eWork in Southern Europe

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EMERGENCE

Report 395

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Contents

Executive Summary

This report forms part of the EMERGENCE project, funded by the European Commission's Information Society Technologies (IST) programme to measure and map employment relocation in a global economy in the new communications environment. Complementing other EMERGENCE reports which give an overview of eWork at European and global levels[1], it focuses on eWork in Southern Europe, drawing together the results of the EMERGENCE European employer survey and case studies with a review of the evidence from other sources.

In the analysis of the survey results, two lines of inquiry were followed, based on a new series of analyses of the data.

The first aimed at integrating the national and sector dimensions. By gauging the diffusion and intensity rates of eWork in the various sectors, an attempt was made to assess the performances of the various country groups.

The second phase of the analysis examined eWork practice in the four Southern European countries (Italy, Spain, Portugal and Greece). Through a procedure of comparative analysis of the main interpretative variables of eWork, an attempt was made to outline each country's profile and to identify similarities and differences in operative behaviour within the Mediterranean economic zone. Starting out from data on the diffusion of eWork, an initial interpretation of the sectors and functions involved was conducted, followed by an analysis of the types of organisation in which eWork is found and the underlying reasons for its adoption. In other words, by collecting data on the eService practice in companies, an attempt was made to interpret its strategic use and the development opportunities for this new type of work.

eWork practice in Southern Europe can be summarised in seven points:

1. The Southern European context, with the exception of Portugal, demonstrates a diffusion of eWork which is higher than the European average.

[1] A full list of EMERGENCE publications can be found on www.emergence.nu.

2. This result, without any particular differences between the countries, seems to be balanced both for sector and company size.
3. The functions in which eWork is most prevalent are software and creative activities.
4. The form of eWork most commonly found in Southern Europe is outsourced eServices.
5. An important explanation of the relatively high diffusion of eWork in the southern Mediterranean countries seems to be the high propensity to outsource (eOutsourcing as a result of outsourcing and eWork as a result of eOutsourcing)
6. The main objective of eOutsourcing is to exploit technical specialisation in order to get a higher quality in the delivery of the business function in question.
7. It is evident that when operating mostly in an adjacent geographical area, contractor companies do not resort to eOutsourcing due to a radically different cost structure.
8. When seeking suppliers for outsourced eServices, only a small minority of companies turn to foreign partners and/or to individuals who are not organised in a company.

As regards the hypothesis on which the next phase of analysis will be based, the explanation of this similar behaviour in the four countries with significantly diverse factorial advantages could be the strategic opportunity that eWork offers in network production organisation. In other words, we could start out from the following thesis: remote connection is a strategic lever for highly fragmented economic systems because it brings about better rationalisation, integration and specialisation of the network units. This is especially the case for countries outside the old industrial European core, characterised by the partial and/or delayed assimilation of the Fordist organisational model (namely, countries in the Mediterranean), that seem capable of taking advantage of this opportunity.

Generally, 'latecomers' such as Italy and the other Mediterranean countries have tended to specialise in low capital-intensive and easily detachable activities, and so their firms are more prone to outsource.[1] Because technological and financial barriers to the use of '*e*Technologies' are no longer relevant for a typical firm in a developed country, the average Mediterranean firm can exploit these technologies in order to gain advantages in widespread outsourcing practices.

[1] See: Traù F (ed.), *La questione dimensionale nell'industria italiana,* Il Mulino, Bologna, 1999

The report also includes brief background reports on each of the countries concerned, providing contextual information on the development of ICTs in the national economy.

We can conclude that the southern European countries do not have a lead in ICT (although they are recovering rapidly from previous backwardness) so the high diffusion of eWork in these countries cannot be explained by technological advantage. The most likely explanation could well be the high outsourcing propensity of southern Mediterranean firms.

1. eWork Diffusion in EU Countries: a Sectoral Approach

1.1 Methodological remarks

The objective of this chapter is to give an overall analysis of both national and sector dimensions. The individual countries are compared through the 'precise' analysis of an indicator on the diffusion of eWork (in this case the presence or not of eWork) at the sