing, to finally (in 1999) settle at 230, while set at 120 for Airbus. Between 1991 and 1999, the required production facilities remained almost stable for Airbus at around 100,000 square feet, while rising substantially to 400,000 square feet with Boeing in 1995 and dwindling to 160,000 by 1999. In terms of deliveries in 2003, Airbus sources show an 8 percent higher output than Boeing while using 18 percent fewer human resources.

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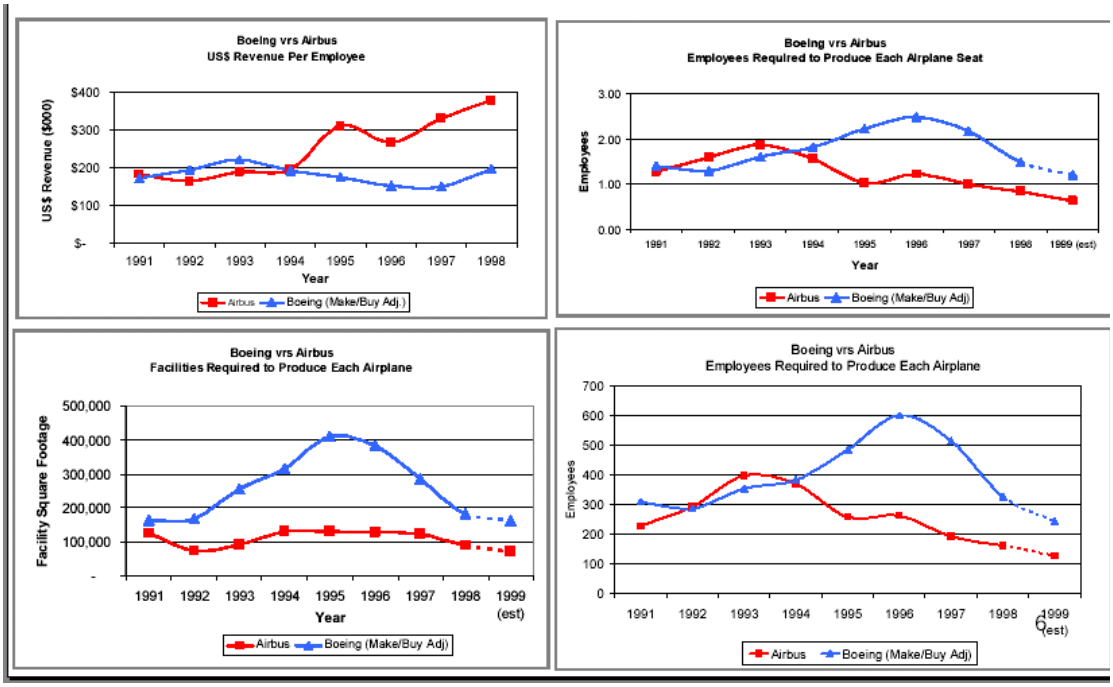
[125] Total (US + Europe) commercial aircraft deliveries in 1990: 674 (of which Airbus: 95), 1994 total: 489 (123), 1995 total: 430 (124), 1996 total: 440 (126), 1997 total: 616 (182), 1998: total 968 (229). Between 1990 and 1995 the total commercial aircraft deliveries suffered a decline by 36.2 percent and it took eight years to return to the 1990 level. Meanwhile, Airbus maintained a steady, slightly rising level of deliveries by deliberately smoothing production of its backlog orders (the orders had been relatively high in 1989, 1990 and 1992). Figures are taken from Commission des Communautés Européennes & Gifas.

Graph 1.40: Deloitte Report



1.5.6.5 Competitive advantage in terms of process, product and organisational innovation

1.5.6.5.1 Managing a skilled workforce

Airbus is rated as one of the top five employers ("best company to work for") by European science and technical students. Airbus co-operates with a network of over 150 universities, allowing the company worldwide access to the best people to hire. Employees from more than 80 nationalities work for Airbus.[126] It has always been a policy of Airbus to avoid or limit layoffs during slumps. This is in stark contrast to the policy of Boeing of hiring during peaks and laying off during downturns. When Airbus hears about skilled or innovative workers (through internship or otherwise) and there is no possibility to hire them, Airbus is very keen to keep them in the area, e.g. by asking a subcontractor to hire them temporarily.

The concentration of aerospace industries and training in the south-west of France generates large synergies among firms and promotes opportunities for employees, while ensuring diffusion of knowledge

[126] Aerospatiale took over a large part of the employees from Dassault and retained their know-how.

and know-how. An indication of the existence of such an extensive pool of skilled workers is the fact that Boeing tried many times to recruit in this area.[127]

A good measure of loyalty is employee turnover, which is a fraction of a percent per annum at Airbus, far lower than elsewhere in the aerospace industry. Similarly, a large proportion of Airbus employees have elected to participate in the Employee Stock Ownership Plan set up by its parent company EADS.[128]

1.5.6.5.2 Managing capacity through business cycles

Through cyclical downturns, e.g. in 1993–1995, Airbus pursued a conservative approach to production capacity management. As airlines cut capacity and delayed fleet replacement and expansion, aircraft manufacturers had to revise their production, resource and financial plans. Implementing long-term strategies and decisions to manage the peaks and troughs is critical to becoming or remaining competitive. Airbus and Boeing fared very differently over these periods. Boeing became fully attached to the boom and bust cycle. Airbus was more conservative about expanding production during boom periods, and as a result has not been forced to execute dramatic lay-offs of employees. The same policy applied to a certain extent to its suppliers/subcontractors.

Conversely, with the substantial upturn after 1995, Airbus refused to increase its production rate in anticipation of demand. Increases in capacity have been implemented only in response to firm demand and secure commercial commitments, using the production flexibility gained from investment in automating production facilities. In addition, Airbus uses scientific order management tools and techniques to closely assess and match deliveries to market requirements.

1.5.6.5.3 Product breakdown and innovation

The four partner companies have obviously succeeded in working closely together without visible frictions in designing, engineering and producing the different parts of the aircraft.[129]

Graph 1.41 shows the product breakdown into major modules and systems and distribution among the French, German, British and Spanish plants. It should be borne in mind, however, that many major

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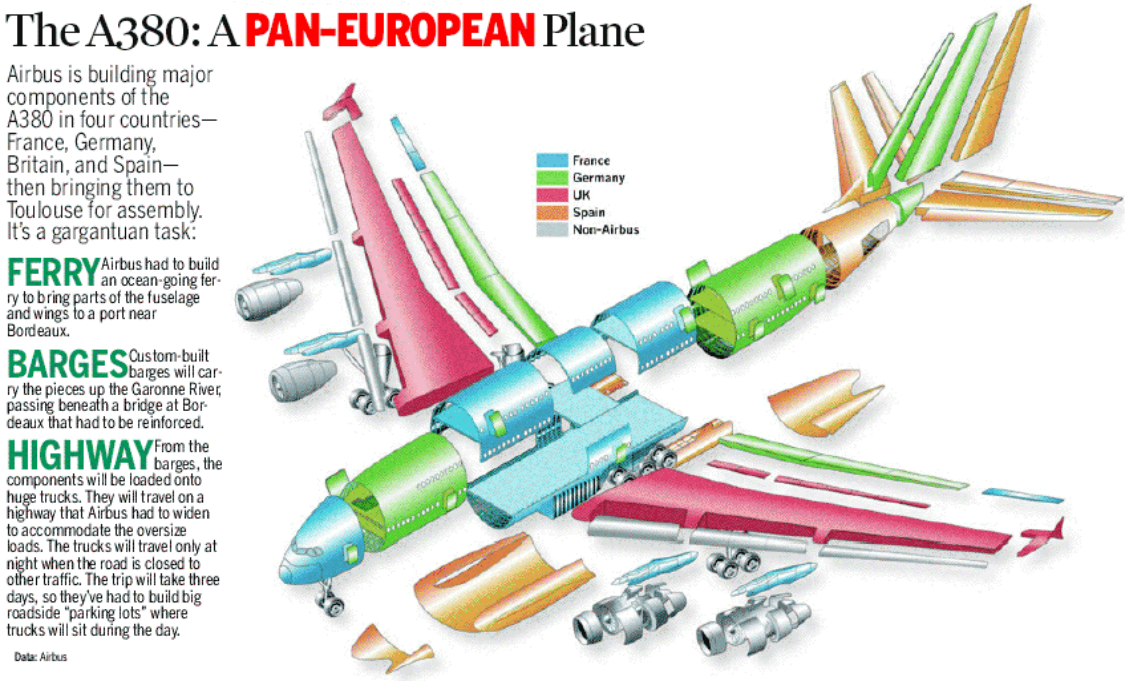
[127] One of these recruiting campaigns took place openly in 1996: Boeing's recruiting team stayed at the Crown Plaza, in Toulouse, and advertised in all media, guaranteeing confidentiality to all would-be employees who wished to come and see them for any information.

[128] For instance, they have chosen to be paid for part of their income by way of company shares. Furthermore, French law specifies some forms of profit-sharing, i.e. distribution of free stock, loans, savings, etc. and of course stock-options.

[129] Airbus claims that "after thirty successful years, it is clear that we have mastered the art of bringing together people of different nationalities, education and disciplines and welding them into an efficient force" (source: http://www.airbus.com/media/).

components may come from outside Europe (e.g. engines from the USA). On average, US parts total 40 percent of the cost of an Airbus aircraft.

Graph 1.41: International production breakdown for the Airbus A380



This choice must be considered strategic as it keeps within the company the core competencies with respect to design and development (the Research Department is located in Toulouse) and production of critical airframe components.

Boeing is following an entirely different strategy for its 787 plane, as the rear fuselage will be produced in Italy and the wings and wing fuselage in Japan using a new critical technology of composite materials. Pritchard and MacPherson (2005) have criticised this approach as a surrender of US technology to Japanese subcontractors just for the sake of gaining access to the Japanese aerospace market, tapping new financing sources and endeavouring to spread risks. From a trade perspective, the authors expect Japanese subcontractors not just to establish competency in producing components and in sub-assembling, but eventually to enter the market as a fully fledged producer of commercial aircraft.

As can be seen in the figure below, with regard to its 787, Boeing:

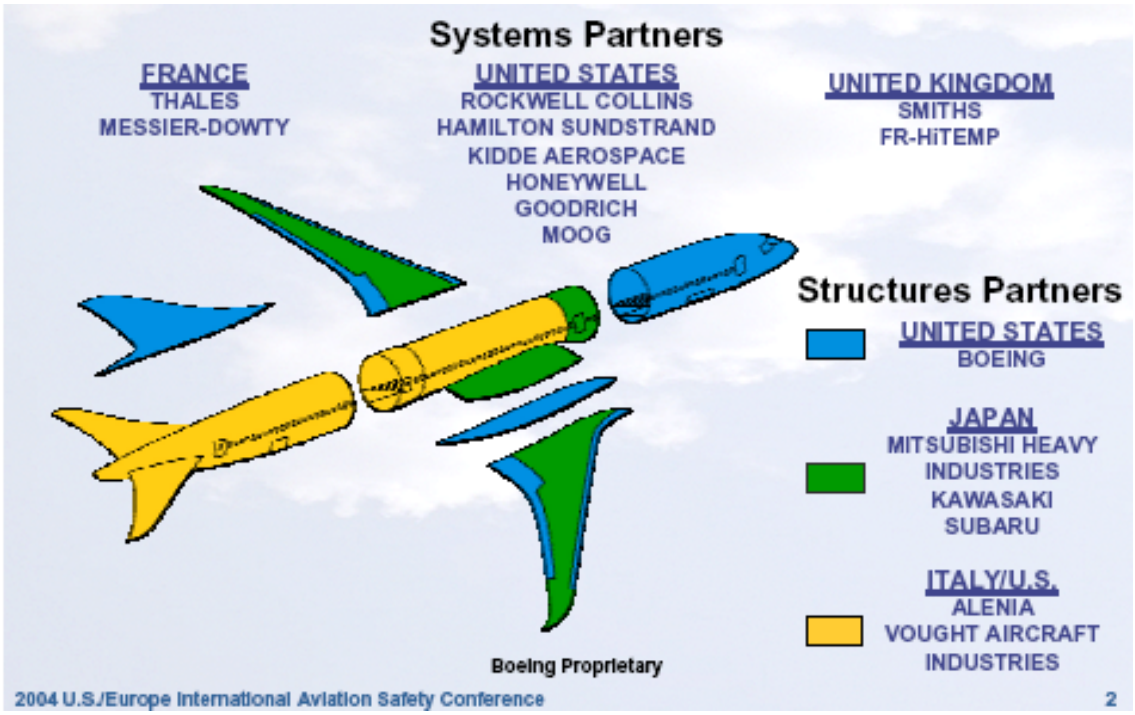
follows the same line as Airbus with regard to sharing parts production between its partners. As already mentioned for the aircraft structure, the rear fuselage is co-produced in Italy, whereas the wings and central fuselage come from Japan. This is the first time that outside companies have been given the lead in wing production for Boeing commercial aircraft;

whereas design, development and production activities of critical airframe components are undertaken *with but outside* Boeing: the fuselage produced in Japan will be using a new critical technology of composite materials (also researched, *but internally*, by Airbus, at the German Stade research centre). Another example: the eight doors of the 787 have been assigned to Latécoère (Toulouse), based on a 20 year US$ 1 billion contract, representing 15 to 20 percent of Latécoère's turnover. These doors (production scheduled to start in 2006) will be made of composite materials (made in France). They are now under development at Latécoère and will be assembled in Toulouse. Latécoère is a major supplier to both Boeing and Airbus.

This raises the question of *who* will ultimately gain the competitive edge for the new technology.

With respect to product innovation, Airbus has a long record of technological "firsts" which have ensured better aircraft performance, lower operating costs, greater environmental friendliness and greater comfort to end customer. Ever since the very first A300B, Airbus has introduced elements of innovative design which have become industry standards. Apart from a number of major innovations, the bulk has been incremental innovations and relative polyvalence of parts and skills (including piloting skills) inside the "families" of planes. But all innovations have provided Airbus with a significant competitive edge.

Graph 1.42: Boeing 787



Some outstanding examples:

1972: the A300, the world’s first twin-engine, twin-aisle commercial aircraft performed its first flight, entering service two years later. Its fuselage cross-section, which was retained for subsequent Airbus wide-body models, could accommodate industry standard LD3 containers side by side in the hold. It featured advanced rear-loaded aerofoil for greater aerodynamic efficiency of the wing, full flight regime auto-throttle and automatic windshear protection.

1983: the A310 introduced the first advanced cathode ray tube cockpit displays, used composite materials in secondary structures and electrical signalling for secondary controls.

1988: the A320 first introduced the fly-by-wire system and a side stick controller to commercial airplanes.

Fly-by-wire is an electronically managed flight control system, which uses computers to make aircraft easier to handle. Pilots manoeuvre their aircraft by controlling the moveable parts, known as flight control surfaces, on the aircraft’s wings and tail plane. Fly-by-wire replaced the mechanical linkage between the pilot’s cockpit controls and the moving surfaces by light-weight electrical wires, hence its name. When this technology, already used extensively on combat planes, was first deployed on the A320, it was a major achievement for several reasons. First, it cut down on the aircraft’s weight and therefore on the amount of fuel consumed. Second, this in turn lowered operating costs for airlines and benefited the environment by reducing exhaust gas. The results were not only better ergonomics, easier operation and enhanced safety, but also "commonality" across the entire fly-by-wire aircraft family (see below). Fly-by-wire has since become the industry standard. This technology has also made it possible for Airbus to develop a true family of aircraft, from the 107-seat A318 to the 555-seat A380, with near identical cockpit designs and handling characteristics.

The A320 was also the first single-aisle airliner to feature a wide 3.96 m/13 ft fuselage, with wider seats and a wider aisle for increased cabin comfort, and a fully containerised cargo loading system for the hold.

1994: lift-off for the Super Transporter ("Beluga"), a modified A300-600, with the world’s most voluminous cargo hold. In 1996, it replaced the Super Guppy as the main transportation link between Airbus production locations and is used for the daily transport of components between production and assembly sites.

1999: the first and longest carbon fibre keel beam for a large commercial airliner was built for the A340-600.

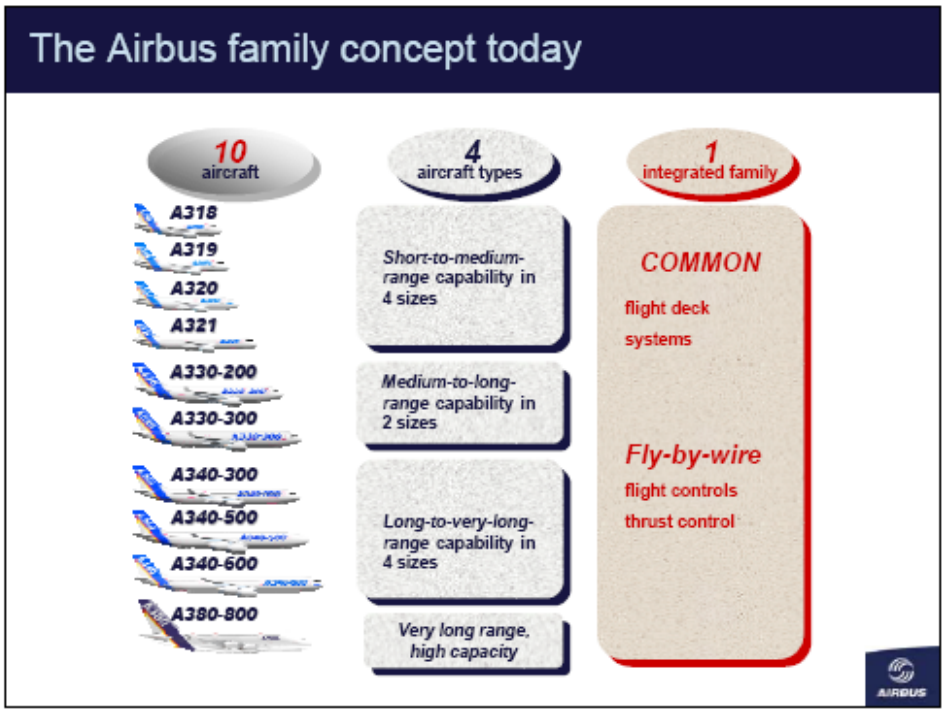
2000: Airbus launched the A380, the largest and first ever four-aisle, full twin-deck aircraft.

1.5.6.5.4 "Commonality"

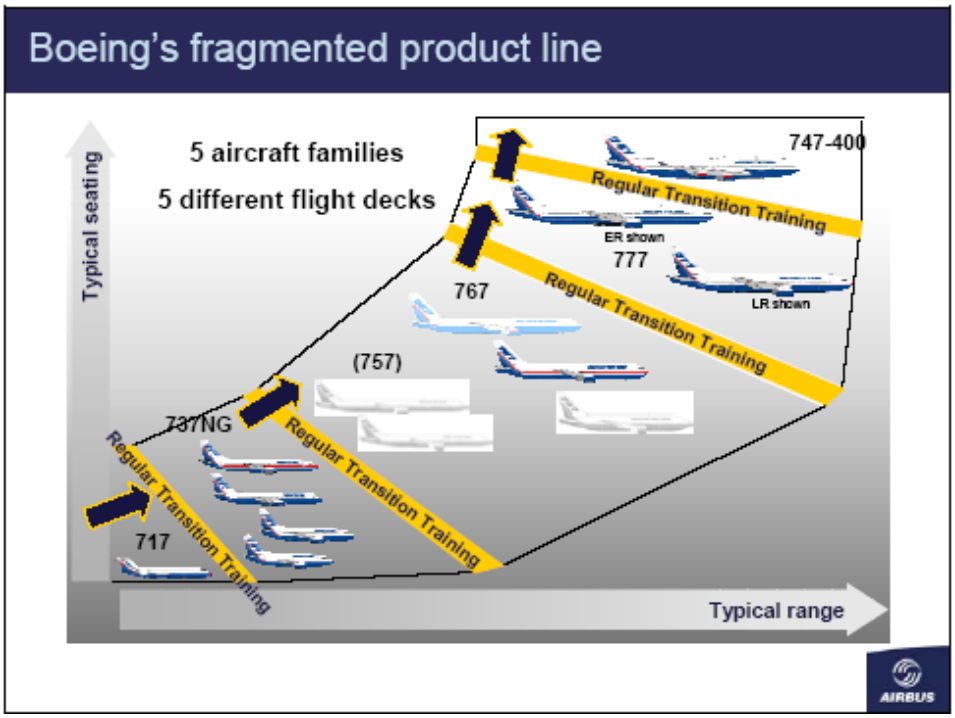
In Airbus terms, "commonality" means a set of common characteristics across several types of aircraft which permit cost-saving standardisation of aircraft handling. Commonality is a unique feature of Airbus's

new generation of jetliners, developed on the basis of the fly-by-wire system in the late 1980s. As a result, ten aircraft models, ranging from the small A318 through to the largest A380, feature very similar flight decks and similar handling characteristics. In many cases, such as the entire single-aisle A320 family, the airplanes in fact share the same pilot type rating, which enables pilots to fly any of them with a single licence endorsement. Offering airlines increased flexibility and cost-efficiency, it has become one of the keys to the company's success.

Graph 1.43: Comparison Airbus family concept versus Boeing's fragmented product line



Graph 1.44: Comparison Airbus family concept versus Boeing's fragmented product line



The benefits of commonality for operators include much shorter training times for pilots: *Cross Crew Qualification* (or CCQ) is a unique concept developed by Airbus, which allows pilots to transition from one Airbus fly-by-wire type to another via differences training instead of full transition training. The CCQ concept was approved by the US Federal Aviation Administration in 1991.[130]

Such time saving reduces training costs for airlines and increases crew productivity. The annual savings in payroll cost through improved productivity from reduced transition time alone amounts to some US$ 300,000 annually for each new Airbus aircraft added to the fleet. It is also more economical for an airline to recruit new pilots who are already Airbus-qualified. For pilots, this benefit provides greater mobility and better employment prospects.

Building on the Airbus operational commonality, airlines are increasingly implementing *Mixed Fleet Flying* (MFF). With MFF, a pilot can be current on more than one fly-by-wire aircraft type simultaneously and can regularly switch from, e.g., short and medium-haul operations on the A320 family to very long-haul flights on the A340. Some of the benefits offered by the MFF concept: (i) The long-haul pilot switching to short-haul gets more take-off and landing opportunities, which eliminates the need for

[130] For example, pilots changing from an A320 family aircraft to the larger A330 or A340 need only eight working days for CCQ instead of 25 working days for a full type rating training course. Pilots switching from the A330 to the A340 require only three days, and just one day to move from the A340 to the A330.

currency training and is less subject to sleep-cycle disruption. (ii) Short-haul crews switching to long-haul are subject to less fatigue from intense traffic, high-cycle operations. (iii) For airlines, the increase in revenue hours flown by pilots means a significant improvement in productivity due to less standby and "dead time". (iv) MFF also enables airlines to interchange differently sized aircraft at short notice with minimum crew-scheduling difficulties, allowing them to better match aircraft capacity to passenger demand.

Total CCQ and MFF improvements are estimated to lead to a saving of up to US$ 1,000,000 annually, for each new Airbus aircraft added to the fleet.

The benefits of commonality include a much shorter time for engineers to transition from one type to another. It also leads to significant savings through streamlined maintenance procedures and reduced spare parts holdings, with common parts accounting for as much as 95 percent within the single-aisle family, to give but one example. Commonality also offers schedule planners a high level of flexibility as aircraft of different mission capabilities, such as the A320 and the A330, can be operated and maintained by the same teams, as a single aircraft fleet.

Commonality has proved to be a major economic and commercial competitive advantage for Airbus by maximising airline operators' revenue through aircraft maintenance, crew training and managing costs and providing more passenger comfort (ergonomics, quietness, smoothness and the "no middle-seat" concept).

1.5.6.5.5 Co-conception with risk-sharing partners and customers

Airbus has a long tradition of working together with its main suppliers. To develop the A380, Airbus has enacted the "plateau de conception", a concept borrowed from the automotive industry. It means a design team working together in the same place for as long as the design process takes place, exchanging their information, knowledge, partaking of the same electronic information and communication tools (computer aided design, complete virtual three-dimensional mock-ups for each section of the aircraft, digitally streamed data, etc.). This enables them to visualise all design information simultaneously across the Airbus system and to test concepts and installations at a very early stage in the programme and at low cost, cutting overall development lead time by one third. This process of co-conception also involves the risk-sharing partners. For the development of the A380, total non-recurring cost covered by the contribution of suppliers is estimated at some 25 percent.

All along the development process, customers (i.e. airlines) are consulted to ensure that the plane meets all their requirements. Major airlines have joined Airbus in designing the A380 and have participated in numerous workshops and programme reviews during Customer Focus Group sessions.

1.5.6.6 Competitive advantage in financial terms

1.5.6.6.1 Research and development (non-recurring or fixed) costs funding

According to the bilateral US/EU1992 Large Civil Aircraft (LCA) agreement, the European civil aircraft industry is allowed to obtain *advances* (or loans) from the partner countries for up to 33 percent of R&D costs. These advances are *reimbursable* over 17 years as soon as the product (the plane) reaches its exploitation phase. They are to be reimbursed with interest at a minimum interest rate equal to the cost of government borrowing plus 0.25 percent. Under this heading, Germany, France, the United Kingdom and Spain contributed each respectively 35%, 35 %, 20 % and 10 % of the amount of € 3.3 billion to the Airbus A380 development programme. Since these advances are being *reimbursed (with due interest)*, they are no subsidies, but nevertheless constitute a considerable aid towards the huge expenses of developing a new large commercial aircraft. Risk-sharing partners/suppliers (371 of them in Midi-Pyrénées for the A380) have similarly benefited from advances from the Midi-Pyrénées region (€ 15.2 million at 0 percent interest).

Suppliers contribute substantially to the research and development costs. These costs are then to be recovered through the sales price of their contribution (studies, parts produced) on the understanding that this price will be adjusted in the light of the sales volume realised. The volume of sale spreads over long periods.[131]

[131] For example, 10 years (or more) to reach a volume of, say, 600 planes sold, with the figure of 600 being a frequent cited reference at Airbus for the popular models.

Table 1.22: Reimbursable advances and subsidies to research 2004-2005

French Finance Law relative to Civil Aerospace Industry				
	LFI 2004		PLF 2005	
	AP	CP	AP	CP
Support to Research				
Civil Aerospace Fundamental Research	59.0	61.7	59.0	51.0
Subsidies to ONERA, ETW and BNAA	4.0	4.0	4.0	4.0
Total	63.0	65.7	63.0	55.0
Support to Development (reimbursable advances)				
A380 Programme	157.1	159.8	163.6	166.2
Equipments	32.0	43.5	32.0	34.5
Engines	5.5	13.2	0.0	10.0
F7X Programme (Falcon Dassault)	10,.8	11.1	0.0	5.4
Sub-Total	205.4	227.6	195.6	216.1
Studies, research et equipments for aircraft security	1.2	1.0	1.2	1.0
Total millions Euros	269.6	294.3	259.8	272.1

http://www.assemblee-nat.fr/12/budget/plf2005/a1865-13.asp

ONERA: Office National d'Etudes et de Recherches Aérospatiales

ETW: European Transonic Windtunnel

BNAE: Bureau de Normalisation de l'Aéronautique et de l'Espace

**AP : autorisation de programmes*

***CP: crédits de paiements. The French budget law determines the amount allowed for programmes (AP) which are then spent during the following years according to specific needs. This explains that actual payments (CP) during one year are not equal to the allowed amount of the year.*

2005

Research in the field of transports, urban development, and housing equipment

(Direction/Head of Research, Scientific and Technical Affairs) :

€ 396.44 million of which 272 to civil aerospace industry

Public subsidies to public research (at universities, National Schools, laboratories, etc.) contribute at least indirectly to aerospace research (to develop innovations and create patents) and the workforce (internship, short-term work contracts for students or young trainees). Airbus departments employ a year-round average of 1500 interns.

1.5.6.6.2 Boeing's World Trade Organisation complaint

In the late 1980s, the EU and US started bilateral negotiations on limiting government subsidies to the Large Civil Aircraft (LCA) sector. Negotiations were concluded in 1992 with the signature of the EC-US Agreement on Trade in LCA which focuses on the limitation of both direct and indirect government support.

In the EU, as discussed above, the agreement puts a ceiling on the amount of direct government support (33 percent of the total development costs) for new aircraft programmes. It stipulates that launch aid (granted in the form of repayable royalty-based advances) will be repaid at an interest rate no less than the government cost of borrowing (plus 0.25 percent) and within no more than 17 years.

In the US, the agreement stipulates that indirect support (i.e. benefits provided for aeronautical applications of NASA or military programmes) should be limited to 3 percent of the US LCA industry turnover. This clause is primarily targeted at the support system in use in the US. In contrast to the European system, there is no pay-back requirement for indirect support.

In order to verify compliance with the above rules, the 1992 (non-binding) agreement establishes that the parties must exchange transparency information on a yearly basis on their respective support systems, through bilateral consultations that normally take place twice a year. Such consultations have highlighted an important divergence between the US and the EU in the way indirect support discipline is interpreted. In general, the EU considers that the US notification of indirect support to its LCA industry falls short of the real benefits derived from NASA programmes and military spin-offs. From Boeing's perspective, Airbus is no longer an infant industry in need of protection but rather a mature company aiming at its competitor.

Boeing has continually complained about state aid to Airbus from the governments of the partner countries, accusing Airbus of abusing the 1992 agreement. The main argument is that the agreement conceded launch aid to Airbus until it reached relative parity with Boeing. Since this has been achieved, Airbus should no longer ask for and receive state aid. Boeing reckons that Airbus has received some US$ 15 billion, US$ 3. 7 billion of which has been linked to the new super jumbo Airbus 380 project.[132]

Airbus has maintained that its launch aid received so far is fully compliant with the agreement and WTO rules. It further argues that some of the military contracts awarded to Boeing and the US government support of technology development via NASA are in effect a form of subsidy violating the 1992 agreement and WTO rules. Similar accusations are brought against subsidies from Washington State and local authorities. With regard to Boeing's new 787 airplane, preferential financing by the government of Japan is asserted. In addition, the European Commission demanded that Boeing receive no export subsidies any more from the US Foreign Sales Corporation, which has already been ruled illegal by the WTO.

In October 2004, following unsuccessful attempts to adapt the 1992 agreement, the US filed a complaint against the EU with a Request for Consultations, and the EU Commission followed suit. In January 2005 both parties agreed to negotiate a bilateral solution within a three month period. However, the dispute flared up again in March 2005, when US trade negotiators discontinued talks with the European Commission and threatened to take the case back to the WTO.

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[132] The Economist, 22nd July 2004 and 23rd March 2005.

Some further details concerning the alleged illegal subsidies on both sides: The EU estimates that US federal aid to Boeing, in terms of military and NASA contracts, has reached US$ 18 billion.[133] This figure includes neither spillovers nor subsidies provided to foreign suppliers for their R&D costs. Experience gained in military contracts was historically transferred to the 747 design. But today's military and space research work is no longer as relevant to the commercial sector as it was in the past. In 1999, NASA cancelled its High Speed Research Programme which founded Boeing's supersonic transport work. From the Airbus perspective, Boeing benefited by up to US$ 35 billion from various forms of public contributions, especially foreign subsidies when production is delocalised.[134]

Conversely, BAe Systems and EADS have benefited from technological cross-pollination between their civil and military divisions. Airbus Military is launching (with a firm contract) the A400M airplane which embodies composite materials technology. This development work over composite materials could be relevant to the A350 medium market jetliner.

According to Pritchard and MacPherson (2004), some of the subsidies in question are permitted under the WTO's subsidy rules (e.g. R&D pre-production support), while other types violate the regulations (e.g. infrastructure and production subsidies such as the Japanese subsidies).

1.5.6.6.3 Complications in analysing subsidies to aircraft manufacturers

A number of questions arise in the context of subsidising aircraft manufacturers. An open issue is the impact of the amount of subsidies on consumer and producer rents. There is no easy answer, because the demand function for airplanes is not known (just consider that Airbus has only 50 main customer airliners). In addition, the "price" for a plane is not a one-dimensional parameter, as the life of a plane is pretty long and aircraft capital cost represents only one-forth to one-fifth of the total cost of running an airline. Fuel consumption, maintenance and servicing matter just as much. Data on costs and prices are not released by the companies, and confidentiality has become stricter in view of the pending WTO cases. It is therefore difficult to model imperfect competition, and standard empirical tools are of little use.

Another question would be whether or not Airbus subsidising resulted in crowding out McDonnell Douglas of the market. From various sources it seems that the stakeholders of McDonnell Douglas stopped investing in aircraft manufacturing long before the crucial year of 1997 when the company merged with Boeing. At the time of the merger, McDonnell Douglas was no longer a competitive force in

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[133] FOCUS Online quotes a total state aid figure disbursed since 1992 of US$ 23 billion. See also FAZ, http://www.faz.net/s/Rub7EF1D5D213234C6989C9039B54879372/Doc~E20C6EC16C10340BC90634028BCAE1E67~ATpl~Ecommon~Scontent.html.

[134] E.g., the proposed launch funding for the Boeing 787 includes a US$ 1.588 billion production subsidy from the Japanese government for wing and fuselage production, and a US$ 590 million subsidy from the Italian government.

the market for commercial aircraft, its market share had fallen from 19 percent in 1988 to about 6 percent in 1996.

Focusing on large commercial planes, are we confronted with the conditions of a natural monopoly? With huge entry costs and with average costs decreasing as cumulated production quantities increase, is there perhaps no competitive equilibrium in aircraft manufacturing (with marginal costs decreasing and being lower than average costs)? Once again, no straightforward answer can be given to this question, because there is not a single market for planes but rather a variety of more or less substitutable planes (planes differ by capacity, range, speed, etc.) and consequently a variety of interdependent markets.

The total market for super jumbos is estimated by Boeing at a maximum of 500 planes. Airbus currently forecasts that A380 plane production will break even at 300 planes. Given these numbers, there seems to be room in the market for two parallel projects (although clearly there was not much space left for two projects). Constructors may develop different strategic visions (hub-to-hub flights vs. point-to-point flights) and choose to occupy different segments of the market.

But, for the sake of arguing, let us consider a situation with only one market and two suppliers. From the welfare angle, is a duopoly preferable to a monopoly? If we are to answer "yes", then subsidising Airbus was legitimate. A textbook exercise could give some support to this idea: if the fall in average costs was very steep, the answer could be ambiguous, but the learning curve (Wright, 1936) and the size of the markets for each plane points at a mild evolution so that intuition suggests that consumers may well be better off with a duopoly than with a monopoly. The final balance too (including the duplication of R&D costs) is probably in favour of a duopoly, as the aerospace industry is a catalyst of high technology (there are positive externalities: it offers more variety, emulation, research on security, cost benchmarking, spillover). Moreover, since many subcontractors sell to both producers, the economies of scale, if there are any, are (at least partially) obtained upstream in the supply chain.

Now suppose it was legitimate for the EU to subsidise Airbus market entry. This could still have a perverse effect, even if it could be convincingly argued that Airbus has not only caught up with Boeing, but surpasses it in efficiency: in this framework of arguments, Boeing can now also legitimately demand subsidies from the US government just to stay in the market, because (as was argued) a duopoly is to be preferred – and this is precisely the argument employed.

It seems that a more accurate question would therefore be: how can governments agree to stop subsidising aircraft manufacturers? Or are they committed to indefinitely pour money into aircraft manufacturing just to prevent the emergence of a monopoly?

1.5.6.6.4 Variable costs and the learning curve

The concept of the "learning curve" was introduced to the aircraft industry in 1936 when T. P. Wright published an article in the February 1936 *Journal of the Aeronautical Science*. The theory of learning recognises that repetition of the same operation results in less time or effort expended on that operation. Wright described a basic theory for obtaining cost estimates based on repetitive production of aircraft assemblies. The learning percentage by which costs decrease is usually determined by a statistical analysis of actual cost data.

Average variable costs are expected to fall by roughly 20 to 25 percent for each doubling of cumulative output. Learning in labour-intensive aircraft production takes place through streamlining. The learning effect is, however, partly offset by organisational memory loss. Employees leaving the company or being laid off imply a loss in workers' experience and expertise. This is in fact a problem for Boeing where turnover is higher than at Airbus. It became manifest during the second half of the 1990s, because Boeing had previously laid off a large part of its workforce when demand was low. Afterwards, it was unable to rehire the same staff, and productivity fell below the levels previously attained.

The learning curve plays an important role in the dynamics of industry competition. A temporary slip in orders can handicap a competitor. The leading producer will be the more competitive the more orders it gets. It has also to be stressed that aircraft orders are not a continuous variable and often come in rare, irregular and large batches. Hence, an aircraft maker who can capture a larger market share will move down the learning curve *more and faster* than the competitors. This results in substantial competitive cost advantages.

1.5.6.6.5 Commercial bargaining

Considering recent news on the commercial negotiations for A380 jumbo airplanes, it appears that Airbus has offered:

deep discounts said to be up to 40 percent of the list price (the passenger model is selling for just over US$ 140 million, the cargo model for US$ 133 million);

low downpayments (as low as US$ 500,000 per plane); and

relatively low penalties for cancellation of options: buyers can cancel their options up to a year before delivery; it will cost them only the loss of their deposit.

These incentives addressed to airlines to place early orders may of course backfire later. But they have helped building a backlog of orders that was necessary to start production. One of the variables is the *break-even level*, or "neutral point" as Airbus calls it. As already mentioned, for its A380, Airbus sets

break-even at 300 (previously 250) aircraft produced, which is considerably lower than for the previous Airbus families.

Predictions about the size of the A380 market are of course crucial to profitability. However, they vary quite a lot from Airbus's estimate (over 1,500) to Boeing's (500). Other estimates are even lower.

To sell 750 planes is the actual target of Airbus, according to a statement by its CEO N. Forgeard. Airbus hopes to obtain some 250 confirmed orders by 2008, the production of which would necessitate investments of around € 10 billion.

1.5.6.7 A tentative list of success factors for large projects

Learning from history and Boeing weaknesses vs. Airbus recent success, it seems pertinent to list the following success factors for large transnational projects.

Take great care to listen to, meet and anticipate customers' needs (cabin features, feeling of spaciousness, so critical in long-haul travel, even in Economy class, overhead storage, lighting and air-conditioning, laptop power outlets and PC data connections, entertainment systems, etc.). Airbus has worked diligently to build a relationship with customers based on consistency and strict adherence to commitment. It has particularly focused on developing a strong customer support organisation through a network of field representatives throughout the world as well as spare parts and training facilities strategically located and, as such, able to respond to customer's need with the shortest of lead time.

Design for flexibility and commonality which helps meet customers' demand as well as meet increasing regulatory demand. For example, in designing its 737 NG, in 1997, Boeing thought it could use the same over-the-wings emergency exits as it had on previous 737. But the European Joint Airworthiness Authority thought otherwise and requested a redesign. This was a major modification involving rebuilding the most crucial part of the plane at huge cost. Airbus has developed a concept of Dynamic Capacity Management allowing airlines to accommodate fluctuations and better match demand on services within their network by operating a pool of common aircraft with varying capacities, and applying these as appropriate to different routes and flights. If an airline operating a hub-and-spoke system has built its fleet based on a mixture of aircraft of the same technology platform, then it has the ingredients to introduce Dynamic Capacity Management and improve profitability. It allows airline companies to re-arrange aircraft assignments to suit changing demand.

Develop extensive collaborative work with suppliers including product design and development (vs. the more classical Boeing-type domination relationship). Aim for an "extended firm" where boundaries extend to include a network of first tier partners. Proper incentives and long term contracts with "quasi-vertical integration" or "value-adding partnerships" where part of the risk is shared discourage

opportunism. The firms in the network may be linked through stock participation. This includes sharing knowledge and diffusing technical innovation along the network.

However, there are some points where no straightforward answers can be given. First of all there is the question that a right balance needs to be found between what is made inside and what is bought from outside, a right balance in the degree of systems integration. Secondly, how can Airbus maintain its core competence (airframe design, production and marketing) while devolving critical tasks to suppliers and what are the *long-run* strategic implications of global subcontracting and knowledge transfer if the first circle of suppliers enlarges or becomes porous? Thirdly, this strategy becomes questionable if most of the value added is being earned by foreign partners, so a right balance has to be found about what is bought within and outside a geographical perimeter (Europe). Let us not forget that Airbus spends over US$ 15 million *a day* in the USA. Purchases from US suppliers reach US$ 6 billion per annum (2003). The total contribution of Airbus to US economy in 2001 supported more than 12,000 jobs and jobs linked to European aircraft industry demand are said to be ten times this figure (US Department of Commerce). On average, 40 percent of the company's worldwide procurement is sourced in the USA. Conversely, Boeing, as seen above in the breakdown figure, is working in France with Thales, Messier-Dowty, ECE Zodiac, Messier-Bugatti; in the UK with Smiths Aerospace, Fr-Hitemp; in Germany with Diehl and Liebherr-Aerospace Lindenberg; in Italy with Alenia, all as major partners. Boeing has described its European suppliers and industrial partners as part of the company's "extended enterprise". Boeing recently said it spends about € 4 billion annually with 500 European suppliers. An estimate gives around 100,000 European jobs tied to the production of Boeing aircraft. Germany, for instance, is home to over 8000 General Electric employees.

Continuous research versus profitability and/or stockholder's value: the main explanation to Boeing's setback seems to be the insufficiency of its non-contract research and development budgets since the mid-1990s in spite of a strong financial situation. The money was returned to the shareholders. Through 2003, Boeing's research budget stayed below US$ 800 million, enough to develop minor variants of existing aircraft but far from sufficient to develop a new design, and thus causing market failures: the derivative 767-400 failed against the A330-200 and the 757-300 failed to find a place in the market. By contrast, Airbus has consistently spent heavily on new product development. During the last three years, Airbus has spent over twice as much as Boeing, regardless of its relatively low *short-term* profitability. Continuous research efforts over time moreover ensure a balanced portfolio of products at different stages of the life cycle, avoiding Boeing's current situation where the company has a portfolio of already very mature or ageing models without much in the line of substitution models to offer to customers for their renewal requirements.

Recognise the central part played by the government/state as a financial investor, customer or regulatory force in defence through R&D budgets, control of intellectual property rights and stock of public companies (e.g. majority stockholder in Air France equity), in commercial manufacturing (reimbursable

advances, tax incentives, air transport regulation), co-operation between public and private research, ability to transfer innovations from military to civil fields, education, utilities and infrastructures, welfare schemes to help firms to keep their temporarily unemployed aerospace workers when business is low, etc.

When asked about who were the best supporters of the industry over the previous decades, all industry leaders cite the names of the prime ministers from the full spectrum of all French political parties. One asset of the industry is the strong continuity of national policy since the 1950s.

Moreover, and this seems to be true for all four partner countries, the aerospace industry has benefited from genuine and strong popular support. The making of the A380 appears as an important *project that unites industry workers, suppliers, politicians and the population* through a strong feeling of accomplishment which – at least in France (where criticism is a national pastime) – is rare enough to cause comment.

1.5.7 Industrial Policy in Textiles and Clothing[135]

1.5.7.1 Introduction

The basic research question motivating this paper is concerned with the role of industrial policy in "declining" industries, i.e. industrial sectors that are subject to substantial structural change thereby facing bleak growth perspectives and severe "inevitable" reductions in employment due to internal and/or external shocks. For an empirical foundation of the arguments the EU's textile and clothing (T/C) sector was chosen as an archetypal example for this exercise.

The general aim of the following "case study" is two-fold: (i) appraising the contribution and impact made by industrial policy measures at EU level to the structural change and competitiveness of the EU's T/C sector on the basis of existing literature, and (ii) outlining the fundamentals of a revised industrial policy for the EU's T/C sector based on "best policy practice" drawn from the experiences in the past to master the challenges of the future.

The remaining part of the paper comprises five sections. Section 1.5.7.2 describes the general characteristics and key developments of the EU's T/C industry which shape its competitiveness. In Section 1.5.7.3 the structural change undergone by the T/C industry in the last decade is briefly investigated, whereas in Section 1.5.7.4 the key challenges for future adjustment in the sector are presented. Section 1.5.7.5 tries to place into a coherent overall picture the multitude of industrial policy measures for the T/C industry at EU level which accompanied the structural adjustment process since the mid 1990s. Section 1.5.7.6 concludes with policy lessons and recommendations.

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[135] Prepared by Michael Boeheim.

1.5.7.2 General characteristics and key developments of the EU's T/C industry

The T/C industry[136] is a highly diverse and heterogeneous industry the products of which are part of the daily life of private as well as commercial users. The variety in products corresponds to a multitude of industrial processes, enterprises and market structures. Its activities range from the production of raw materials (i.e. natural as well as man-made fibres) to the manufacture of a wide variety of semi-finished and finished products. Downstream parts of the T/C industry – such as the clothing industry – use the output of several upstream parts (such as fabrics of all types). The T/C industry is also intertwined with the agricultural sector because it needs inputs in the form of natural fibres (such as cotton or wool), and with the chemicals industry when it comes to the wide range of man-made fibres such as nylon or polyester. Design and retailing provide a common bracket across the value chain (Box 1.20). Other industrial sectors rely heavily on so-called technical (or industrial) textiles, which include products as diverse as filters, conveyer belts, optical fibres, packing textiles, ribbons and tapes, air bags, insulation and roofing materials, etc. (Stengg 2001).

The T/C industry is often referred to – sometimes with a more or less depreciatory innuendo – as a "traditional industry", as a sector belonging to the so-called "old economy", or as "low-tech industry"[137] implying that there are little R&D and innovation efforts within the sector.[138] These notions divert attention from the fact that the textile and clothing industry has undergone significant restructuring and modernisation efforts during the past two decades, increasing productivity throughout the production chain, and reorienting production towards innovative, high-quality products.

Like many other sectors, the textile and clothing industry has been greatly affected by the phenomenon of globalisation. Europe and the United States are not only important producers of textile and clothing products, they are also the most attractive outlets for the T/C-exporting countries. Many developing countries, especially in South-East Asia, have become very competitive in textiles and clothing manufacturing, as they combine low wage costs with high-quality textile equipment and know-how imported from industrialised countries.

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[136] See Appendix 1.7 for a definition of the T/C industry.

[137] The OECD Frascati Manual (OECD 2002) distinguishes between four industry types (high-tech, medium-high-tech, medium-low-tech, low-tech) according to the sectoral ratio of R&D expenditure over turnover where low-tech industries are defined as industrial sectors with an R&D ratio below 4 percent. According to this industry classification four groups of low-tech industries have been identified: manufacturing, n.e.c.; recycling (NACE 36+37); wood, pulp, paper, paper products, printing and publishing (NACE 20+21+22); food products, beverages and tobacco (NACE 15+16) as well as textiles, textile products, leather and footwear (NACE 17+18+19). It is clear, however, that such classifications cannot take into aacount the diversity *within* an industrial sector, i.e. that there may be both high- and low-tech firms in low-tech sectors (as it is certainly the case in the T/C industry) and vice versa.

[138] The FP5 research project on "Policy and Innovation in Low-Tech. Knowledge Formation, Employment and Growth Contributions of the 'Old Economy' Industries in Europe (PILOT)", is exclusively directed towards these issues (cf. www.pilot-project.org).

Today the T/C industry is a genuinely globalised industry with constantly growing trade flows all over the world. Traditionally clothing was economically more important than textiles, but this relationship has undergone a substantial turn-around during the last ten to fifteen years. In the 1980s, world trade in clothing exceeded world trade in textiles and since then has expanded at twice the annual growth rate of textiles (6 percent vs. 3 percent) between 1990 and 2001. Several textile and clothing products were among the 20 most trade-dynamic products during the period of 1980–98 (UNCTAD, 2002B). In 2002, world trade in textiles and clothing reached US$ 152 billion and US$ 200 billion, respectively, or 2.4 percent and 3.2 percent, respectively, of world merchandise exports (OECD, 2004G; WTO, 2003, Tables IV.56 and IV.64).

It is anticipated that, with the elimination of quantitative restrictions that have regulated international trade in these products for over four decades, world trade in textiles and clothing will remain dynamic in the foreseeable future resulting in unprecedented adjustment challenges for the EU's T/C industry.

In the light of the huge labour cost differential between many third-world countries and Europe, the EU industry strives to remain competitive by means of higher productivity and through competitive strengths such as innovation, quality, creativity, design and fashion. These competitive advantages are the result of a permanent process of restructuring and modernisation. The sector has been adopting new technologies at a fast pace, both with regard to information and communication technologies and new production techniques. Equally, the EU industry has a leading role in the development of new products, such as technical textiles.

As far as the work force is concerned, Europe has seen a sharp decline in employment over the past two decades, losing as much as 47 percent (in textiles) and 40 percent (in clothing) over the period 1980 to 1995 while Asia managed to increase T/C employment by almost 50 percent in textiles and above 100 percent in clothing respectively (OETH, 2000).

Box 1.20: The T/C industry value chain (OECD, 2004G)

The T/C industries have distinctive characteristics and involve a large and diversified range of activities that employ a varying mix of labour and capital. The entire value chain can be condensed to four segments (cf. OECD, 2004G). This segmentation of the industry will also serve as a basis for the discussion of the adjustment challenges of the T/C sector.

1. Natural fibres. The preparation of natural fibres involves various agricultural activities that are influenced by factor endowments, i.e. the quality of land and regional climate and the country's agricultural policies. Various natural fibres are used in the production of textiles, i.e. cotton, flax, jute, silk, sisal and wool. Two of them involve animal husbandry, i.e. silkworms and sheep herding.

2. Textiles. The preparation of textile products, from either natural or man-made fibres, involves manufacturing activities in which technological innovations have greatly increased the speed of operations through the use of sophisticated machinery thereby resulting in huge productivity gains making the production of textiles today a very capital-intensive operation. Non-clothing applications of textiles – the so-called "technical textiles" – are now more important than clothing applications and account for the fastest-growing segment of total textile production in developed countries.

3. Clothing. The preparation of articles of clothing involves manufacturing activities as well. The clothing sector is also referred to as the "apparel" or "garment" sector. The pre-assembly stage involves designing, grading, marking of patterns and cutting of textiles into individual components. It has been revolutionised through the application of computer-aided design (CAD) and computer-assisted methods (CAM) systems. By contrast, the assembly stage remains highly labour-intensive and involves delicate handling and sewing operations that do not lend themselves to automation. Aside from productivity gains attributable to better needles and more secure fabric-holding techniques, sewing techniques remain basically those of a century ago. This industry is almost unique in its low ratio of capital equipment to labour inputs. However, technological progress in telecommunications and transport networks has made it easier for clothing manufacturers to divide the supply chain on an international basis and to perform the assembly stage in low-wage countries.

4. Retailing. Retailing activities have changed significantly with the blurring of the traditional boundaries between retailers, brand marketers and manufacturers. There is ever greater cross-over between distribution and production. Retailers intend to control the entire value chain in order to respond as closely as possible to consumers" desires. Direct control over both design/creation and distribution is considered a strategic necessity. Retailers are increasingly involved in global sourcing as lead buyers through a wide variety of organisational channels, such as vertical integration, subcontracting and licensing arrangements. Retailers are becoming ever more active in designing and perfecting their products. The retail stage has also become increasingly concentrated into large, lean retail organisations that are able to exert considerable influence throughout the supply chain.

This restructuring process has also involved the outsourcing of more labour-intensive operations (which generate less added value) to countries such as the new EU member states (in particular Poland), accession candidate countries (in particular Romania) and countries of the Mediterranean Rim (such as Tunisia or Morocco) with low labour cost. Despite higher labour costs EU manufacturers prefer those countries over some Asian countries with even lower wage rates due to their geographical proximity and their higher quality standards.

This illustrates that labour costs are just one important determinant of competitiveness in the T/C industry which gives an interesting perspective to T/C manufacturers located in regions with comparatively high labour costs. In a highly customer demand driven industry the ability to respond quickly to changing market demands, i.e. the "time-factor", as well as the need for quality suppliers to maintain control over the management and quality of the outsourced operation may become may be even more important.

1.5.7.3 Structural change in the EU's TC industry in the last decade

Experiences of the "Old" Member States[139]

Traditionally the T/C industry has been one of the least liberalised and most highly protected sectors in the global economy. While tariff protection applied to textile and clothing imports still remains high compared to average tariffs imposed on manufactured products, foreign trade experienced a substantial "liberalisation boost" through the abolition of the quota system due to completion of the phase-out of the Multi-Fibre-Agreement (MFA) over the time period of 1995 to 2004 as agreed in the WTO Agreement on Textiles and Clothing (ATC) in 1993 (Box 1.21).

Box 1.21: The Multi-Fibre-Agreement (MFA) "in a nutshell"

Since the introduction of the MFA in 1974 the T/C industry has been treated as a "special case" in so far as it was exempted from most agreements on deregulations designed under the auspices of GATT/WTO. Originally the MFA, which lasted for two decades, was meant as a short-term measure allowing the industrialised countries to adjust to competition from developing countries.

Under the MFA a complex trade regime based on *quantitative import restrictions* by granting export quotas to the T/C exporting countries was built up over decades. Since the most competitive T/C exporting countries soon reached their "quota ceiling", the trade restrictions from the quota system contributed to the international fragmentation of the supply chain, because clothing assembly processes were subcontracted to low-wage (developing) countries , which had plenty of spare export quotas.

The "adverse selection" effect of the MFA penalised the more competitive suppliers (e.g. from Hong Kong and China) and benefited less competitive suppliers located in countries with spare export quotas whose (only) competitive advantage was low wages (cf. OECD, 2004G).

After twenty years the Agreement on Textiles and Clothing (ATC) as part of the Uruguay round brought an end to the MFA by plotting the route of a "four-step phasing-out process" that started in 1995 and was completed by the beginning of 2005 (Table 1.23).

[139] The notion "Old" Member States means the EU-15 countries whereas the 10 central European countries which joined the EU on 1 May 2004 are denominated as "New Member States".

Table 1.23: The MFA phase-out

December 1993	Agreement on Textiles and Clothing' (ATC) agreed upon in the Uruguay Round final draft act. All MFA and other quotas an textiles shall be phased out in a 10 year period starting 1995
1 January 1995	1st ATC tranche liberalised by importing countries - 16% of the 1990 import volume
1 January 1998	2nd ATC tranche liberalised by importing countries - further 17% of the 1990 import volume
1 January 2002	3 rd ATC tranche liberalised by importing countries - further 18% of the 1990 import volume
1 January 2005	4th ATC tranche liberalised by importing countries - final 49% of the 1990 import volume

Source: Spinanger (1999).

Considering the multitude of safeguard mechanisms that will allow importing countries to apply new tariff and quantitative restrictions if the impact of liberalisation is deemed too devastating for domestic industries, it remains, however to be seen, if the quota system is now a phenomenon of the past.

The end of the MFA does, however, certainly not mark the end of all trade protection in T/C. It can be expected that trade policies other than textile-related quotas like preferential trade arrangements under the General System of Preferences (GSP) as well as tariff protection will gain importance in the T/C sector.

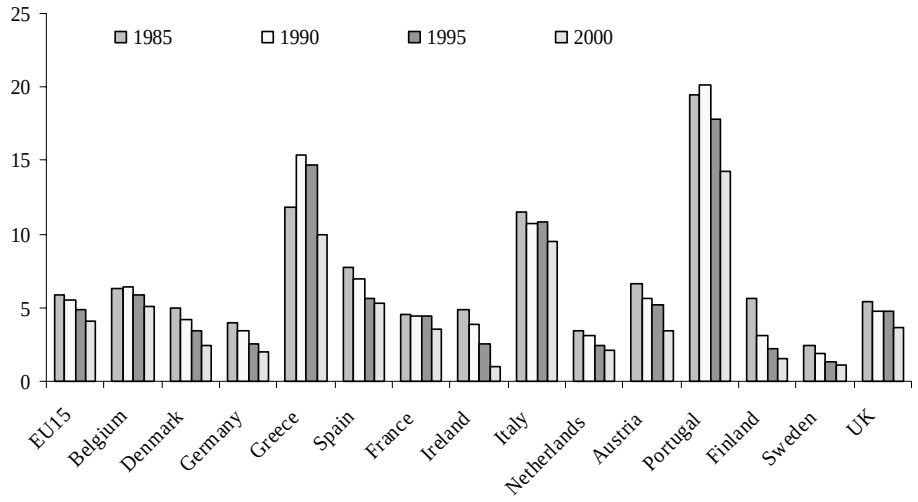
Since the MFA phase-out process was extended to a decade to give T/C manufacturers and economies depending on the T/C sector a reasonable period of time for structural adjustment, "the new world order" hardly came as a surprise to either the T/C industry or the governments.

This section takes a closer look at how the T/C sector in the EU prepared itself for the changing framework conditions after the MFA phase-out started in 1995. A comparison with the manufacturing industry will illustrate the significance of structural change in the T/C sector.

A declining share in total manufacturing of both value added and employment shows a continuous trend towards "despecialisation" of the European textiles and clothing industry. Portugal, Italy and Greece remain the most highly specialised countries in T/C with up to nearly 15 percent of value added and 25 percent of employment in manufacturing (as in Portugal in 2000). In contrast, the Northern countries (Sweden, Finland and Denmark) as well as Germany are least dependent on the T/C sector, with shares of both value added and employment in manufacturing of less than 3 percent as of 2000. (Graphs 1.45 and 1.46).

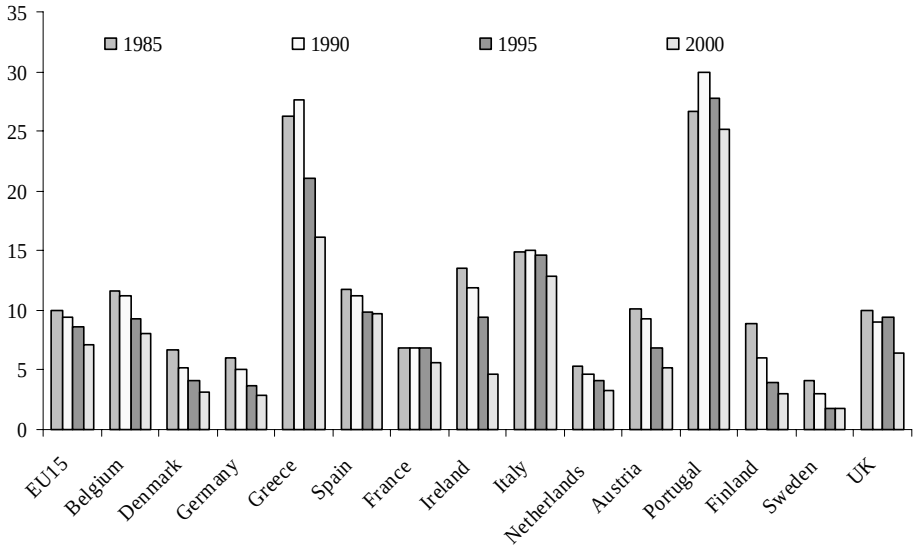
As intended and expected, the MFA phase-out, which commenced in 1995 (see Box 1.21), led to a noticeable opening of import and export markets of the EU's T/C industry. Both extra-EU exports and extra-EU imports of the T/C products developed positively, although imports were significantly more dynamic and earlier than exports. Compared to manufacturing, however, which managed to increase its exports at around twice the annual growth rate during 1996 to 2002, the development of the T/C industry was significantly less dynamic on the export side while imports grew at roughly the same pace. Thus, the stylised fact that extra-EU exports are larger in textiles while extra-EU imports are larger in clothing was further strengthened (Graphs 1.47 and 1.48).

Graph 1.45: T/C share in total manufacturing value added in the EU-15 (1985 – 2000)



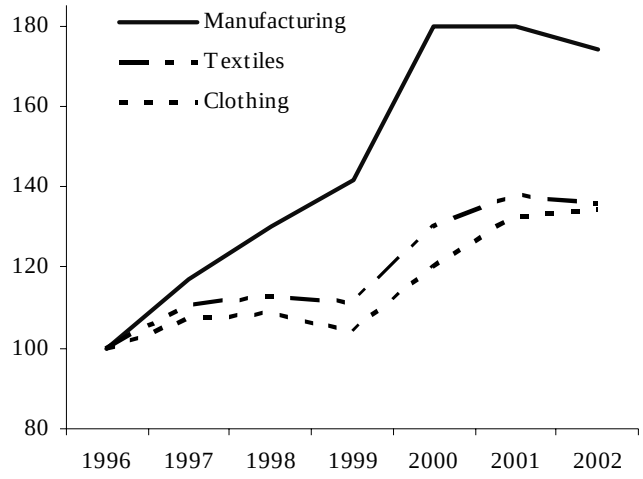
Source: WIFO calculations using Eurostat.

Graph 1.46: T/C share in total manufacturing employment in the EU-15 (1985 – 2000)



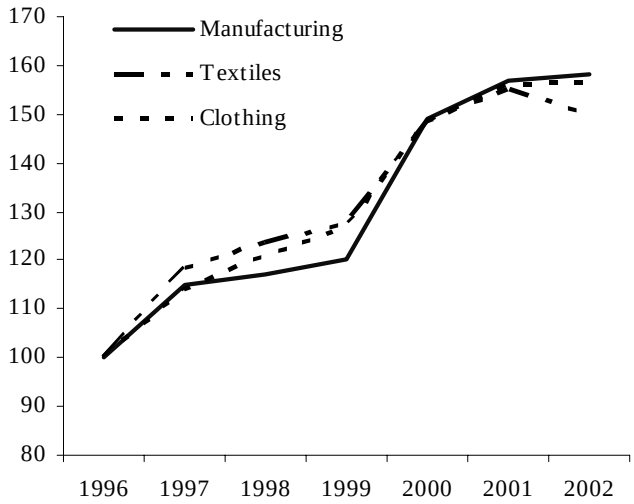
Source: WIFO calculations using Eurostat.

Graph 1.47: Extra-EU exports (1996 = 100)



Source: WIFO calculations using Eurostat.

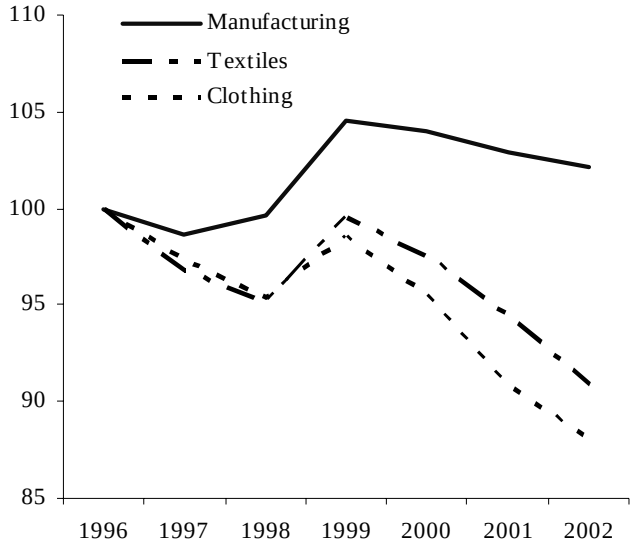
Graph 1.48: Extra-EU imports (1996 = 100)



Source: WIFO calculations using Eurostat.

Structural change has left significant traces in the T/C industry. Between 1996 and 2002, 9 percent of the textile enterprises were forced out of the market. Figures for the clothing industry are even worse: 12 percent of manufacturers closed down (Graph 1.49).

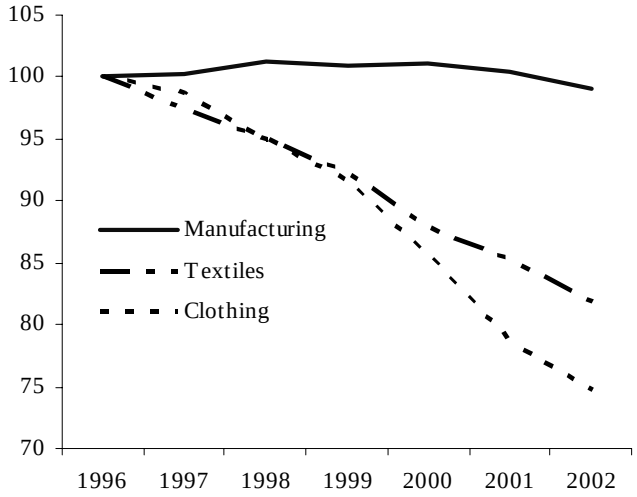
Graph 1.49: Number of enterprises (1996 = 100)



Source: WIFO calculations using Eurostat.

These high exit rates go hand in hand with dramatic reductions in employment, making this one of the most pressing policy problems. While employment in manufacturing declined only slightly, the workforce of the EU's textile and clothing industries was reduced by 18 percent and 25 percent respectively, leading to a substantial increase in labour productivity (Graph 1.50).

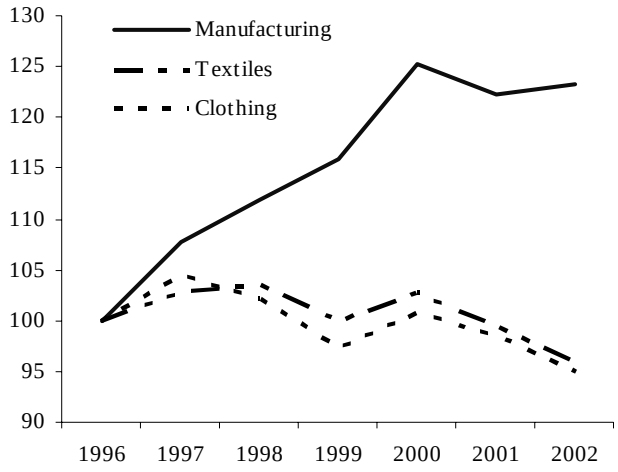
Graph 1.50: Number of employees (1996 = 100)



Source: WIFO calculations using Eurostat.

Labour productivity increases were clearly higher in the labour-intensive clothing industry (which outperformed even total manufacturing) than in the capital-intensive textile industry. In contrast to manufacturing, however, the substantial increases in labour productivity in the T/C sector were mainly due to reductions in employment and not to increases in value added. Despite these positive productivity developments labour productivity levels, however, still remain significantly lower than in manufacturing as such, where value added per employee reaches approximately two and three times the value of the textiles and clothing industries respectively. In contrast to manufacturing which enjoyed substantial increases in value added with only modest reductions in employment, the opposite applies for the T/C industry (Graphs 1.51 and 1.52).

Graph 1.51: Value-added at factor cost (1996 = 100)

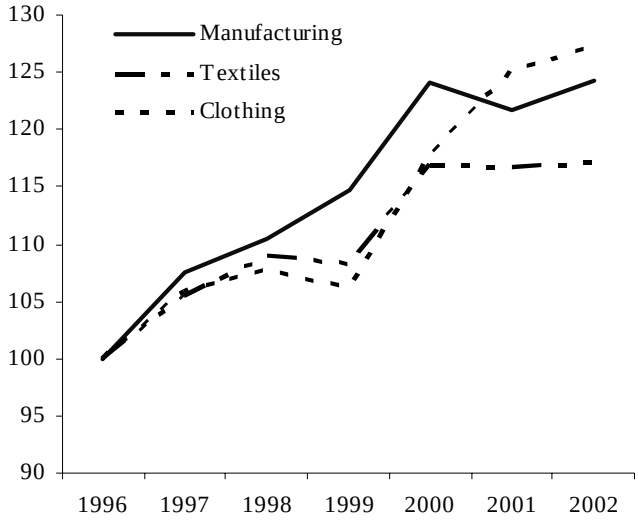


Source: WIFO calculations using Eurostat.

Rising labour productivity, due to a lesser decline in value added than in employment, confirms that the EU's T/C industry tends to upgrade and use resources more efficiently.[140] It also indicates that while more labour-intensive work is delocalised, high-value activities remain in the EU. It should also be noted that the growth is comparable for textiles and clothing, indicating some coherence in the evolutions of both sectors.

[140] Changes in labour productivity, measured in value added per employee, can be the consequence of a multitude of factors, some of them positive, others negative. Growth in labour productivity can be an indicator of upgrading or specialisation (market adjustment), relocalisation of parts of production or lower cost sourcing of inputs (sourcing adjustment) or investment in productivity enhancement (productive adjustment), or marginalisation of workers by using sweatshops, low-skilled workers, marginal workers (social adjustment). All of these trends might be included in the empirical figures, however, in various and unquantifiable proportions.

Graph 1.52: Labour productivity (1996 = 100)



Source: WIFO calculations using Eurostat.

Table 1.24: Structural change in the EU12 T/C sector (1996 – 2002)

	Number of enterprises	Value added at factor costs	Number of persons employed	Labour Productivity	Extra-EU Exports	Extra-EU Imports
			% changes			
Manufacturing	2.2	23.2	-0.9	24.4	74.0	58.3
Textiles	-9.1	-4.1	-18.1	17.2	35.9	49.9
Clothing	-12.0	-4.9	-25.3	27.2	34.2	56.5
			% changes p.a.			
Manufacturing	0.4	3.5	-0.2	3.7	9.7	8.0
Textiles	-1.6	-0.7	-3.3	2.7	5.2	7.0
Clothing	-2.1	-0.8	-4.7	4.1	5.0	7.8

Source: WIFO calculations using Eurostat.

While most countries are at levels close to the EU average, some countries differ. In textiles growth in value added has been substantially higher only in the UK and other northern EU-15 countries such as Ireland, Denmark and Finland. It is much lower for Austria and Germany. In textiles, the main drivers of added value seem to be productivity-oriented investments and upgrading. In clothing, Ireland and the UK score above average while Sweden scores far below average. In clothing, the drivers are essentially delocalisation in combination with upgrading. In the NMS, evolution of value added has been far less positive, reflecting the dominance of subcontracting (cf. IFM, 2004).

Summarising the structural change of the last decade, we can conclude that the EU-15 T/C industry managed to increase its productivity substantially by adopting new technologies (production, information, communication) at a fast pace. The EU's T/C industry has gained and strengthened its leading role in the development of innovative products, such as technical textiles, leading to an improvement of its quality position on world markets. Dramatic reductions in employment, however, show that the T/C sector is still too big to be squeezed into a niche market. Further structural adjustments seem inevitable if the EU-15 T/C industry wants to gain in competitiveness.

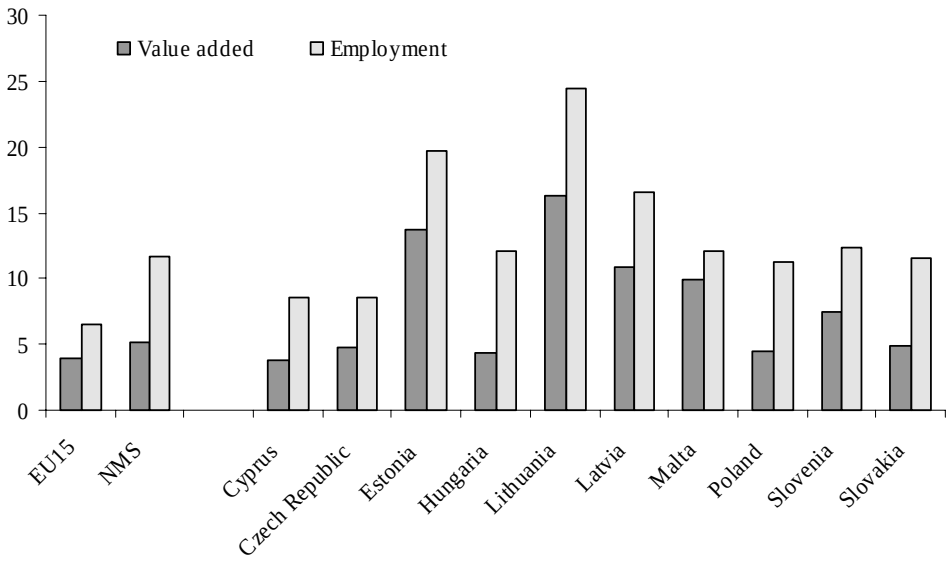
Prospects for the New Member States

On average, the T/C industry is more important in all NMS than in the EU-15, both in terms of value added and even more pronounced in terms of employment. Within the NMS the three Baltic states (Estonia, Latvia and Lithuania) are most specialised in T/C, holding a position that is comparable to Portugal, where the T/C share of total value added is roughly 14 percent. Least dependent on T/C are Cyprus, the Czech Republic, Poland, Hungary and Slovakia with a specialisation comparable to Spain and Belgium where the T/C share of total value added is around 5 percent. A similar picture emerges concerning employment (Graph 1.53; European Commission, 2003E).

Compared to the EU-15 the NMS are facing a substantial labour productivity gap in their T/C industry which produces less than 8 percent of the EU-15 value added but employs more than 30 percent of the workforce. Labour productivity in the NMS' T/C industry is less than 50 percent of total manufacturing and on average about 80 percent lower than in the EU-15 T/C industry[141] (Graph 1.54). Until now the T/C industry in the NMS was at least partially able to compensate for its low productivity with relatively low labour costs. Since, however, wages will have the tendency to rise during the integration and convergence process this comparative advantage is expected to erode in the medium term.

[141] Except for Malta, all NMS rank significantly below the EU-15 T/C industry average The data set of Malta, however, has to be interpreted with considerable care due to the small industrial basis.

Graph 1.53: T/C specialisation in the NMS (2002)

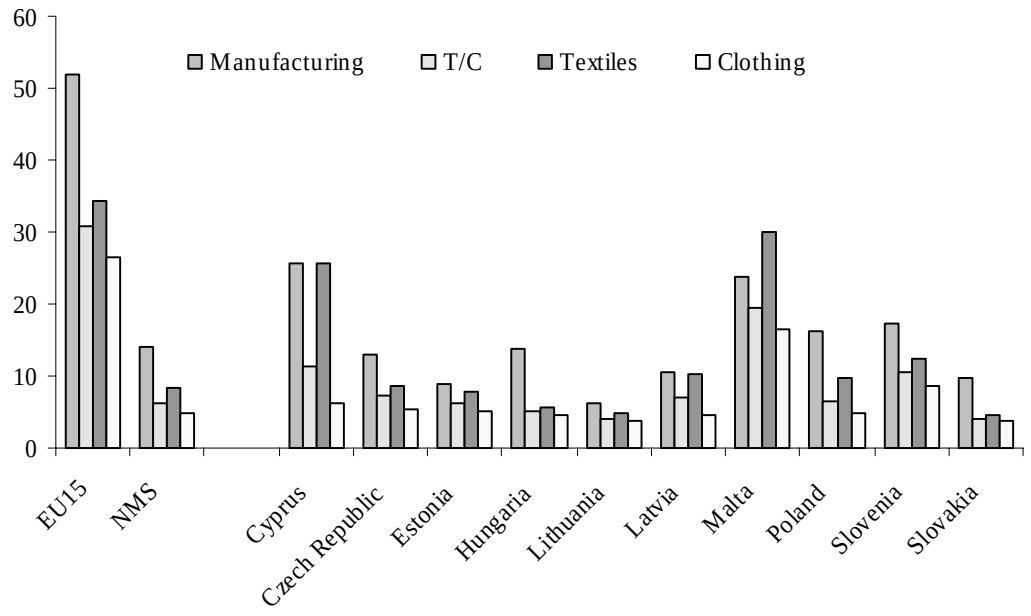


Source: WIFO calculations using Eurostat.

While to some extent the productivity gap between the NMS and the EU-15 is a problem for the whole manufacturing sector, it is especially pronounced in their T/C industry. Reducing the productivity gap therefore has to have top priority for the enterprises in the T/C industry of the NMS to improve competitiveness. Policy makers in the NMS have already realised that the NMS' locational advantages are shifting from labour- to skill-intensive activities, and that the pitfalls of the growth path based on low-cost labour have to be avoided (cf. Section 1.5.4). Since upgrading to higher quality market segments with higher value added, however, will most likely materialise only in the medium-term, the structural adjustment process will inevitably bring massive employment reductions in the short-term since possibilities for intra-industry re-employment are rather limited.

Summarising the situation of the NMS, we may conclude that their T/C industry will run through a comparable structural adjustment process that has already happened in the EU-15 over the last decade. Against the background of still more dynamic future challenges to come (cf. Section 1.5.7.4) industrial policy will have to play a vital role in the efforts of the sector to improve productivity by providing support to its structural adjustments.

Graph 1.54: Labour productivity in the NMS (2002)



Source: WIFO calculations using Eurostat.

Adaptation to structural change at the regional level

In spite of a high level of integration within Europe, inputs and sales regions/industrial districts are still an important "reality" in terms of labour market as well as in terms of institutions and economic context, thus making it worth while to study regional characteristics in more detail.

A recent study of selected T/C regions[142] in the enlarged EU (Table 1.25) showed that some regions are exemplary for a broader evolution of the EU's T/C industry (cf. IFM, 2004).

Successful adjustment strategies in the T/C industry at regional level are characterised by an "intelligent" combination of upgrading, specialisation, delocalisation and industrial re-engineering (cf. IFM, 2004).

[142] The selction criteria and some core data of the selected T/C regions are presented in Appendix 1.9.

Table 1.25: SWOT analysis of selected T/C regions within the enlarged EU

Member State	Region	Specialisation	Strengths	Weaknesses	Opportunities	Threats
Portugal	North	clothing	Technical expertise Specially in fine knitwear Linkages to Spanish retrailers	Lack of brands Lack of commercial dynamism Financial weakness	Delocalisation Branding	Competition from CEEC Concentration of distribution
Czech Republic	Severocesky	home and apparel textiles	Technical expertise Proximity to core EU regions	Lack of commercial dynamism Financial weakness	Inward investment of EU firms	Competition from CEEC and South-East Asia
France	Choletais - Pays de Loire	luxory clothing subcontractors	Entrepreneurial flexibility Technical skill Collective organisation	Fragmentation of production Strong focus on French clients	Control OPT Export	Concentraion on luxury groups Quality suppliers from CEEC
Germany	Nordrhein-Westphalen	technical textiles	Technical skill Linkages with research infrastructure	Lack of commercial dynamism Credit squeeze (bank reform)	Innovation Branding	Inflexibility of business environment Medium-term shortage in skilled workforce
Hungary	South-East	clothing subcontractors	Technical skill	Low investment/productivity Lack of commercial drive Financial weakness	Co-contracting	Rising production costs Cheap imports
Italy	Lombardy	cotton textiles	Commercial dynamism Quality and technical skill	Disinvestment Weak financial basis Family ownership	Innovation New markets	Inflexibility of business environment Upgrading of Spanish and Turkish industry
Belgium	Flanders	home and apparel textiles	Industrial culture High investment/productivity Commercial dynamism	Family structure No commercial/technological breakthroughs	Innovation Productivity leadership	Competition from lower cost countries Government bureaucracy
Spain	Catalonia	home and apparel textiles	Flexibility Cost leadership in fashion fabrics	Low investment levels Low export levels	Investment Branding (home textiles)	Price competition Government bureaucracy
Greece	Macedonia	clothing subcontractors	Commercial dynamism OPT in Bulgaria	Peripheral location Skill shortages	Local market Branding Quick-response	Lack of design/fashion tradition
Netherlands	Randstad	suppliers to large retailers	Design logistics Commercial drive	Skill shortage	Branding Distribution function	Quality of pre-suppliers
UK	North-West, West Yorkshire	suppliers to large retailers	Industrial knowledge Quick response processes	Underinvestment New to OPT Export weakness	Innovation Branding	Import penetration Decrease of Asian export market

Source: IFM (2004), WIFO compilation.

Successful regions mostly are characterised by a combination of great creative or innovative know-how, a powerful export-oriented commercial drive and technological advantage. They often mix commercial emulation within a district with efficient sharing of training and research infrastructures. Regions which have many retailers" and design HQ, branded manufacturers and logistic functions are less affected by structural change than regions which concentrate on co- or subcontracting. For this reason the southern regions and those in the NMS are more vulnerable, especially as they have fewer strategic options and less visibility on the market.

Lombardy (Italy) and Pays de la Loire (France) on the one hand as well as Flanders (Belgium) and Nordrhein-Westfalen (Germany) on the other hand can be considered as examples of industrial districts with successful regional T/C strategies in countries with high labour costs. All of them have strongly anticipated liberalisation, thereby building on their bold experience in industrial restructuring and are now pursuing sustainable regional cluster and network strategies targeted at upgrading their product pipeline.

The Italian and French regions have greatly specialised in high-end clothing. Lombardy’s strength is service and flexibility in design, co-makership, competence in product development and in industrialisation. The products are almost exclusively positioned in the high-quality segments of the

market since firms have consequently withdrawn from the middle segment. The T/C cluster of the Pays de la Loire region is specialised in delivering a complete service for Parisian luxury designer brands, starting with product development and continuing through to the management of delocalised production targeting the middle to upper price segments, with short delivery times (5–10 days) and small series (fewer than 50 units).

The German and Belgian regions have entered the innovative market segments by shifting to technical textiles. Business models are either built on specific knowledge and advanced product development in creating products in low volumes with high margins, while others rely on highly engineered production processes for high-volume/low-margin production. Because of relatively high barriers to entry in terms of technology, product development, organisation of production and financial model, Nordrhein-Westfalen and Flanders enjoy a considerable lead that competitors will not easily and rapidly catch up with.

1.5.7.4 Future Adjustment Challenges

The main causes for the "prolonged adjustment challenge"

The structural change in the past at least partly eliminated some of the problems of the T/C industry discussed above, but due to a complex combination of factors – some of them sector-specific while others macroeconomic in nature – the EU's T/C industry will have to cope with a "prolonged adjustment challenge" in the foreseeable future.

Both the *slow growth in the EU and its major export markets* as well as the *deterioration of price competitiveness* due to the substantial appreciation of the Euro versus the US-Dollar are adverse developments at the macroeconomic level which affect not only the T/C industry but also all other export-driven industries to a greater or lesser extent.

With the *enlargement of the EU* a new dimension of economic perspectives but also a heavy load of problems was added to the policy agenda of the T/C industry. The new member states (NMS) are more specialised in the T/C industry in terms of value added and employment than the EU average. Labour productivity in the NMS is around one third of EU-15 levels. The NMS, however, have been at least partially able to compensate for this low productivity with relatively low labour costs. Furthermore a high level of economic integration has already been established between the NMS (and also the candidate countries) before enlargement which, however, cannot only be interpreted as successful anticipation of enlargement, but also as an indicator for the high vulnerability of NMS economies to the changes in the international trade regime.

The grave changes in the international trade regime have to be attributed to the *dismantling of the quota system* consequent to the completed phase-out of the Multi-Fibre Agreement (MFA) by the end of 2004 as agreed in the WTO Agreement on Textiles and Clothing (ATC). Strong competitive pressure can be

expected by those NMS where exports to the EU-15 markets fell under the quotas liberalised on 1st January 2005. Crowding-out by products from Asia (and other strong competitors) will cause substantial structural problems in the NMS economies.

Since most of the adjustment challenges for the T/C industry can be attributed to the new liberalised trade regime the consequences will be discussed in more detail under the heading of "adjustment challenges in the post-quota world" below.

Adjustment challenges for the EU's T/C industry in the "post quota" world

The importance of structural adjustment may be properly judged from a dynamic analysis of the economy and the desire to reap the benefits of economic growth and welfare by taking advantage of evolving conditions of competition and productivity. More than a quarter of a century ago, the OECD (1978) stressed the need to promote "adjustment to new conditions, relying as much as possible on market forces to encourage mobility of labour and capital to their most productive uses."

The elimination, at the end of 2004, of quantitative import restrictions under the World Trade Organisation (WTO) Agreement on Textiles and Clothing will put an end to a complex trade regime built up over decades, and will have huge implications for all those involved in the entire supply chain, from growers to retailers and from the least developed to the most developed countries. The fact that countries will no longer be able to restrict the quantity of textiles and clothing they import after the end of 2004 will entail considerable adjustment for everyone in the sector worldwide. The most striking adjustment challenges are discussed below (cf. OECD, 2004G).

Vulnerability of low-wage countries

Up to now, the trade restrictions have contributed to an international fragmentation of the supply chain, where low-wage countries specialised in the labour-intensive part of the value chain. This fragmentation process began when exports from Hong Kong and China reached their maximum levels under the quota system. Clothing assembly processes were then subcontracted to low-wage, developing countries throughout the Asian Pacific region which had spare export quotas, such as Bangladesh. In effect, the system of quotas restricting exports penalised the more competitive suppliers from Hong Kong and China and benefited less competitive suppliers located in countries that had spare export quotas and whose only competitive advantage was low wages.

The fragmentation of the supply chain was further encouraged when developed countries granted preferential trade arrangements, known as production sharing arrangements or outward processing programmes, to a limited number of low-wage countries. Under these programmes, textiles or pre-cut materials were temporarily exported into low-wage countries for final assembly, with the finished clothing products then being re-imported under preferential provisions.

But ultimately this model discouraged low-wage countries from developing a competitive textile industry of their own, locking them into a situation where they would not go beyond offering a low-wage assembly line. In a new trade environment where export quotas no longer apply, the economic vulnerability of a global business model based on production fragmentation is exposed. If there is no quota restriction on the amount of production in a particular country, it is cheaper for a country that can produce both textiles and clothing to do so, thus avoiding the transport costs, time delays and management time needed to co-ordinate a production chain where shirts or seat covers are cut out in one country and stitched together in another. In the post-quota environment, the most vulnerable countries are those that until now have acted only as an "assembly workbench".

Migration of textile capacity to the most competitive developing countries

The elimination of quota restrictions will open the way for the most competitive developing countries to develop stronger clusters of textile expertise, enabling them to handle all stages of the production chain from growing natural fibres to producing finished clothing and even retailing. The main beneficiaries will be Chinese clothing suppliers who will be able to buy their textiles directly from domestic sources and hence meet tighter delivery dates. Access to high-quality textiles is considered one of the most important determinants of the competitiveness of clothing suppliers. Since up-to-date textile and clothing machinery is also readily available, access to the needed resources is no longer restricted for manufacturers in China (and other competitive developing countries).

Up-to-date equipment will deliver the necessary quality of textile inputs. Other developing countries with both textile and clothing capacity may also be able to prosper in this new competitive environment. As a result, the textile industry in developed countries will face intensified competition in both their export and domestic markets. The migration of textile capacity will nevertheless be influenced by objective competitive factors and will be hampered by the presence of distorting domestic measures and weak domestic infrastructure in several developing and least developed countries.

The growing importance of the non-clothing use of textiles

The textile industry is also undergoing a major reorientation towards non-clothing applications of textiles, known as technical textiles, which represent the fastest-growing segment of total textile applications worldwide with growth rates twice as high than for textiles for clothing applications (4 percent vs. 2 percent p.a., OECD, 2004G). EU-15 exports of technical fabrics and finished items recorded a particular strong growth: 76 percent between 1995 and 2002, the share in the total extra-EU export rising from 10 percent to 12 percent, making technical textiles the fastest growing T/C product group in foreign trade (IFM, 2004).

Technical textiles are often defined as textile materials and products manufactured primarily for their technical and performance properties rather than for their aesthetic or decorative characteristics. They

have many applications, including bed sheets, filtration and abrasive materials, furniture and healthcare upholstery, thermal protection and blood-absorbing materials, seatbelts, adhesive tape and multiple other specialised products and applications. It is estimated that technical textiles are growing at roughly twice the pace of textiles for clothing applications and now account for more than half the total textile production. The processes involved in producing technical textiles require relatively expensive equipment and skilled workers and are, for the moment, concentrated in developed countries. With the availability of the adequate machinery this competitive advantage of the EU's T/C industry in technical textiles could, however, diminish rapidly if the European industry does not respond with continuous innovation of both products and processes.

Shifting industrial expertise towards services-related skills

While low wages can still give developing countries a competitive edge in world markets, time factors now play a far more crucial role in determining international competitiveness. Developing countries that can offer low-wage workers for sewing garments or seat covers together may have a comparative advantage over developed countries for that one stage of the assembly process, but that does not necessarily translate into a comparative advantage in the management of the entire supply chain when no export restrictions apply. Countries that aspire to maintain an export-led strategy in textiles and clothing need to complement their cluster of expertise in manufacturing by developing their expertise in the higher value-added service segments of the supply chain such as design, sourcing or retail distribution. To pursue these avenues, national suppliers need to place greater emphasis on education and training of services-related skills and to encourage the establishment of joint structures where domestic suppliers can share market knowledge and offer more integrated solutions to prospective buyers.

Leadership role of large retail groups

Retail distribution is increasingly dominated by large retail organisations in the main consuming countries, where the trend is towards greater product specialisation, brand-name products and market segmentation. These large T/C retail groups, e.g. Hennes & Mauritz, Zara, etc., have turned "upside down" the traditional business model of the T/C industry where the manufacturer is at the centre of the value chain. Retailers act as intermediaries between manufacturers and customers by converting their collected market information about the latest trends in styles and tastes into marketable products. This ability of integrating information gives them considerable leverage in dealing with suppliers.

T/C retailing in Europe is, however, still very fragmented, concentration in the EU-15 is relatively low (58 percent) compared to the USA (86 percent) and Japan (83 percent), however, large differences prevail within the EU-15, ranging from 27 percent in Italy to 83 percent in the UK. European apparel and home textiles retailing is still largely done by national or regional players. Few companies make more than 30 percent of their turnover outside of their country of origin. The globalisation of retailing has been

happening at a slower rate and remains less widespread than the advances made by a few well-known multinational brands might lead us to believe. Great differences in clothing tastes, in attitudes to fashion and in price and distribution structures may serve as an explanation. Market concentration is, however, expected to continue at a significantly faster pace at all levels of the T/C value chain, especially retailing and manufacturing, throughout Europe (IFM, 2004).

However, the speed has undoubtedly accelerated through the emergence of truly international chains such as H&M, Mango and Zara, which are gradually covering all of Europe and contributing to a certain amount of convergence in terms of fashion and price range. The success of these brands lies in their understanding of the usages and expectations of a well-identified target population of consumers, in their vertical control over their value chain – from the design of products to their commercialisation – and in their use of sophisticated information systems Their appearance all over Europe has been speeding up competition and exerting ever greater pressure on price, turning these players" way of doing business into the new standard for fashion retailing for the great majority of retailers (IFM, 2004).

This change in the business model implies a shift of the "decision centre" from the producer to the retailer, therefore from manufacturing industry to services – a trend that can be observed in other branches as well, e.g. DIY stores and furniture stores (such as IKEA). Despite their individual differences, the common competitive advantage of the "global" T/C retail chains is based on a vertically integrated business model embracing design, just-in-time production, marketing and sales. This gives them the flexibility to respond to rapidly changing fashion trends. Designers are in permanent touch with store managers, the availability of exact real-time point-of-sale data on every purchase enables them to find out which items are most in demand. Repeat orders and new designs can be continuously fed to the manufacturing plant. Production is located in or subcontracted to low-cost regions. This lean just-in-time production mode eliminates the need for warehouses and reduces inventories and hence tied-up capital.

An archetypal example of the thorough implementation of this "new" business model can be found at Zara, the clothing chain owned by the Spanish Inditex group. Zara needs only two to three weeks to make a new line from start to finish – compared to an industry average of nine months. Around 13,000 new designs are created each year by a team of 200 in-house designers, none of these designs kept in a store for more than one month. Whereas Zara has committed only 15 percent of its production at the start of a season, the figure for an average EU retailer is as high as 60 percent. Zara can therefore more easily dump a product line which has turned out to be unpopular. Zara's success is based on a vertically integrated business model embracing just-in-time production (with a remarkable depth of production starting with basic fabric dyeing), marketing and retailing. Zara applies a sophisticated global sourcing strategy: while "basics" with little or no "fashion component" and ranking as commodities due to their standardisation in specifications (e.g. T-shirts) are imported from cheap South-East Asian suppliers, "fashion" articles that demand a fast response to new trends are kept "nearer" to the HQ. Thus, 30 percent of Zara's products are

still manufactured in Spain, and another 10 percent not far away in nearby Portugal (cf. The Economist 19th May 2001; Welt am Sonntag 27th March 2005).

As a consequence, only the HQ functions, including management, quality control, research, development and design, and a tiny fraction of fashion-sensitive and/or high quality production will stay in high-wage countries which can supply both the infrastructure and the skilled labour force needed in the long term. Labour-intensive T/C manufacturing will be delocalised or subcontracted to low-wage regions/countries in order to benefit from low-labour costs and to realise an attractive price-performance ratio for the customer together with higher margins for the retailer.

T/C manufacturers can benefit from working in close co-operation with large retail groups and brand-name marketers as they learn to manufacture quality products, apply the buyers" codes of conduct and deliver products in a timely fashion. The development of business relationships between national clusters of expertise and the large retail groups plays a crucial role in helping to transform the supply chain. For exporting countries seeking to develop their export-led strategies, nurturing contacts between domestic clusters and the large retail groups and brand-name marketers are essential.

The chance for labour-rich countries in Europe, and hence a strategic option for policy-makers, lies in the intelligent management of the trade-off between labour costs and time. Another option is upgrading, specialisation in niches. Geographical proximity, however, is a clear comparative advantage especially in the time-challenged fashion business. Thus "close" delocalisation in the Euro-Med Zone offers a good compromise since labour costs are substantially lower than in the EU-15, communication is easier due to fewer cultural differences and delivery times are shorter than with Asian suppliers.

Moreover, the large retail groups and brand-name marketers in textiles and clothing are expanding their distribution networks and pursuing business opportunities in countries with attractive growth prospects. Although these groups are predominantly headquartered in the USA and the EU, some leading manufacturers in Hong Kong and China have also launched their own brand names and are entering retail distribution. This strategic move requires services-related expertise in designing, marketing, retailing, financing and the gathering of market intelligence on foreign markets which are areas where European firms still enjoy a considerable lead. If this vertical integration of the value chain by Chinese groups turns out to be a success, even one of the last "bastions" of the EU's T/C industry might be jeopardised. At the moment, however, this seems to be no real threat to the industry.

Coping with job losses

Although trade liberalisation yields economy-wide benefits, the opening of markets to international competition puts pressure on labour markets and results in hardship, whether temporary or permanent, for

displaced workers. More than four million jobs have already been lost in the T/C sector of developed countries[143] and the elimination of export quotas will have a profound effect on employment levels in developing countries, too. Experience shows that displaced workers in the textile and clothing industries tend to have a low level of education, low skill levels (which also means low wages), and are predominantly women and minorities. All of these characteristics make it more difficult for these workers to adjust to changes in labour market conditions. Moreover, it is difficult to identify the individual causes of worker displacement as technological change, productivity gains, increased import competition and shifts in production can all contribute to job loss. Therefore, there is a need for broader programmes aimed at helping the unemployed in general rather than a specific programme designed only for those who lose their jobs because of increased import competition.

Governments increasingly rely on training as part of their toolbox of labour market adjustment programmes (cf. OECD, 2004G, Chapter 3). Many workers in traditional low-wage manufacturing industries lack basic language and math skills, which prevents them from learning the specific skills needed for the new jobs being created. The shift in the structure of the labour market in developed countries has also resulted in a gap between the skills that workers needed in their old jobs and those required for their future jobs.

The main goal of any labour adjustment programme should be re-employment which means either returning to one's previous job or finding a new job as soon as possible and with minimal disruption in earnings. A combination of class-room learning (to acquire basic skills) and, even more important, on-the-job training (to acquire specific job-related skills) is considered best practise.

The role of technology and innovation

The influence of technological development varies between the textile industry and the clothing sector. Whereas huge productivity gains were achieved through innovations in the textile industry, the clothing industry can only point to various improvements in fragmented clothing processes. In fact, today's sewing techniques do not differ much from those of a century ago. And although the textile and clothing industries can be considered to be mature, they both use technological innovations that are largely generated in other industries, above all in chemicals (complex man-made fibres) and machinery (computer-aided design systems).

Technology transfer between machinery suppliers and users plays a pivotal role in the performance of textile and clothing suppliers. Hence, it is appropriate for governments to encourage a technology transfer process by exploiting more efficiently the opportunities offered by modern information and

[143] The decline in T/C employment might, however, be overestimated since the creation of new jobs in the T/C-related service sector (e.g. design, retailing, etc.) is not captured in the employment statistics for the T/C industry.

communication technologies for the dissemination of advanced technological knowledge. Governments could also keep in mind that, in the long run, innovative capacities basically depend on the availability of suitable human capital. Therefore, a sound education and qualification system seems much more important for sustainable technical progress than public innovation programmes.

1.5.7.5: Industrial policy in "declining industries" with a focus on the EU's T/C sector

Industrial policy in favour of "declining industries", i.e. industrial sectors that are subject to substantial structural change and face bleak growth perspectives and severe reductions in employment, has always been a controversial issue.

In general, industrial policy should be based on today's competitive advantages and at best tries to anticipate future developments. Comparative advantages may change over time and government can to some extent predict the change since analyses show that comparative advantages and industry structure change with the income position of a region. If possible, government should prevent, limit and support the phase-out of specialisation in declining industries and promote early structural change. This would create a starting advantage for industries with growth potential and reduce the costs of future structural changes.

That the T/C sector will remain a declining industry in Europe is a fact that can be hardly denied. Structural change, involving shrinking employment and corresponding hardship, will inevitably continue in the EU's T/C industry.

Under these circumstances the best that industrial policy at EU and member states level directed at the T/C industry can do is to pro-actively accompany this structural adjustment process. Trying to stop structural change will not only be a costly yet wasted effort but also mean squandering scare resources with a considerable risk of causing substantial "collateral damage". Even if state intervention for declining industries could bring temporary relief, the hardship caused by delayed structural change may be even greater.

For good reasons, the EU's industrial policy framework follows in its principles a horizontal approach, thereby keeping in mind that specific sectoral policies should be a rare exception rather than the rule. While tailoring and adjusting industrial policy measures to the specific characteristics and needs of an industry might be sensible, policy makers should resist the pressure to design purely sectoral policy measures and subsidies, in favour of which lobbies and pressure groups, especially from the declining industries (but also in all others), are arguing with considerable enthusiasm. Experience with and the ex-post results of such sectoral programmes, however, do not justify the ex-ante euphoria. Especially in declining industries is a real implicit danger that this kind of policy tries to go against structural change rather than accompanying and smoothing it. What is called for is the best sectoral application of horizontal policy guidelines, also referred to as "matrix-type industrial policy approach" (cf. Section 1.5.7.3 and Böheim, 1998).

EU industrial policy in the T/C sector since the mid 1990s

The development of an EU industrial policy for the T/C industry proceeded in three clearly distinguishable phases, each marking a strategic milestone.

Milestone 1: Facing the challenge of the MFA phase-out (1995–1996)

Already at the beginning of the MFA phasing-out process in the mid 1990s, the European Commission recognised how important it was that the industrial policy framework would assist the EU's T/C industry in its ongoing efforts to adapt to changing production and trade conditions (European Commission, 1995).

In this document, the European Commission followed in principle the above horizontal/matrix type approach by calling for public support for the T/C industry through programmes which are open to enterprises of all industrial sectors, such as the 4th Framework Programme (FP4 for R&D), the European Social Fund and the Community initiatives ADAPT and EMPLOYMENT (for training, adaptation, requalification and re-employment).

Within the scope of the FP4 for R&D, more than 60 projects of the industry and co-operation research CRAFT (Co-operation, Research and Action for Technologies) scheme were financed in the textile and clothing sector, in particular within the IMT programme (Industrial and Material Technologies) and the SMT programme (Standards, Measurements and Testing). In addition, the initiative of intermediaries representing the sector may serve as a platform for disseminating and promoting the results of research throughout the sector (ENTEXA, the successor to ITEX which ended in 1998, aims to set up three textile gateways: statistics, a sectoral business register, and business-to-business transactions), and for co-ordinating and improving the projects (TERESA, the European Textile and Clothing Research Network). The results of these projects are widely disseminated in electronic form and should improve co-operation between the industry and the providers of information technologies.

This horizontal policy framework was supplemented by the RETEX programme which aimed to assist in the diversification and transformation of the EU's textile and clothing sector, providing support for the regions hardest hit by the necessary adaptation of the T/C industry. With a budget of around 600 million ECU for 1994–1999, the Commission's special RETEX programme can best be viewed as a comparably small (and hence justifiable) "extra bonus" for the T/C industry while most of the financial resources were anyhow devoted to horizontal policy objectives (e.g. 13,000 million ECU for the 4th FWP and 1,400 million ECU each for ADAPT and EMPLOYMENT).

Milestone 2: The T/C action plan (1997–2002)

In 1997, the European Commission launched a "Plan of action to increase the competitiveness of the European textile and clothing industry" (European Commission, 1997), which was again committed to

focus on horizontal policies, creating an environment which fosters the sector's competitiveness. The "action plan" identified priorities in employment and training, the development and dissemination of new products, processes and equipment using information and communications technologies, the smooth running of the internal market and regional development. Access to the markets of non-member countries and compliance with the rules governing it were further key objectives. The work to implement this analysis as concrete industrial policy measures was put forward in a "table of action" (European Commission, 1999).

The "mid-term" evaluation ("progress report") of the "action plan" (European Commission 2000) three years after its inception arrived at a variety of interesting conclusions as a base for further improvements in industrial policy.

One of the most important general insights which, however, is not yet sufficiently implemented is the need to put an end to the uncoordinated proliferation of research activities and support programmes launched at Community and Member States level, resulting in a substantial "co-ordination gap" which reduces synergistic effects and the impact on the T/C industry.

The report further showed that substantial gaps in public support can be mainly pinned down to sub-optimal participation by the T/C sector in horizontal community programmes, particularly with regard to R&D and innovation. Despite efforts, T/C SMEs failed to sufficiently exploit (co)financing tools offered by FP4 (1994/1998) and FP5 (1998-2002). One (part) explanation may be a lack of information and stimulus for businesses to participate because of the "high entry barriers" of these programmes (short deadlines, complex and costly application procedures, etc.). Furthermore, certain innovating T/C enterprises exploit and adopt advances made in basic research in the chemicals, mechanical, information exchange and communications sectors, without themselves generating advances. As the "innovation content" of a project, however, is one of the European Commission's award criteria for funding, there might be some mismatches between the interests and needs of the enterprises on the one hand and the available Community programmes on the other. This might call for a review of the project selection criteria which were defined in FP5 (innovation and scientific/technological quality, scientific and technical developments and perspectives, Community added value, contribution to Community policies, social objectives, resources, partners and management).

In order to stimulate higher investments of T/C enterprises (especially SMEs) in R&D and innovation, it has been suggested to step up efforts to link co-operation between textile enterprises, research centres and other sectors and establish networks which are able to link the main research infrastructure to industry, to create discussion and exchange forums with other sectors and to disseminate knowledge. Setting up networks should facilitate the establishment of important consortia which would have the "critical size" that enables them to undertake major strategic medium- and long-term projects for the T/C sector.

Enterprises should be encouraged not only to participate in generic research, but also in the development of new methods, new products and product quality improvements.

The report also considered the preparations for EU enlargement and the creation of a Euro-Mediterranean free trade zone (EEA, CEEC, Turkey and Southern Mediterranean countries) with a market of more than 600 million people.

Milestone 3: Preparing for EU enlargement and the quota free trade regime (2003 and beyond)

Three years later, the Communication on "The future of the textiles and clothing sector in the enlarged European Union" prepared by the European Commission (European Commission 2003D), presented a sectoral view of the EU's industrial and trade policies, taking into account the particular features of the T/C sector based on the Communication "Industrial Policy in an Enlarged Europe" (European Commission, 2002B). This document can be interpreted as refining the "matrix type industrial policy approach" to the T/C industry in an enlarged Europe which "brings together a horizontal basis and sectoral applications" (European Commission, 2004G).

The Competitiveness Council stressed the importance of ensuring effective interaction of policies at EU level and emphasised the strategic importance for the sector to improve competitiveness, notably through research, innovation, training and protection of intellectual property rights. It also noted the important role played by better access to markets and the completion of the Euro-Mediterranean Free Trade Area.

In its Resolution of 21 January 2004, the European Parliament called for an adequately resourced EU-level programme for the T/C sector, especially in regions particularly dependent on the sector, covering support for research, innovation, vocational training and SMEs, speeding up both the abolition of non-tariff barriers to trade and the creation of a Pan-Euro-Mediterranean free trade area, as well as close monitoring of Chinese imports into the EU.

In order to rapidly implement the ideas developed in the Communication, the Commission set up a High Level Group (HLG) for textiles and clothing in early 2004, bringing together top EU decision-makers and stakeholders of the sector with a mandate to formulate recommendations on an integrated set of concrete initiatives that could be undertaken at regional, national and EU level to facilitate the sector's adjustment to major challenges, and to suggest actions to improve its competitiveness.

The recommendations of the HLG were published in the report "The challenge of 2005 – European textiles and clothing in a quota free environment" on the basis of which the European Commission formulated a condensed version of the main policy issues (Box 1.22).

Box 1.22: Selected recent policy recommendations for the European T/C industry

Recent EU industrial policy towards the T/C sector stays committed to the horizontal/matrix-type policy approach by fostering continuous progress in the areas of research and innovation, education, training and employment as well as regional development through the best sectoral implementation of horizontal policy guidelines.

On the basis of this policy commitment a series of recommendations was elaborated including *inter alia* (cf. European Commission, 2004I and 2004J, HLG 2004):–

- establishment of national training and employment "observatories" for the co-ordination of education and training measures;
- development of a common European T/C qualification standard ("European Degree");
- improvement of the technology base of T/C manufacturing through innovation;
- fostering applied research in multi-functional fibre and textile-based products and processes;
- opening public support programmes for non-technological innovation;
- creation of a European T/C Technology Platform for mobilising research, technological development and innovation efforts;
- improvement of co-ordination of research activities at regional and national level to complement EU level actions;
- completion of the Pan-Euro-Mediterranean T/C free trade area;
- elaboration of Regional and Local Strategic Plans for the T/C sector;
- development of consumer-oriented commercial strategies.

Although the HLG urgently requested both a sectoral Community programme for T/C as well as a specific sectoral regional initiative, the Commission made it clear that any successful T/C industrial policy package had to be designed within the framework of the "matrix-type approach". This clear commitment to the principles of EU industrial policy illustrates the unbroken conviction that sustainable solutions for the structural challenges faced by the T/C sector have to be provided by enforcing the European industry's competitive advantages and the appropriate framework conditions.

The actions recommended in the areas of research, education, training and trade policy (cf. Annex of European Commission, 2004J) have to be interpreted as an attempt to formulate a coherent policy package at EU level to meet the competitiveness challenges faced by the European T/C sector which, however, need to be complemented and boosted by adequate support at national and regional levels to further the competitiveness factors. Policy measures at national and regional level should be based on the best practices of sectoral implementation of horizontal policy guidelines in the Member States ("Industrial Policy Benchmarking"), as they focus their strategies on the appropriate sectoral competitiveness factors while providing support through the horizontal instruments compatible with the Common Market.

1.5.7.6: Policy lessons and recommendations

Background

Maintaining the competitive edge of an industrial sector – be it the T/C industry or any other – basically means constantly adapting production and distribution methods, designing better products and developing more efficient production processes. New processes and "intelligent equipment" incorporating sophisticated ICT – the so-called "electronic revolution" – will enable manufacturing industries to react faster to market developments and to focus on quality aspects of the products, e.g. the design and development of products and services.

Traditionally, textiles and clothing are not a technology-generating sector but are situated downstream of the technological innovation process. Currently, the situation is evolving and some enterprises in the sector have become important generators of new technologies, by developing either new materials (e.g. technical textiles) or cleaner and more efficient textile processing technologies, enabling them to obtain new high added-value products for multi-sectoral applications. The sector's innovative capacity is evident, from the invention of new fibres to the constant renewal of designs and models, as well as the modernisation of all stages of production and distribution. Technical textiles are one of the sector's strong points, and some parts of the industry are highly competitive and innovative, creating qualified jobs of high added value (European Commission, 2000).

Future industrial policy measures should be based on the strong points and competitive advantages but should also target the weaknesses and disadvantages of the T/C sector, strictly following the horizontal/matrix-type policy approach (cf. Section 1.5.5.3).

Over the past four decades the evolution of T/C markets has been extremely challenging or even negative for the European industry. Given the globalisation and liberalisation of markets for textiles and clothing there is no doubt that competing on price is hopeless for most EU T/C manufacturers. Since competition on price is definitely no longer a viable position for the EU on world markets, competition on quality, which implies creating additional value for customers in order to be able to charge premium prices, is the only strategic option left.

A significant part of the EU's T/C industry still succeeds in remaining competitive, and defends its market position against competitors which benefit from much lower labour costs and much less constraining regulatory environments, so that industrial policy can build on quite a strong "bridgehead" for supporting the quality offensive on world T/C markets.

The competitive advantage of T/C products from EU manufacturers has its foundations in the industry's rich, century old history in the art of western apparel and textile creation. Especially in the labour-intensive clothing sector the intrinsic value of EU products to their customers was never truly "industrial"

in the narrow sense of the term. Rather it was largely immaterial by focusing on design, fashion and style – all, however, based on solid and innovative industrial know-how (IFM, 2004).

The desperate pursuit of large parts of the EU's T/C industry of price rather than quality competition over the last decades seems, however, to have tied up substantial resources which would have been put to better use in restructuring and upgrading. An analysis of the actual strengths and weaknesses of the EU's T/C industry therefore still finds "a lot of “minuses” which are not effectively counterbalanced, as its major “plusses” remain mostly potential rather than actually being exploited" (IFM, 2004, p. 372).

It has to be clearly stated that the prime responsibility for this strategic malformation lies within the T/C enterprise sector itself, since public authorities – both at the national and regional level and at the European level – have long since devised and used sensible policy instruments and programmes to accompany the T/C firms" restructuring efforts. Quite frequently, however, the "right" policy instruments for fostering strategic change have been readily available on a horizontal or matrix-type approach basis, but their mode of operation is not yet adapted to the sector, or, to put it differently, the sector is not yet structured to fit in the policy instruments. A low participation rate of T/C enterprises, mostly SMEs, in more complex horizontal EU policy programmes, e.g. in the framework programmes for R&D, is the depressing result.

The joint responsibility of policy-makers can be pinned down to making the use of these instruments more coherent in a long-term vision of the industry. All that the policy-makers can and should do is to establish adequate framework conditions to enable the industry to use current and future policy instruments. The responsibility for exploiting available policy instruments and programmes to their maximum benefit, however, will always remain the T/C firms" responsibility.

Brief outline of a two-fold industrial policy strategy for the EU’s T/C sector

Given the above framework industrial policy, "declining industries" like the T/C sector should basically pursue a two-pillar strategy which, on the one hand, *accommodates the social impact of downsizing and restructuring* and, on the other hand, *fosters innovative business models*.

Considering that rapid and/or unexpected structural change may in the short run destroy physical and human capital, resulting in corresponding welfare losses which might, at least temporarily, be higher than those from slow adjustment, a sensible accommodation of the adjustment process is needed to "smooth" the adjustment path without changing its principal direction. This is most likely to be the case if capital market imperfections exist, if mobility is low and the workforce is insufficiently qualified and/or highly specialised. This policy pillar demands fostering "re-employability" of the workforce by providing education and training as well as encouraging mobility, especially in regions heavily dependent on the T/C sector and thus most adversely affected by structural change.

However, the latter strategic option –fostering innovative business models –has to take into account the fact that the traditional business model of the T/C industry with the manufacturer at the centre of the value chain has been replaced by a new business model which is based on the shift of the "decision centre" from the producer to the retailer, therefore from manufacturing industry to services.[144]

In order to implement either of the two strategic lines, policy-makers can rely on an "industrial policy mix" under the auspices of the proven "matrix-type approach" comprising R&D and innovation policies, labour adjustment policies, regional policies, trade policies as well as business facilitation policies, which will be discussed below in some detail (European Commission, 2004I and 2004J; HLG, 2004; OECD, 2004G).

The industrial policy mix

Research and innovation

Contrary to common perception, there seems to be no fundamental lack of invention and innovation in the T/C industry. Thus it would not be appropriate to launch large-scale basic research projects on textile and clothing technologies beyond horizontal industrial research schemes. Although the textile and clothing industries can be considered mature, they use technological innovations that are largely generated in other industries, above all in chemicals and machinery. These technology suppliers are well able to provide product and process innovations for textiles and clothing without financial support from public research programmes. While governments may stimulate collaborative innovation processes in the fields of dissemination and technology transfer, such approaches should not distort market-oriented innovation programmes (cf. OECD, 2004G).

Since technology transfer between technology suppliers and technology users plays a pivotal role in the technological performance of textiles and clothing, it seems appropriate, therefore, that innovation policies are concentrated in this area. As long as the opportunities offered by modern information and communications technologies for the dissemination of advanced technological knowledge are not yet fully exploited by the T/C sector, such a policy would require complementary public funding to give innovators financial incentives for passing proprietary technological knowledge on to other firms.

Especially in mature industries non-technological innovation based on sophisticated non-codified knowledge seems to play an important role for competitiveness and entrepreneurial success (cf. Böheim, 2004). While technological innovation is widely regarded as a "growth driver", non-technological innovations are somewhat hidden in the shadows. Therefore it seems appropriate that innovations in the

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[144] Cf. section on "Leadership of large retail groups" above.

organisation and management of the value chain, logistics and distribution as well as design and marketing get their deserved share of attention by policy-makers.

Education, training and employment

In the long run, innovative capacities basically depend on the availability of suitable human capital. Therefore, a sound education and qualification system seems much more important for sustainable technical progress than public innovation programmes. This applies not only to textiles and clothing, but to all other industries as well.

To master the "re-employment goal", the EU maintains the established tradition of a social dialogue as a driving force behind successful economic and social reforms and will continue to promote it. The European social dialogue in the textile and clothing sector plays a major role in addressing key challenges of the sector, such as enhancing skills and qualifications, modernising work organisation, promoting equal opportunities and developing active old-age policies. Social dialogue and social partnerships are regarded as fundamental elements of efficient and responsible restructuring.

As far as education and vocational training is concerned, the need for a Europe-wide lifelong training strategy for the T/C sector should be supported. At EU-level, the Leonardo da Vinci II programme and "Article 6" measures under the ESF provide the framework for funding sectoral projects with European added value and innovative actions in the area of employment and adaptation to industrial change.

However, downsizing the industry means that in many regions the critical mass for educational structures will melt down (a point that is also valid for research centres and services to the industry). This may affect the support level for remaining firms. Public authorities should ensure that adequate accompanying structures remain in place. At the same time these structures should be integrated in a European space for education and research, facilitated by EU programmes and cross-border initiatives, involving national and regional authorities, research and educational institutes. Today fashion and design do not sufficiently permeate the EU's T/C industry. Facilitating interactions and sharing knowledge between these two worlds would considerably help the industry to re-build emotional consumer value and strengthen synergies within and between firms (IFM, 2004).

Regional aspects

The impact of structural change at the regional level depends very much on the position in the supply chain. Regions which have many retailers and design HQs, branded manufacturers and logistic functions are less affected than regions which do business predominantly by way of "co-contracting" and subcontracting. For this reason the southern regions and those in accession countries are more vulnerable, especially as they have fewer strategic options and less visibility on the market.

In regions which are highly dependent upon textile and clothing activities, the challenges raised by present and foreseeable developments need to be approached in an integrated way in order to achieve sustainable solutions. Further downsizing, however, most likely will not come as a shock but as a continued restructuring in 2005–2010. The nature, speed and impact of this process will differ between regions. This urgently calls for assistance at the regional level with a long-term involvement where sustainable regional development plans have to be formulated on the basis of a sound framework at both EU and national levels (cf. IFM, 2004).

The participation of the T/C industry in EU horizontal/multisectoral programmes provides an adequate and efficient framework for supporting the sector and, at the same time, allows for diversification of production between various sectors and ultimately serves the economic situation of the regions in question better than any sectoral Community programme for textiles and clothing or any specific regional initiatives which would risk fragmentation of EU industrial and regional policies, with little significant impact on the sector as a whole. Anyway what should be aimed for is greater participation of the T/C sector in the national regional programmes of the Member States.

In principle, EU structural funds provide adequate support for the social dimension of industry adjustment and retransformation. Since major employment reductions in the T/C industry are (also) expected to occur in regions that fall outside the EU structural funds' objectives 1 and 2 (e.g. Baden-Württemberg and Nordrhein-Westfalen (D), Catalonia (E), Rhone-Alpes (F), Lombardy and Veneto (I) and East Midlands (UK)), these regions or districts suffering from especially bleak employment perspectives should also be eligible for funding. It goes without saying that any support must be strictly limited to measures directly targeted at cushioning the social effects of structural adjustment and retransformation, thereby avoiding intra-T/C industry distortion of competition (IFM, 2004).

The situation of the NMS deserves special attention since restructuring in their T/C industry is expected to be comprehensive and have a serious social impact as the convergence process is progressing. It is expected that increased delocation of production from EU-15 states on an OPT basis might only partly compensate for the adjustment losses.

For mitigating the socio-economic impact on those regions most affected by structural change additional policy measures might make sense. In this context, the proposal of the European Commission that Member States reserve 1 percent of the Structural Fund annual contribution for the "Convergence" objective and 3 percent of the contribution for the "Regional competitiveness and employment" objective to cover unforeseen local or sectoral crises linked to economic and social restructuring or to the consequences of trade opening is also of relevance for the EU's T/C industry (European Commission, 2004H).

Further momentum for the EU's T/C industry might come from the completion of the Pan-Euro-Mediterranean free trade area which is expected to form a large "European T/C cluster" allowing for the

integration of the whole value chain from design to retailing within relative geographical proximity. Within this large "European T/C cluster" the formation of several "sub-clusters", e.g. a Northern T/C cluster (Belgium, Denmark, Germany, France, Ireland, the Netherlands, Austria, Finland, and UK), a Southern T/C Cluster (Greece, Spain, Italy, Portugal, Cyprus, Malta plus Mediterranean countries) as well as an Eastern T/C cluster (Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia and Slovakia), seems conceivable. This could be a critical step in providing the conditions necessary to allow the sector to remain an important contributor to European industrial production in the mid-term future (European Commission, 2004I).

Foreign trade

From a strategic foreign trade perspective, the rapid completion of the Pan-Euro-Mediterranean Zone is crucial for the EU textile and clothing sector, as it will enable the sector to maintain the whole chain of production close to the European market, combining advantages in terms of costs, quality and proximity. Progress in this field has been too slow, particularly the conclusion of free trade agreements (FTAs) among the countries concerned, and further efforts in this direction seem to be indicated.

Improved and equal access to markets is a long-running issue for the EU's T/C industry. Seeking to obtain conditions of access to third-country markets that are both fair and comparable across the world for all major textile and clothing producers is an important issue for the EU's T/C industry. The establishment of an international level playing field in global trade of T/C products has to be vigorously pursued by policy-makers. Trade defence instruments designed as countervailing measures, however, should be viewed with considerable scepticism.

Summary

Increased global competition due to the phasing-out of the Multi Fibre Agreement caused restructuring of the worldwide production locations to the disadvantage of European textile and clothing manufacturers. Employment has declined sharply in all Member States over time, both in the rather capital-intensive textile industry as well as in the more labour-intensive clothing industry. Increased outsourcing of the "lower end" of the value chain to low-wage countries caused a decline in value added which could not be fully compensated by the specialisation of the industry in the quality and innovative segments of the market. Strong competitive advantages of the EU's T/C industry can be found mainly in technical textiles as well as in clothing with a high fashion content and/or high quality component.

This upgrading strategy brought the required substantial improvements in labour productivity which prolonged and kept profitable production of the higher value added shares and of headquarters in the old Member States. Additional forces like EU enlargement and the changed foreign trade regime will contribute to the prolongation of the adjustment process in the EU's T/C sector in the medium and long term.

Despite these strong and prolonged sectoral adjustment challenges which will shape the fate of the EU's T/C industry for years to come, policy-makers at all levels – whether EU, national or regional – should resist any requests concerning sectoral programmes and initiatives for textiles and clothing. Future industrial and regional policies should be rigorously based on the proven matrix type approach by focusing on two pillars: on the one hand accommodating the social impact of downsizing and restructuring, on the other hand fostering innovative business models, innovation, high value services and fashion content. Cluster style policies making use of both up- and downstream integration of the value chain by building on regional competitive advantages as well as co-operation between large retail groups and textile and clothing manufacturers will increase in importance. Innovation policy in this context often means fostering of "non-technological innovation" by utilising non-codified knowledge that combines education and training for increased "employability" and co-operation with universities and specialised medium and upper level technical colleges.

Quite often, however, the "right" policy instruments for fostering strategic change have been readily available on a horizontal or matrix-type approach basis, but their mode of operation is not yet adapted to the sector and/or the sector is not yet structured to fit in the policy instruments as is evident from the comparably low participation rate of T/C enterprises in the more complex horizontal EU policy programmes, e.g. in the framework programmes for R&D.

The joint responsibility of policy-makers can be pinned down to making access to and usage of these instruments more coherent in a long-term vision. Policy-makers should concentrate on creating adequate framework conditions to enable the industry to use current and future policy instruments. The responsibility for exploiting existing policy instruments and programmes to their maximum benefit, however, will always remain with the T/C firms" alone.

1.6 Summary and principles of a new industrial policy

Summary

From intervention to the matrix approach

Throughout Europe, there have been considerable differences over time and across countries in the implementation of industrial policy. On both the Community and national levels, changes have been made in the objectives, instruments, agents and ambitions of industrial policy. Many reflect explicit differences in strategy; the majority were the result of the reaction of agents to problems that had arisen. In this report, we distinguish four phases of industrial policy: (i) The European Community of Steel and Coal – a predecessor of the EU – conducted a rather interventionistic sectoral policy. This approach was upheld even after the economic situation changed from one of shortage to oversupply. (ii) The Treaty of Rome aimed at the elimination of trade barriers and the reduction of subsidies. It therefore minimised the role of an explicit industrial policy, which at that time would have meant financial support or import shelters for industries in certain countries. In respond to crises in specific industries, the actual policy proved to be sectoral. (iii) In the nineties, the objective of industrial policy was to foster competitiveness by promoting research, education, and business start ups. Since these measures have an impact on all industries, this form of industrial policy was called horizontal. (iv) Most recently, economists have increasingly recognised that the impact of horizontal measures differs according to sector, and that problems – as well as existing regulation – differ across industries. Individual sectors might therefore require measures that are complementary to the horizontal lines pursued. A new combination of a mainly horizontal policy with a careful study of its sectoral impact and the search for complementary sectoral measures to improve the competitiveness of European Industry has been labelled the matrix approach (Aiginger and Sieber, 2005).

The scope of industrial policy

Industrial policy is sometimes defined in a very narrow sense as "specific measures for specific sectors", and sometimes very broadly as "everything that effects a company". This paper assumes a moderate position, defining industrial policy as "activity which creates a favourable environment for European business in general, the manufacturing sector and its industries in specific". Thus, policies are included which primarily effect manufacturing, but also influence the quality of inputs, business related services, and the co-operation of firms with suppliers, institutions, and the government. The inclusion of “manufacturing sectors and its industries” in the definition should indicate the elements of the matrix approach as described above. Industrial policy interacts with other policies, the largest synergies and overlaps exist with innovation policy. The most complex relation is that between industrial and competition policy: some studies claim competition policy an essential part of industrial policy itself, while others stress the potential conflicts. Empirical research supports a non linear relationship between competition and innovation (where under certain circumstances competition fosters innovation, but not for

all circumstances). Further overlaps exist between industrial policy and education, employment, regional policy and trade policy. A prerequisite for a future-oriented industrial policy is the revaluation of overlaps between industrial and other policy areas and the joint development of mutually supportive strategies by agents responsible for industrial, as well as related policies.

The importance of the industrial sector

The share of manufacturing in GDP is declining. It is larger in Europe than in the US, but lower than in Japan. Within Europe (in the old member countries), the highest share of manufacturing is in Ireland, Finland and Germany, followed by Sweden, Austria and Italy. The share is high and slightly increasing in the Czech Republic and in Hungary. In southern Europe, manufacturing has been decreasing dramatically for the past 10 years. In Italy, Spain, Portugal and Greece, which used to have relatively large industrial sectors, the share has fallen below the EU average. The general trends have been that manufacturing is declining relative to GDP in high income countries, since the demand for services increases as incomes rise. The second reason for the decline of manufacturing is that the increase in productivity has been highest in manufacturing. The latter trend implies small price increases or even price decreases relative to services. Even if the amount of goods supplied by manufacturing is more stable than its share in sales or in nominal value added, the factor incomes in manufacturing are not keeping up with those of services, and the employment share of manufacturing is declining. The share of manufacturing plus producer related services however is constant relative to GDP, even in nominal terms. Thus, the data substantiates neither fears of absolute de-industrialisation nor the decline of the industrial sector in a wider sense – including services interlinked to manufacturing.

Furthermore, the importance of manufacturing may be understated by quantitative shares. Manufacturing currently dominates the trade balance, it is the engine of growth for many upstream industries, it furthers the development of technologies and creates spillovers to services. The share of hybrid products, whereby consumer value or productive use is created when goods are combined with services, is increasing. Manufacturing and services often cannot be separated; if production is relocated, research and other high value added services follow. The resurgence of growth in the US, Sweden and Finland in the nineties – as well as Ireland's catching up story – was led by manufacturing, while slow growing countries achieved only moderate levels of manufacturing growth. A good example of how important the production sector is with respect to spillovers to other industries and services is the information and communication technology sector. ICT started in countries with strong firms producing new products and developing new technologies. Then, productivity growth accelerated in the ICT sector, ultimately boosting overall productivity and creating new products in industries and services utilising ICTs.

The rationale for industrial policy in a knowledge-based economy

Industrial policy is necessary in a market economy, at the very least to counteract market failures, which may be of either a static or dynamic nature. Market failures are specifically abundant in technology and knowledge intensive industries, which today contribute the lion's share of growth to manufacturing and even to total growth. The realm of industrial policy can be extended to counteract the strategies of other countries and to soften the burden of structural change. Static market failures result from monopoly power, externalities, information asymmetries and the existence of public goods. The dynamic rationale for intervention is founded on first mover advantages, experience and capabilities. This situation seems to call for the enactment of policies to foster rent shifting, the creation and support of national champions, technological lead projects, headquarter policy and the specific support of promising industries. In knowledge and technology intensive industries, externalities and spillovers are more important than in other sectors. Lock-in problems, network externalities and industry standards are important to competition and competitiveness. Calling for co-operation and supporting related institutions characteristically derives from a "system of innovation" perspective. New growth theory, as well as evolutionary theory, deals intensively with the importance of incentives, the costs of innovation and the contribution to growth by new general purpose technologies, such as ICT and biotechnology. Policy-focused arguments claim that the burden of change might be too heavy for a region, a country, or firms and employees. The cost may be cumulative, leading to a degree of uncertainty, which biases investment and consumer demand downward. This is specifically the case when change is abrupt and unpredictable, and if regions are highly specialised in declining industries. Interventions motivated by the re-establishment of level playing fields on an international basis also belong to this category.

Defining the optimal degree of or the limits to intervention need to take into consideration the possibility that good intentions are often overshadowed by bad outcomes. Policies promoting structural change are often implemented in such a way that they slow down actual change. Temporary measures to counteract a specific market failure can be applied permanently even when they do not succeed in eliminating the original problem. Future-oriented interventions can be based on forecasts which prove wrong or overlook a specific condition necessary for success. Flagship projects are sometimes badly managed. Strategic interventions can be counteracted by the parallel strategies of other countries. Secondly, a market failure does not always call for intervention. The direct costs of intervention may be too high; an implementation bias could add to the costs and result in a public failure larger than the market failure. Vested interests may be more important than market failures. Thirdly, an intervention should implement that instrument, which minimises costs and the length of intervention. Fostering market access, competition and the birth of new firms could be superior substitutes for subsidisation and the regulation of output and prices. Quality control, certificates, guarantees and well defined property rights reduce market failure more than command and control or subsidies. Financial support in general and flagship projects should be awarded on a competitive, transparent basis.

The challenge of catching up

Given the tasks of transforming the formerly socialist countries, creating the Monetary Union, and fulfilling the Maastricht criteria, industrial policy did not rank very high on the economic policy agenda during the nineties. Renewed interest on the Community, as well as national levels, at the end of the nineties was a product of new challenges, including globalisation, technological change and the redefinition of the European landscape. Growth in GDP slowed down and is now lower in Europe than in the US. The same holds true for productivity growth and employment creation. Privatisation, liberalisation and progress in the internal market did not contribute as much to growth as expected, and neither the input nor the output targets set in Lisbon seem to be within easy reach. De-industrialisation does not occur in a way that output declines absolutely, but employment and the share of manufacturing in GDP does; this process has been accelerated by outsourcing. Regional imbalances between old and new member countries, as well as between prosperous and peripheral regions are considerable and will be evened out only slowly.

Indicators of the three types of instruments

This report develops a set of indicators for measuring three types of industrial policy: state aid, market access and future investment. The traditional instruments of financial support through subsidisation or specific tax advantages are documented best. Data on vertical and horizontal "state aid" is provided, although comparability and completeness are somewhat limited. Efforts to liberalise and deregulate attempt to decrease market failures by fostering competition. An extensive survey by the OECD, as well as statistical documentation on the progress of the Internal Market Programme helps us to draw comparisons of this form of competition enhancing industrial policy. The statistics measure, for example, the share of open tenders and the regulation of labour and product markets. Industrial policy targeted at future investments ny horizontal issues, like promoting research and new general purpose technology, or upgrading human capital, can be measured by indicators on research inputs, the qualifications of the work force or indicators on the expenditures for and use of information technology. Since not even all the indicators together create a complete picture, we add indicators which reveal the ex post results of structural change and competitiveness by measuring the shares of technology driven and skill intensive industries. While the success or failure of structural change may be a result of industrial policy, we should keep in mind that comparative advantages, starting positions and firm strategies can also play a role.

The clustering of countries according to the policy instruments used

If we group old member countries according to their application of policy instruments, four groups emerge. (i) Small, northern European countries spend less on state aid, and have deregulated product and labour markets. They emphasise training and provide assistance to the temporarily unemployed. Thirdly, these countries invest dramatically in research, the quantity and quality of education and life-long

learning. (ii) The second group is comprised of large continental countries which rely – for various reasons – more on state aid, and less on market access and deregulation. These countries have not increased investment in the future as demanded by the Lisbon strategy or as has been done by the northern countries. Their position in research used to be strong, but they loose their lead; they have not yet fully embraced the information and communication technologies, and the importance of life-long learning has not yet been generally accepted. (iii) The third group of small continental countries is characterised by low levels of state aid, and competition that is promoted more by openness than through active policy. Their moderate position in future investment is not in line with their high income per capita . A high level of productivity is achieved by small, flexible firms and the active diffusion of technologies and incremental innovations. (iv) The fourth group includes the southern peripheral countries. These countries are characterised by strict regulation, which in some cases is limited by the Internal Market Policy. Their low level of investment in the future is in line with their low cost and income positions, and their import of technology via FDI. Tourism is important to these countries and the agricultural sector is still quite large[145].

The first surprising result of this grouping is that we did not discover that some countries were performing excellently in terms of low state aid, while others were following the market access approach, and maybe a third group was investing in the future. The three Nordic countries were excelling according to all criteria, that is by combining low levels of financial support with open market access and high levels of investment into innovation, education and new technologies. Secondly, the strategies of these countries are in line with the targets and instruments agreed upon in Lisbon. Thirdly, industrial policy contributed to an excellent macroeconomic performance in the nineties, when measured by either a small set of economic variables or a broader set of economic, social and environmental objectives[146]. The policy practised by the successful countries therefore does not rely on a single set of narrow instruments, but is rather based on a coherent strategy of learning from the past successes and failures of industrial policy and other policy areas. The successful countries did not place high priority on one, single goal, but rather on a set of goals, and followed this strategy over the long run. A consensus among decision makers was reached which put an end to stop and go policies, sudden changes in priority, and policy changes following elections.

Statistical data do not disclose the complex structure and impact of industrial policy. Therefore, the report includes case studies on economic policy in France, Finland, the new member countries, Japan and the US, Airbus and the textile industry. The case study on France (by Alain Alcouffe) highlights the specifically French approach to industrial policy, which is more sectoral, project-oriented and top down.

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[145] To a certain extent, the United Kingdom resembles the Nordic countries, although it is a leader in deregulation and has a smaller public sector. R&D is lower in the UK; the importance of business related services is larger. Ireland has successfully caught up via a combination of FDI plus the promotion of endogenous firms and education.

Finland was chosen because it successfully transformed its industrial structure within one decade from one which was based on a resource-oriented manufacturing sector to one which is knowledge based (Pekka Ylä-Anttilla and Christopher Palmberg). Industrial policy in the new member countries investigates the experiences of these countries after transition and to which degree industrial policy is different for countries catching up, as compared to those at the technology frontier (Adam Toeroek). Industrial Policy in the US and Japan is analysed by Christian Ketels, who investigates how various problems and market failures are addressed in these two countries and what new measures and instruments are currently being planned. Airbus is a large European project, successful at least insofar as the sales of Airbus planes did catch up with and finally surpass the sales of the incumbent (Christiane Alcouffe). Industrial policy in the textile industry, analysed by Michael Boeheim, highlights policy options in an industry with a declining share in value added and a drastic decline in employment in Europe as a whole.

Policy shifts in new member countries

There was no explicit industrial policy in the new member states during the nineties. This was a reaction to the over-centralised, inefficient, interventionist government policy prior to transition. Privatisation, deregulation, the liberalisation of FDI, the reduction of government controls, and the reform of the fiscal and financial systems were the priorities. The actual policy included some elements of subsidisation and supported the favourable tax treatment of large or strategic industries, often packaged as restructuring, and programmes to make these new member states fit for privatisation. Programmes for the "dirty dozen" (12 large, industrial firms in engineering, aluminium, fertilisers and rubber) in Hungary, and the eventual exemption (according to need) from competition policy in Slovakia and Hungary (to improve the competitiveness of their exports) are described by Adam Toeroek. A re-evaluation becomes necessary for two reasons: First, the transitional crises reduced industrial capacity extensively. Had this continued, the basis for growth and exports would have eroded. Secondly, the Lisbon agenda called for an industrial policy which could accelerate the speed of catching up without distorting competition. A shift from "crisis management" to a horizontal industrial policy did take place, supporting innovation, the development of SMEs, and the levelling of regional imbalances. Competition for FDI was increased via tax reforms, fiscal incentives, improvements in the provision of infrastructure and enterprise zones (in Poland). A special plan favouring domestic enterprises was developed in Hungary (Szechenyi Plan, 2000). Tax options were offered to small firms and a programme for clustering in tourism was developed. Labour market regulation in the new member countries is weak in comparison to the old member countries, and ICT expenditures are comparatively high. State aid is relatively high, and business R&D is relatively low, as are the shares of tertiary education, life-long learning and venture capital. The Baltic countries have low levels of state aid and better positions in education and life-long learning. The lag in public R&D is low, that for private

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[146] See Aiginger (2004) for such a ranking combining growth of output, productivity and employment, but also fiscal indicators, inflation and per capita income; however, the same position is revealed in the ranking of the competitive

R&D is large. Slovenia's position is most similar to that of old member countries, with public R&D above average and private not too far behind. It enjoys a good position in life-long learning and in sophisticated industries. State aid is above average in both Slovenia and Slovakia.

The role of government and "Grand Programmes" in France

France is to certain extent the founder, spearhead and promoter of industrial policy in Europe. The notion that government can enhance productive capacity, that it should create and support national champions, and assist firms under pressure is deeply rooted in France's history of trying first to catch up with the UK and then with the US. In France, market failures are less of an argument for industrial policy than is generally the case in the economic literature. Questions of policy, creating strategic advantages, and pushing new technologies are the arguments involved in French industrial policy. The system of "planification" includes and stresses a sectoral approach. The economic and political system is elitist and education promotes this tradition; financial networks, the close relation between banks, insurance companies, firms and government encompasses holdings, cartels and state ownership. Many of the failures of interventionist systems were prevented by a specific focus on productivity and on maximum technical efficiency, as described by Alain Alcouffe. Marshall Plan funds were reinvested internally, and not used for building empires via FDI as in the UK. Industrial policies during the last quarter of the 20th century approach the European mainstream, partly adhering to the rules of the European Union, while retaining specific characteristics like deferred privatisation, resistance to the liberalisation of network industries, stressing the importance of vertical chains and the disadvantages of globalisation. On the active side, plans to develop an "ecosystem" between universities and firms, which could constitute a French Silicon Valley, should also be mentioned.

A distinctive feature of French industrial policy is the promotion of "Grand Programmes", some of which have been quite successful (Airbus, nuclear programmes, and components manufacturing), while others have failed. A final balance is not easy to establish, since costs and benefits are very difficult to measure. The promotion of Minitel – the first combination of a computer with a telephone – included the distribution of terminals free of charge to consumers; the programmeme helped to eliminate the technology gap in the French telephone system. Nevertheless, Minitel ultimately lost against Internet; among the reasons Alcouffe mentions is that (i) it was a proprietary system; (ii) videotext was not implemented at the right level, and (iii) the software was not monitored. On the other hand, telecommunications increased in popularity and several firms profited from their first mover advantage and having developed their own strengths in telecommunications.

Airbus, on the other hand, is considered a true success, insofar as the firm managed to develop a fleet of commercial aircraft, that is not merely competitive on the world market, but which has even surpassed

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position of WEF and IMD and the ranking of performance in the Lisbon process in CEP.

Boeing, the former leader in the number of aircraft delivered. Whether world welfare increased is less easy to establish, but at least the goals of European governments and the European Commission to found and maintain a viable European firm in this high technology business were successful. Airbus succeeded despite the difficulties of creating a European firm by merging national enterprises in four states, and the complications of initially working with a multitude of European and non European suppliers. Christiane Alcouffe carves out from the management point of view the following success factors. First, Airbus developed and used proximity, local synergies and trust in its main centres of production. Secondly, it recognised that procurement was not a short run task, but rather a strategic long run activity. Airbus gave suppliers the responsibility for the sub-assembly of complete systems and not of individual parts. Some research was also performed by these partners, whose profits were connected to the sales of the aircraft. The development of supplier relations and trust was considered important, and the number of suppliers was eventually reduced from 700 in 1993 to 130. New products were developed as families, and essential parts were kept identical. Cockpits and handling characteristics, for example, are similar across products, allowing pilots to fly the entire range of aircraft with little additional training; these product similarities also help keep maintenance costs low. A family of similar plants with varying capacities enabled plant size to be adjusted to demand. Government relations were positive and there was little intervention. Perhaps it was the specifically clear goal of keeping up with or surpassing Boeing, that prevented the slacks and inefficiencies which are often abundant in other complicated projects with government stakes and financing.

Industrial policy in France lost some of its significance during the nineties. Employment increased due to the redistribution of income, job training for young people, Keynesian demand management and the reduction of working hours. Public deficits were contained by boosting privatisation revenues. Research funding was spent on defence programmes, and there was little fall out for the civil sector. Research has declined in absolute size, but still accounts for half of public aid. Large programmes were continued, although few were added; research spread to small and medium sized firms via ministerial programmes and tax credits (which were, however, capped at € 8 mio, providing few incentives for larger firms). Analyses of French competitiveness revealed decreasing market shares specifically relative to US firms and a general underrepresentation of high tech industries. Within each sector, innovation remained high, but the unfavourable assortment of industries led to an overall decline in innovation. The question was soon raised as to whether France had not forsaken its industrial policy with a strong sectoral focus and the grand programmes for European liberalisation and integration, without reaping the promised return in growth and employment. The idea of competitive regional poles or clusters gained support (Datar Report), as well as the idea of initiating new and focused programmes in important technological fields (Beffa Report). Governments could be guarantors and incentive providers, launching and initiating programmes in co-ordination with one or more big industrial firm. The fields to be chosen would be characterised by high levels of future demand, and the strengths of the firms chosen would guarantee that they attain a significant share in the large future market. The R&D initiated and subsidised by these programmes would

culminate in a "model project" –promising a major scientific breakthrough. Successful programmes should be significant contribution to help shift the existing industrial structures towards high tech. The participation of large industrial firms, regular evaluation, and the termination of programmes in the case of negative results, would distinguish the new programmes from older, large scale undertakings. Leading firms would be encouraged to found partnerships with small and medium sized enterprises. In principle, all European firms could participate. In contrast to the European Framework Programmes, the French initiatives are pre-competitive and more targeted (less broad). As potential areas for initiatives, the Beffa Report recommends specific fields in the health industry, energy, transport, environment and ICT. The industrial mobilising programmes (MPII) should be organised by an innovation agency (IIA) The relation of this agency to the competitive poles is yet to be defined; it should exist complementarily to a research agency for bottom-up programmes and an agency for small and medium sized firms. It is considered by Alain Alcouffe to be a moderate route between the old command approach, whereby the government made its decisions via "grand corpses" or "grand projects", and the market approach insofar as the new industrial mobilising programmes are based on tendering, incentives and contracts and are in principle open to firms in other member countries.

Finland: No master plan, but a future-oriented, pro-active policy

In the early nineties, Finland successfully overcame serious economic problems stemming from the breakdown of product, as well as geographical markets. It left behind the capital-driven, energy-intensive industrial structures based on raw materials in favour of a move towards the knowledge-driven society. Finland is now leading in the PISA ratings on education performance, excelling in many indicators of innovation, education and information technology. Christopher Palmberg and Pekka Ylä-Anttilla describe this transformation as the result of a pro-active policy. They report that the restructuring of the Finnish economy did not follow a master plan and the larger part of Finland’s new competitive advantage can be attributed to decisions made at the micro level in firms, financial institutions and innovation policy agencies. They describe the policy shift as one from short run macroeconomic policies (including frequent devaluations of the Finnish currency) to long term microeconomic policies supporting knowledge creation and innovation. Although industrial policy stopped backing the losers, it restrained from picking the winner, and instead aimed at improving the quality of the business environment. The Finnish model is founded on three principles. The first is the early application of a systems view of innovation, stressing the interdependency between research organisations, universities, firms and industries. The policy framework was developed by various public private partnerships, including economic research organisations, industry federations, firms and policy councils. The second principle is the integration of industrial, science, and technology policy. The third is cluster-based policy, which was accentuated in a White Paper on National Industry Strategy in 1993. Technology programmes are designed by TEKES, based on a competitive tendering process and favouring strong vertical collaboration between universities and firms. Finnish industrial policy has more of an industry pull than a science push character. Finland gave up the linear

model of innovation (implying that one stage follows the other) early, in exchange for the standpoint that processes are increasingly simultaneous. Consequently, supporting agencies were delegated new responsibilities, and institutions were created that support firms by means of a given instrument over a longer range of time, so there is no longer a need to switch between agencies at each new stage of a project. There are two components to this impressive structural change, namely inter-industry change from old industries to new knowledge based industries, and intra-industry change via the exit of low productivity firms. The long term commitment to structural change enabled Finland to boost R&D even during the worst economic crisis in the early nineties. Today, Finland is one of the few countries on track for the fulfilment of the Lisbon input and output targets.

Despite this apparent success, Finland is already engaged in an intensive discussion of future challenges. First, there is the challenge of Central European and Asian countries specialising in similar product groups, specifically ICTs. The internationalisation of the Finish innovation system and the increasing utilisation of technological and social innovation are new objectives. The impact of globalisation on individual industries is also being investigated, and the low level of entrepreneurship, specifically in R&D, is currently under analysis. On the policy side, the amount of public research expenditures is to be raised by a minimum of 7 percent per year, tax incentives for R&D are under discussion, and R&D, as well as higher levels of education are to be concentrated in fewer locations, so that it is possible to create a critical mass. The systemic approach of the Finnish innovation policies will be upheld, but emphasis will shift from innovation to the commercialisation of technologies. Networks are to be extended to the rapidly growing Asian countries.

USA: Fierce competition plus a business friendly government

The US has no consistent industrial policy, and associates the term industrial policy with old style sectoral interventions, conflicting with the benefits of competition and the principles of a market economy. However, the US implements many policy tools associated with industrial policy in Europe. Economic policy at the federal, as well as at the regional level does exert a specific impact on firms and their competitiveness. Direct financial subsidies have been used in agriculture and in the airline industry. Firms have been bailed out, for example, in the car and loan industries. Trade barriers have been erected in agriculture, textiles, the forest industry and steel. Restrictions on foreign ownership continue in airlines and media; foreign firms partly owned by governments face barriers to their activities. The foreign sales corporation tax credit was an instrument of export promotion and was removed by a WTO ruling in 2002. Aside from India, the US is the most prolific user of anti dumping and countervailing duty measures in the world. This tactic mainly provides short term relief to industries under pressure from imports. The effects of defence policy on industry amounts to about three quarters of a percentage point of GDP for procurement, and equally as much for R&D spending. Additionally, the US government lobbies – more than other governments- in large foreign procurement decisions in favour of its own firms. As far as innovation is concerned, the main channel is the funding of universities and research institutions (directly

and indirectly by favourite tax regimes for private sponsors). Direct public funding for business R&D has been declining after the end of the cold war but still remains above the EU and OECD averages, the participation of small firms in programmes is encouraged. Effective subsidisation through tax credits amounts to 7 %; this policy has survived attempts to lower taxes and broaden the tax base. Sectoral priorities are similar to those in Europe. On the one hand, agriculture and textiles seem to be protected, on the other hand, life sciences are being actively promoted. Innovative and comprehensive cluster projects exist at the state level (e.g. in Ohio and Georgia). Specific features of US policy include the co-operation between the public and private sectors and round table discussions on the improvement of microeconomic issues critical to upgrading competitiveness in specific industries and regions. In general, the US economy is characterized by a combination of government investment and fierce rivalry in competitive markets; the lower share of government involvement in GDP is due to very low transfers rather than lower levels of investment and procurement. Specifically different from the situation in Europe is the regulatory environment of universities, which extends beyond the narrow rules of technology transfer. Overall, a strong commitment to attractive business conditions, to open markets with a high degree of rivalry and to infrastructure investment compensates for the impact of the ad hoc, internally inconsistent and relatively interventionist market policies of the US on competitiveness (Christian Ketels).

Japan: Changing strategies are still targeting at specific industries

Industrial policy was hailed for long as the key reason for strong growth in Japan. Later, industrial policy was increasingly seen as one of the symptoms if not root cause for Japan's structural problems. Reforms on the microeconomic level were realised in the nineties, including a review of industrial policy and a change in the name of the ministry responsible for industrial policy (from MITI to METI). The general focus shifted to the creation of knowledge-based assets, requiring investment into research, the standardisation of skills, and the mobilisation of clusters. A new industrial promotion strategy (the Nakagawa Report) identifies three groups of industries as key to Japan's future.

The first group includes industries that can compete globally at the cutting-edge of their respective markets; the report identifies fuel cells, digital consumer electronics, robots and the content industry as some elements of this group. The second group is comprised of industries that meet new or growing demands from the domestic market; i.e. health care, environment and energy, and business support services. And thirdly, industries that play a critical role in specific regions within the country are classified together; i.e. advanced high tech industries, new manufacturing industries, regional services and high value-added food products.

The report then outlines broad policy priorities: For the seven industries identified in the first two groups, the report suggests a combination of R&D investment, skill upgrading, and regulatory changes, especially the setting of standards. For regional revitalisation around the specific industry clusters identified in the third group, it suggests investments in physical infrastructure, regional university-business networks, and

the branding of regions. The report also includes a list of 14 cross-cutting policies that are deemed critical to upgrading the overall business environment in Japan, ranging from skill promotion to property rights and the supply of raw materials. Fifty percent of the public research budget is allocated to programmes within the seven targeted industries; measures to support the content industry in the development of intellectual infrastructure are specified in the report, as is the expansion of infrastructure for digital electronic media; special zones for structural reforms will also be created (in which regulations will be waived or at least revised). According to tradition, tariffs will be used to shelter certain parts of the economy, although Japan is now more open to inward FDI. In general, the Japanese focus still seems to be more on picking and nurturing industries with the best perceived chance of succeeding. This is achieved to a lesser extent through market intervention than in the past, although the clusters identified continue to be supported by significant amounts of additional public funding.

Textiles: Struggling for positive strategies in a declining industry

Increased global competition due to the phasing out of the Multi Fibre Agreement led to the restructuring of world wide production locations to the disadvantage of European textile and clothing manufacturers. Employment has declined sharply in all member states over time, in both the rather capital intensive textile industry, as well as in the more labour intensive clothing industry. The increased outsourcing of the 'lower end' of the value chain to low wage countries caused a decline in value added, which could not be fully compensated by the specialisation of the industry in the quality and innovative segments of the market. However, this upgrading strategy did enable substantial improvements in labour productivity, which prolonged the production of higher value added shares by maintaining profitability and retaining headquarters in the old member countries. Future industrial and regional policies will be based upon two pillars. On the one hand, the social impact of downsizing and restructuring will be accommodated; on the other hand, innovative business models, innovation, high value services and fashion content will be fostered. Cluster style policies making use of both the up- and downstream integration of the value chain by building upon regional competitive advantages, as well as co-operation between large retail groups and textile and clothing manufacturers, will increase in importance. In this context, innovation policy often means the fostering of 'non-technological innovation,' making use of non-codified knowledge, which combines education and training to increase employability.

The Principles of a Renewed Industrial Policy

The goal of dynamic competitiveness

The objective of a renewed industrial policy is to foster the dynamic competitiveness of regions, industries, countries and of the European Community in general. Dynamic competitiveness is the ability of firms, regions and countries to increase economic growth, to make use of and to develop the given resources, and to comply with the long run objectives of the European Community with regard to

cohesion, and social and ecological responsibilities. Competitiveness built on low costs, wide income disparities between persons and regions, social risks and ecological depravation is a short term strategy. Efficient, profitable and competitive firms are the precondition for developing the social system and financing sustainability.

Looking forward, aware of limited knowledge

Renewed industrial policy is future-oriented and anticipates coming developments in resources and competitive advantages, as well as changes in demand and technology. We should be cautious in our acceptance of the knowledge of firms, experts and the government regarding future developments; we should refrain from relying on the supposedly superior knowledge of one group versus another. However, some trends and economic rules are highly likely to prove true - e.g. that rich countries cannot build their strengths on low input prices, that the composition of demand and of production changes with rising incomes, that the ability of countries and firms to develop and apply new technologies fosters competitiveness, that human capital is a precondition for implementing new technologies, and that defending old positions and past advantages increases the future costs of change. An industrial policy anticipating these future developments is different from an industrial policy which prevents structural change, which supports declining industries, and which defends the slow reactions of national champions to changes in the environment. It is different from a policy which calls for or allows crisis cartels. The more modest knowledge of the future is, the more limited is the probability that picking winning strategies will constitute a substantial part of a renewed industrial policy. This suggests that policy makers are not likely to rely on the dominance of a sectoral approach in their industrial policy.

Industrial policy supports the Lisbon Strategy

The concept of a Renewed Industrial Policy is in line with the Lisbon Strategy. It can be seen as one of the policies necessary to achieve the output goals of the Lisbon strategy, namely growth, social cohesion and ecological responsiveness. A future oriented industrial policy, as defined in this report, relies heavily on the inputs of research, innovation, education and life-long learning. The principles and progress of industrial policy should therefore be an essential part of the National Implementation of the Lisbon Strategy agreed upon at the Spring Council 2005 in Luxembourg and in the subsequent evaluation of the progress of the country strategy on the Community level in 2006. The principles of a future-oriented industrial policy and an evaluation of the progress should also find its way into the country evaluations of the European Community as well as of the OECD, into the Broad Economic Policy Guidelines, and the evaluation of fiscal policy demanded by the Stability and Growth Pact. Deviations of a country from the medium-term goal of "close to zero" deficits are economically different if they stem from a conservative extrapolation of expenses or from investment into future competitiveness. Complying with short term deficit limits has a different impact on the growth path, depending on if this goal is reached at the cost of reducing investments into the future, or from curbing expenditures ensuing from red tape and bureaucracy.

Reassessing the rationale

Every intervention in a market economy must be taken into very careful consideration. Interventions clearly correcting market failures are welfare enhancing per se. However, there is often a trade off between static and dynamic effects. Interventions rationalised by temporary necessities have to be observed as to their persistence and the long term viability of the sheltered sectors or firms. Those rationalised by strategic arguments have to face the probability of retaliation; those justified by the interventions of other countries or regions have to be tested for a potential national perspective. Even if an argument proves to be reasonable, the first option should always be to stop the outside intervention, rather than to add a second intervention. This is an important task of European Industrial Policy (working together with European and National Competition authorities), since national and regional agents tend to be taken hostage by regional interests and often have no other choice than to be biased. Interventions in general should try to rely on those instruments which will have the least distorting effect in the long run. Increasing competition, improving market access, fostering interconnectivity and the use of common resources have to be preferred to more direct forms of intervention like price and output regulations, command and control, and entry or trade barriers. Despite all of these caveats against intervention, market failures are specifically abundant in promising industries, as well as in the process of knowledge creation and in the application of new generic technologies. Therefore, governments would be ill-advised to practise a general hands off approach, which in all likelihood would also prove inconducive to general welfare. New growth theory, as well as evolutionary theory, emphasises contribution of innovation to growth and competitiveness; both describe the importance of incentives, spillovers, property rights and institutions. An industrial policy acknowledging market failures in technology and knowledge intensive industries strongly supports research and innovation, knowledge, and education and draws attention to innovation systems. Institutions which optimise the proceeds and costs of innovation are just as important to the correction of market failures as financial subsidisation. Policies to prevent or slow down innovation and to decelerate structural change have no place in a policy based on these theories. The growth and competitiveness of regions and industries depend on research, human capital, and the speed of diffusion of new technologies plus institutional conditions.

Activities to be encouraged

The main activities to be promoted in a renewed industrial policy are research, knowledge creation and the diffusion of technologies. Secondly, this policy demands the reshaping of institutions necessary for the promotion of dynamic competitiveness. Thirdly, it calls for the co-operation of other lines of policy fostering market access, encouraging the birth of firms and competition, preventing deadlocks and making product and labour markets more flexible. A new industrial policy should follow the systemic approach, which states that the entire system of innovation is important, that all lines of policy should work together, and that there is no single instrument with which dynamic competitiveness can be achieved. The superiority of the systemic approach has been demonstrated by the example of Finland’s transformation

from a resource-based to a knowledge-based society or by the success of policies practised by the Scandinavian countries in general, which were future-oriented in every respect. Promoting synergies between industrial policy and competition policy implies the co-operation of policy agents, interchanging expertise and increasing research on the relationship between competition and competitiveness. On a sectoral basis, industrial policy also has to comply with the rulings of the new regulatory authorities, as they monitor market access to network industries, in which national and regional market delineations and the public ownership of incumbents are still abundant. Liberalisation based on the ability to increase value added and prevent the substitution of old monopolies (national incumbents) with new oligopolies (which have low incentives to innovate) is supportive of the goals of renewed industrial policy.

Towards a matrix type approach

A new consensus is evolving that although industrial policy should primarily be supportive of favourable activities and thus promote competitiveness in all industries, the impact of each instrument will differ according to sector. Individual sectors each have their own specific inputs and competitive advantages have various sources. Furthermore, the impact of globalisation is not the same everywhere, and the new general purpose technologies are becoming more differentiated as they mature. The analysis of competitiveness on the industry level grows more important in a globalising world, as does the search for policies complementing the horizontal approach. A renewed industrial policy which makes use of the matrix approach is therefore a horizontal policy, aware of its varying sectoral impact and acknowledges that the competitive advantage in specific industries is defined by various determinants.

Support innovation by all instruments, but monitor efficiency

Fulfilling the Lisbon target of raising research expenditures to 3 percent of GDP implies increasing both public and private support. Public financing may take the form of tax grants (for firms investing in R&D), project by project evaluations of firm proposals (bottom up approach), or defining priority programmes to which firms, academic institutions, and regions can apply (top down approach). Support can be rather general or focused on a specific stage of innovation (pre-competitive, transfer phase, market phase). Money can come from the Commission or the central governments of the member states, regional governments etc. To fulfil the 3 percent goal, public R&D expenditures must be increased, even when a country is close to the 1 percent share of public R&D/ GDP. This is requested by the supplementary rule that two thirds of R&D should be financed by firms. Tax incentives should be implemented even when we know that part of the money saved would have been spent on the projects regardless of the incentive.

Achieving the Lisbon goal requires the implementation of all available resources and instruments, since each has its own advantages and disadvantages. It appears as if the various country strategies for policy instruments were now converging. Finland, which originally abstained from tax subsidisation, is now taking this method into consideration. France, which relied on top down "grand projects" is now tendering

regional projects, as well as core technological top down projects. Competitive procedures, transparency and openness, and constant ex post or even continuous evaluation are important to policies crucial to competitiveness. Individual expenditures for research are risky, but average rewards to society are high. At the moment, Europe is not using all the resources available for research. Within the Community, the Sapir Report recommended shifting expenditures from agriculture to research, but this has not yet taken place; regional communities are reluctantly shifting means to fulfil the goals of a renewed industrial policy; innovation and life-long education are not yet as important as they should be; private sponsors are less present in research than in the US. The research expenditures of firms depend on profits and costs, but they are also influenced by the ability to recover these costs through future revenues. This assigns important roles to the patent system and to property rights in general, utilising regional spillovers, and increasing co-operation between firms and universities and public labs.

Education, life-long learning, new skills

The quality of human capital determines future growth as it influences product quality and determines how quickly new technologies can be developed and applied. Restructuring education according to the demand of firms is an important instrument of competitiveness. Making use of, but also adapting an existing two-tier system of vocational education (apprenticeship) is important, as is the upgrading of qualifications, and increasing the share of the workforce with secondary and tertiary educations. Reassessing the optimal degree of specialisation is another important issue, as some studies indicate that less specialisation and a wider range of new capabilities (co-ordination, problem solving) are becoming more important. Life-long learning will be the single most important factor to the quality of competitiveness in Europe, if the trends towards the acceleration of technological progress, the catching up of Asian countries in medium technologies and the ageing of society in Europe continue. The eldest age groups of today's workforce will account for the largest share of employees tomorrow; careers within firms and mobility between firms will have to address this issue. Qualification-dependent and demand oriented immigration will be an issue of renewed industrial policy.

Core regions, strategies for the periphery

A central role of the renewed industrial policy will be to cluster policies and regional centres of competence. Both are "medium level policies" insofar as they do not focus on individual firms, nor are they strictly considered national level programmes. They can be initiated by the governments of larger regions or by national governments. It is important that the choice of clusters and regions is future-oriented, so that they complement and support the general strategy; the organisation and financing of the clusters or centres should be transparent, open, and non-distorting. The danger of investing money in a cluster of firms no longer competitive in a high wage country or in region not following a future-oriented strategy must be prevented. Cluster policy can increase synergies, make use of spillovers, create the critical mass in research and adapt education to the demand of firms. The European Community can

monitor the process, set minimum guidelines, or eventually accelerate the process through a community-wide programme supporting clusters, which follows specific rules in its search for excellence.

A question faced by a future-oriented industrial policy is how to address the problems of regions with high shares in declining or footloose industries. Shifting the focus to the highest quality segment, helping to retain headquarters and as much of the value chains as possible is one alternative. However, this is often not a viable strategy if the region is peripheral or less developed. Fostering forward or backward linkages with retailers or concentrating on the strengths of a region in tourism or agriculture could be more viable. Trying to attract regional or international inward investment is a third strategy; developing endogenous skills by upgrading qualifications will be necessary, even if the short run private incentives for better education are not high. Regional planning, connecting institutions and firms, fostering co-operation between regions and across national borders to create new centres of competence will prove superior to defensive strategies and the subsidisation of existing firms. Again, a renewed industrial policy looks different than the old approach of relying on financial means and slowing down structural change.

Impact and needs are different after all

The main strategies of a renewed industrial policy are horizontal. Fostering research, education, new technologies, competition, and market access are policies which effect all industries. The scepticism as to whether policies can single out specific industries as specifically important, precludes the recommendation of a sectoral approach, as does the knowledge that vested interests are specifically strong in traditional industries with established firms and employees, thus in practise leading to an industrial policy oriented on the past. However, the impact of horizontal policies is different in industries in which the competitive edge is defined by different competitive advantages. It therefore makes sense to study the competitiveness of specific industries and to investigate where market failures have taken place and whether there are any complementary policies which could improve competitiveness. These additional measures should be scrutinised carefully for their contributions to the objectives of a future-oriented policy (i.e. whether they help to increase dynamic competitiveness or simply provide short run relief to firms out of line with competitive or comparative advantages). A matrix type approach is a horizontal industrial policy which implements instruments applicable to all industries and acknowledges that the impact of favourable activities may depend on the inputs used and the respective competitive advantages, and may therefore require different complementary measures in individual industries.

Competition, openness and control are necessary in top down strategies

There is presently a renewed interest in core technology projects. This is specifically the case in France, where the general feeling is that technological progress has slowed down, since the stimulus of the grand projects has been reduced in order to increase the conformity of French industrial policies with EU policies in general and liberalisation specifically. Specifying national priorities in research strategies is

quite far from a project-based approach, but is in principle also a top down approach. Whether the past grand projects have been costly or rewarding in the long run, can not be determined by this report. The probability of success and of the benefits being higher than the costs does not seem very high. However, this must be assessed in relation to other forms of government expenditures, the importance of spillovers, and of changes in industry specialisation. What seems to be important is that the core projects and national priority programmes are more transparent, open to tenders and international co-operation, and success is being evaluated on both the national and international levels. European-wide technology programmes (like Galileo) are not subject to the danger of creating new borders within Europe. European research programmes should be stimulated, their administrative costs reduced, speed of implementation accelerated.

Policies depend on the position relative to the frontier

The strategies of countries at the technological frontier and of those trying to catch up should move in the same direction, but may use different instruments. The use of these instruments must be evaluated according to the distance from the frontier and with respect to the alternative methods available with which the gap can be closed. Countries and regions with lower income levels should try to direct policies towards the elements most crucial to their future competitiveness. Innovation will be important in catching up economies, but with a stronger emphasis on incremental innovation and adaptation. For the upgrading of human capital, secondary education and life-long learning may be crucial. The most important factors in catching up will be physical investment in machinery, new plants, and the renewal of infrastructure. While progress may be fastest via foreign direct investment, it is important that FDI plants be complemented by a net of local suppliers. At the same time, the existing group of endogenous small and medium sized firms should be upgraded and new start ups encouraged. Cluster policies are very important, but it may be difficult to find leading firms and the intermediate, semi-private institutions needed for success. Both higher education and research organisations must be established. Rules for state aid differ according region, which can foster catching up. Tax incentives for new firms promote structural change and cannot be seen as unfair competition. The long run viability of all subsidies and financial privileges should be kept in mind. Upgrading programmes and temporary employment should be provided for persons who have lost their jobs due to the exit of non viable firms, keeping in mind that the incentives to take up a new or temporary job must be large (low marginal tax for switching from a sheltered job to a new one; temporarily keeping part of the old income).

A unified strategy with different tasks

As to the optimal division of labour between the Commission, the national government and the regions, it is important that all decision makers share the same objectives and consensus about the main instrument of the renewed industrial policy. Secondly, most of the actual policy measures will have to be implemented and financed by the national authorities. The division between the national and the regional governments

may depend on the size of the country; e.g., choosing, implementing, and operating clusters will be different in a large country than in a small country. The role of the European Community is (i) to some extent the provision of money; (ii) to a larger extent setting rules for national programmes, particularly to prevent the reintroduction of barriers to trade and to mobility; (iii) to promote studies on the competitiveness of industries, nations and regions, (iv) to report the best practises for encouraging openness in national measures and funding for partner countries; (v) to foster cooperation between firms, the education sector, and to promote European standards for new technologies; and (vi) to prevent distortions from non-European firms, which might be disadvantageous to EU firms, and give rise to retaliation and economic wars on the global level. The development of a European Patent and a European Company Law are important priorities of a European Industrial Policy.

The fields in which the Community spends money directly are primarily research (framework programmes) and structural funds. Both should be used to boost growth and competitiveness, as well as to co-ordinate national policies, providing incentives for co-operation and exchange. Commission programmes could be used to complement national programmes and to prevent new splits. Large European technology programmes and research priorities need to be defined; universities and research facilities of excellence should be created and encouraged on the European level.

In comparison to today, this would mean the decentralisation of industrial programmes, and a stronger role of the Commission as a watchdog over fair competition, the extent that national policies foster competitiveness, and the degree that policies are future oriented. This role must be integrated into the Lisbon strategy and underlined by European programmes which give a greater importance to national programmes, under the condition that they are open to firms from other countries and regions. The existing role of the Commission to increase mobility and openness, to make education and research more international and to promote lifelong learning should be accentuated. It is the task of national governments to prove that they have done enough to promote growth and competitiveness, and that these programmes are future-oriented, non discriminatory and competitive.

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White House Office of Management and Budget (OMB) (2005B), Overview of the President's 2006 Budget, Washington, D.C., 2005.

White House Office of Management and Budget (OMB) (2005C), President Bush Proposes Strengthening America's Communities Initiative, Washington, D.C., 3 February 2005.

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Appendix

Appendix 1.1

Definitions of Industrial policy

Author	Definitions of Industrial Policy
Sharp, M., "What is Industrial Policy and Why is it Necessary?", Prepared for TSER project No PL97 1059 on Science, Technology and Broad Industrial Policy, May 1998	Broad concept "(industrial policy) can be defined as any policy affecting the allocation of resources to industry and in this sense embraces both macro-economic policy … as well as the more traditional areas of microeconomic policy."
Curzon Price, V., "Industrial Policies in the European Community", 1981	"Industrial policy may be generally defined as any government measure, or set of measures, to promote or prevent structural change."
Graham, H., "European Industrial Policy", Croom Helm, London, 1986	"Industrial policies referrer to those policies intended to affect in some ways manufacturing or service industries."
Johnson, Ch., "The Idea of Industrial Policy", in Johnson, Ch., "The Industrial Policy Debate", 1984	"Industrial policy means the initiation and co-ordination of governmental initiatives to leverage upward the productivity and competitiveness of the whole economy and of particular industries in it."
Adams and Klein, "Industrial Policies for Growth and Competitiveness", Lexington Books, 1983	Industrial policy includes "everything which is useful to improve growth and competitive performance"
Beath, J., "UK Industrial Policy: Old Tunes on New Instruments?", Oxford Review of Economic Policy, Vol. 18 No.2, 2002	Broad view: "any policy that shapes or influences the competitiveness of a country's firms and industries.
Jacquemin, A., Industrial Policies and the Community in Coffey, P., Nijhoff, M. (ed.), Main Economic Policy Areas of the EEC, 1983.	Industrial policy "has to specify and solve the problems of structural change in the economy. Its task is to create optimum conditions for the necessary structural transformations to be carried out."
Foreman-Peck, J., and Frederico, G., European Industrial Policy: The Twentieth-Century Experience, Oxford University Press, 1999	Industrial policy is "every form of state intervention that affects industry as a distinct part of the economy."
Geroski, P.A., "European Industrial Policy and Industrial Policy in Europe, Oxford Review of Economic Policy, Vol. 5, 1989	Industrial Policy is "wide-ranging, ill assorted collection of micro-based supply initiatives which are designed to improve market performance in a variety of occasionally mutually inconsistent ways."
Rodrik, D. (2004A), "Industrial Policy fort he Twenty-First Century", CEPR Discussion Paper No. 4767, 2004	Uses the term industrial policy for "restructuring policies in favour of more dynamic activities generally, regardless of whether those are located within industry or manufacturing per se."
Tyson, L., Zysman, J., "American Industry in International Competition: Government Policies and Corporate Strategies", 1983	"Industrial policy, … means government policy aimed at or motivated by problems within specific sectors."
Beath, J., "UK Industrial Policy: Old Tunes on New Instruments?", Oxford Review of Economic Policy, Vol. 18 No.2, 2002	Narrow view: "Restrict attention to policies that target particular firms and industrial sectors."
Krugman, P., Obstfeld, M., "International Economics Theory and Policy", 1991	"Industrial policy is an attempt by a government to encourage resources to move into particular sectors that the government views as important to future economic growth."
Chang, H.-J., "The Political Economy of Industrial Policy", St Martins's Press, 1994	Industrial policy is one "aimed at particular industries (and firms as their components) to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole."
Sharp, M., "What is Industrial Policy and Why is it Necessary?", Prepared for TSER project No PL97 1059 on Science, Technology and Broad Industrial Policy, May 1998	Narrow concept "Industrial policy is often restricted to policies about subsidies."

Appendix 1.2

The industry classification based on Peneder (2001)

1...Mainstream industries
- 173 Finishing of textiles
- 175 Other textiles
- 176 Knitted and crocheted fabrics
- 177 Knitted and crocheted articles
- 212 Articles of paper and paperboard
- 243 Paints, coatings, printing ink
- 251 Rubber products
- 252 Plastic products
- 261 Glass and glass products
- 266 Articles of concret, plaster and cement
- 268 Other non-metallic mineral products
- 272 Tubes
- 287 Other fabricated metal products
- 291 Machinery for production, use of mech. power
- 292 Other general purpose machinery
- 293 Agricultural and forestry machinery
- 295 Other special purpose machinery
- 296 Weapons and ammunition
- 297 Domestic appliances n. e. c.
- 311 Electric motors, generators and transformers
- 313 Isolated wire and cable
- 314 Accumulators, primary cells and primary batteries
- 315 Lighting equipment and electric lamps
- 354 Motorcycles and bicycles
- 355 Other transport equipment n. e. c.

2...Labour intensive industries
- 172 Textile weaving
- 174 Made-up textile articles
- 181 Leather clothes
- 182 Other wearing apparel and accessories
- 183 Dressing and dyeing of fur; articles of fur
- 201 Sawmilling, planing and impregnation of wood
- 202 Panels and boards of wood
- 203 Builders' carpentry and joinery
- 204 Wooden containers
- 205 Other products of wood; articles of cork, etc.
- 262 Ceramic goods
- 264 Bricks, tiles and construction products
- 267 Cutting, shaping, finishing of stone
- 275 Casting of metals
- 281 Structural metal products
- 283 Steam generators
- 284 Forging, pressing, stamping and roll forming of metal
- 285 Treatment and coating of metals
- 294 Machine-tools
- 316 Electrical equipment n. e. c.
- 342 Bodies for motor vehicles, trailers
- 351 Ships and boats
- 352 Railway locomotives and rolling stock
- 361 Furniture
- 362 Jewellery and related articles

3...Capital intensive industries
- 171 Textile fibres
- 211 Pulp, paper and paperboard
- 232 Refined petroleum and nuclear fuel
- 241 Basic chemicals
- 247 Man-made fibres
- 263 Ceramic tiles and flags
- 265 Cement, lime and plaster
- 271 Basic iron and steel, ferro-alloys (ECSC)
- 273 Other first processing of iron and steel
- 274 Basic precious and non-ferrous metals
- 343 Parts and accessories for motor vehicles

4...Marketing driven industries
- 151 Meat products
- 152 Fish and fish products
- 153 Fruits and vegetables
- 154 Vegetable and animal oils and fats
- 155 Dairy products; ice cream
- 156 Grain mill products and starches
- 157 Prepared animal feeds
- 158 Other food products
- 159 Beverages
- 160 Tobacco products
- 191 Tanning and dressing of leather
- 192 Luggage, handbags, saddlery and harness
- 193 Footwear
- 221 Publishing
- 222 Printing
- 223 Reproduction of recorded media
- 245 Detergents, cleaning and polishing, perfumes
- 282 Tanks, reservoirs, central heating radiators and boilers
- 286 Cutlery, tools and general hardware
- 335 Watches and clocks
- 363 Musical instruments
- 364 Sports goods
- 365 Games and toys
- 366 Miscellaneous manufacturing n. e. c.

5...Technology driven industries
- 242 Pesticides, other agro-chemical products
- 244 Pharmaceuticals
- 246 Other chemical products
- 300 Office machinery and computers
- 312 Electricity distribution and control apparatus
- 321 Electronic valves and tubes, other electronic comp.
- 322 TV, and radio transmitters, apparatus for line telephony
- 323 TV, radio and recording apparatus
- 331 Medical equipment
- 332 Instruments for measuring, checking, testing, navigating
- 333 Industrial process control equipment
- 334 Optical instruments and photographic equipment
- 341 Motor vehicles
- 353 Aircraft and spacecraft

Source: Peneder (2001).

Appendix 1.3

Agenda for the Industrial Policy Workshop on the 8th and 9th March 2005

Location: WIFO – Österreichisches Institut für Wirtschaftsforschung, Arsenal, Objekt 20, 1030 Vienna

Tuesday, 8th March

11:00	Karl Aiginger (WIFO): Welcome and Introduction
11:15	**INDUSTRIAL POLICY AND COMPETITION POLICY: THE UK PERSPECTIVE** Paul Geroski (UK Competition Commission and London Business School (LBS))
11:45	Discussion
12:15	Sandwich Lunch
13:15	**INDUSTRIAL POLICY IN NETHERLANDS** Theo Roelandt (Netherlands Ministry of Economic Affairs)
13:45	Discussion
14:15	**SUCCESS AND FAILURE OF LARGE INDUSTRIAL PROJECTS** Elie Cohen (CNRS)
14:45	Discussion
15:15	Break
15:30	**POLICY DISCUSSION: NEW IDEAS FOR INDUSTRIAL POLICIES** Gert Jan Koopman (European Commission) Karl Aiginger (WIFO) Herbert Didier (European Commission) Michael Losch (Austrian Ministry of Economics and Labour) Heinz Handler (WIFO)
17:00	End of day one
19:30	Evening programme

Wednesday, 9th March

09:00	**INDUSTRIAL POLICY FROM THE GERMAN POINT OF VIEW** Michael Stolpe (University of Kiel)
09:30	Disucssion
10:00	**NEW DEVELOPMENTS AT THE INTERFACE BETWEEN INNOVATION AND INDUSTRIAL POLICY** (short contribution) Gernot Hutschenreiter (OECD)
10:15	Discussion
10:30	Break
10:45	**INDUSTRIAL POLICY IN FINLAND** Christopher Palmberg (ETLA)
11:15	Discussion
12:15	End of Workshop

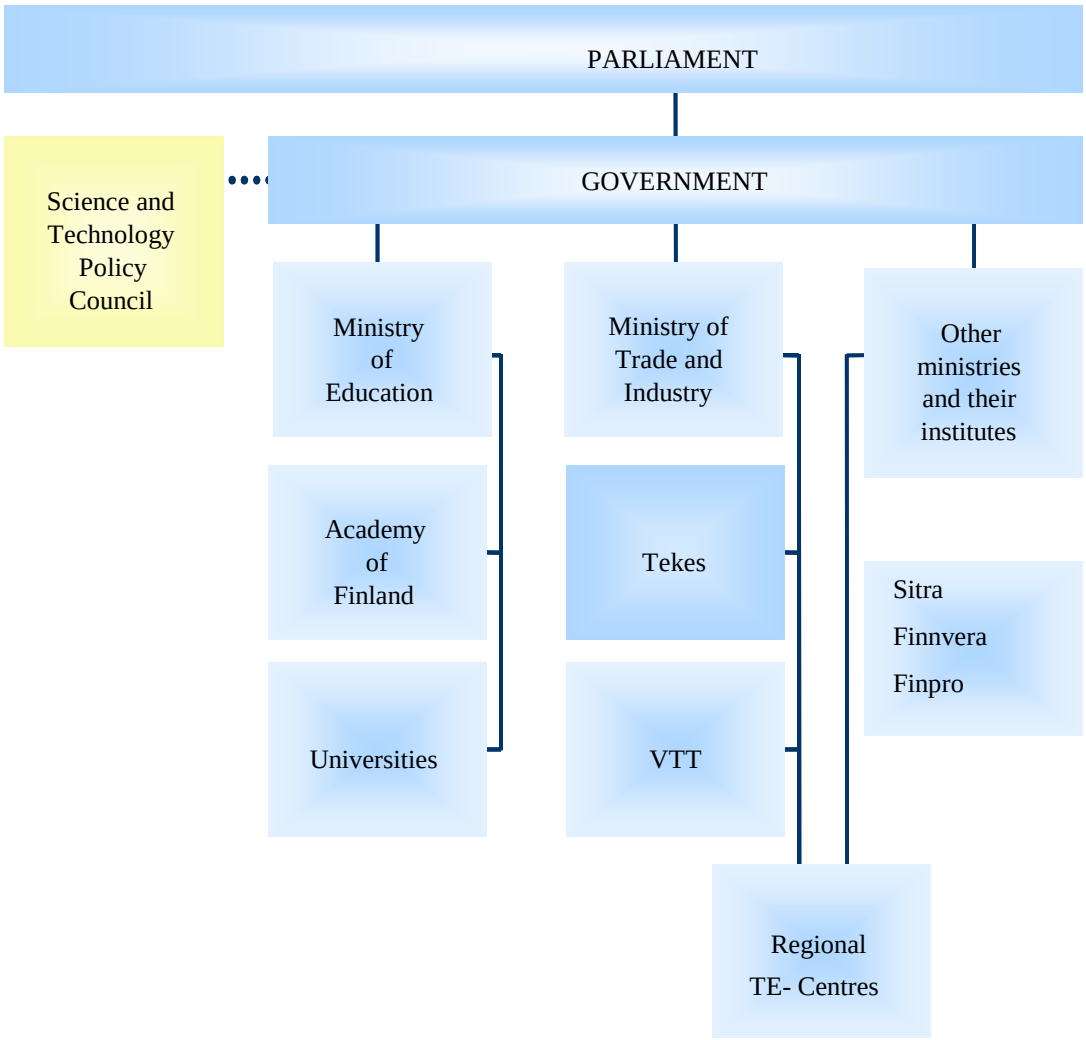
Appendix 1.4

Participants Industrial Policy Workshop on the 8th and 9th March 2005, WIFO

Karl	Aiginger	WIFO
Alain	Alcouffe	UT1/LIRHE
Daniele	Archibugi	CNR
Michael	Böheim	WIFO
Elie	Cohen	CNRS
Paul	Geroski	UK Competition Commission and LBS
Isabel	Grilo	Euroepan Commission
Heinz	Handler	WIFO
Didier	Herbert	Euroepan Commission
Heinz	Hollenstein	ETH-KOF
Werner	Hölzl	WIFO
Gernot	Hutschenreiter	OECD
Gert Jan	Koopman	European Commission
Hannes	Leo	WIFO
Michael	Losch	Austrian Ministry of Economics and Labour
Josefina	Monteagudo	European Commission
Christopher	Palmberg	ETLA
Michael	Peneder	WIFO
Theo	Roelandt	Netherlands Ministry of Economics Affairs
Susanne	Sieber	WIFO
Roman	Stöllinger	OeKB
Michael	Stolpe	University of Kiel
George	Strogylopoulos	Logotech
Gunther	Tichy	Austrian Academy of Sciences
Adam	Török	University of Veszprém & Budapest University of Technology and Economics
Gideon	Van der Staaij	Netherlands Ministry of Economic Affairs

Appendix 1.5

Key public organiszations in the formulation and implementation new industry policy formulation and implementation in Finland



Appendix 1.6

Airbus: various internal documents:

http://www.airbus.com/about/history

http://www.airbus.com/media/innovation

Deloitte Consulting LLP Report 2004

Other sources:

http://www.assemblee-nat.fr/12/budget/plf2005/a1865-13

pages.stern.nyu.edu/~lcabral/teaching/widebody.pdf

www.afii.fr/France/Newsroom/ Publications/publication_2004-05-27_fr

www.industrie.gouv.fr/observat/bilans/pdf/chap5_2002.pdf

www.industrie.gouv.fr/observat/ bilans/bord/cpci2003/CPCI2003_08_chapitre4.pdf

http://www.ens-lsh.fr/geoconfluence/doc/transv/Mobil/MobilDoc.htm

http://www.eads.net

Appendix 1.7

Definition of the T/C industry

In this paper, the T/C industry is meant to comprise the following activities (cf. Stengg 2001):

- the treatment of raw materials, i.e. the preparation or production of various textile fibres, and/or the manufacture of yarns (e.g. through spinning).

  "Natural" fibres include cotton, wool, silk, flax, jute, etc.

  "Man-made" fibres include cellulose fibres (e.g. viscose), synthetic fibres (i.e. organic fibres
  based on petrochemicals, such as polyester, nylon/polyamide, acrylic, polypropylene, etc.), and
  fibres made of inorganic materials (e.g. glass, metal, carbon or ceramic).

- the production of knitted and woven fabrics (i.e. knitting and weaving);

- finishing activities – aimed at giving fabrics the visual, physical and aesthetic properties which consumers demand – such as bleaching, printing, dyeing, impregnating, coating, plasticising, etc.;

- the transformation of those fabrics into products such as:

  garments, knitted or woven (= the so-called "clothing" industry);

  carpets and other textile floor coverings;

  home textiles (such as bed linen, table linen, toilet linen, kitchen linen, curtains, etc.);

  technical, or "industrial", textiles.

The corresponding chapters in the NACE database are NACE Rev 1 17 for "textiles" and NACE Rev 1 18 for "clothing". Since this limitation in statistical data and analysis which is due to data restrictions shows only the "manufacturing view" of the T/C sector, important upstream (e.g. design) and downstream activities (e.g. retailing) along the value chain are covered by referring to secondary data sources and specialised literature.

Appendix 1.8

Important T/C regions within the EU

Regions were selected because of their significant size or because of their possible representativeness for the EU industry at large. Five of the 11 selected regions rank amongst the top ten regions of the industry in the EU in terms of employment. All regions fit in the top quarter of regions in the EU. Eight regions rank first in their respective country. Only one region selected scores at less than 25 percent in the national T/C industry employment. The share of the industry in the regional manufacturing employment varies from dominant (Northern Portugal) to substantial (six regions) while in four regions the industry represents less than 5 percent of employment (cf. IFM, 2004).

Appendix 1.9

Core data on important T/C regions within the EU

EU ranking	Region	Regional employment 1999				
		Manufacg	Textile	Apparel	T/C	%of manufg
	Portugal Norte	515 947	85 887	116 320	202 207	39,2%
2	Lombardia	1 256 206	117 286	58 590	175 876	14,0%
3	Catalonia	658 799	58 096	41 109	99 205	15,1%
7	NW & Yorkshire	na	na	na	55 000	Ca. 10%
8	NR-Westfalen	1 423 764	37 418	16 223	53 641	3,8%
11	Flanders district	261 172	38 165	7 842	46 007	17,6%
17	Severocesky	na	na	na	33 000	Ca. 10%.
21	Ouest P.d.Loire	522 428	7 670	18 556	26 226	5,0%
27	Macedonia (GR)	na	na	na	21 000	Ca. 5%.
28	East Hungary	na	na	na	20 000	Ca. 10%.
42	Randstad W.NL	315 342	4 040	4 252	8 292	2,6%

National ranking	Region	National employment 1999		
		T/C	%of region	Position
1	Portugal Norte	260 300	77,7%	Dominant
1	Lombardia	644 600	27,3%	Dominant
1	Catalonia	249 200	39,8%	Dominant
1	NW & Yorkshire	200 000	27,5%	Representative
1	NR-Westfalen	192 600	27,9%	Representative
1	Flanders district	58 300	78,9%	Dominant
1	Severocesky	60 000	55,0%	Dominant
5	Ouest P.d.Loire	228 000	11,5%	Specific
1	Macedonia (GR)	45 000	46,7%	Dominant
1	East Hungary	55 000	36,4%	Representative
3	Randstad W.NL	31 100	26,7%	Specific

Source: IFM (2004)

Appendix 1.10

Investment and productivity in selected T/C regions within the EU

Textile Regions	Inv.Level 1999	Trend 96/99	Productivity 1999	Trend 96/99
Flanders	High	Growing	High	Growing
Lombardy	Medium	Declining	High	Growing
NR-W	Medium	Growing	High	Stable
Portugal Norte	Medium	Stable	Medium	Growing
Catalonia	Low	Stable	Medium	Growing
NW&Yorkshire	Low	Declining	Medium	Stable
Severocesky	Low	Declining	Low	Growing
Clothing Regions				
Pays de la Loire	High	Growing	High	Growing
Portugal Norte	Medium	Growing	Medium	Growing
Macedonia	Medium	Growing	Medium	Growing
Randstad W.NL	Low	Stable	High	Stable
NW-Yorkshire	Low	Declining	Medium	Stable
East.Hungary	Low	Stable	Low	Stable

Source: IFM (2004).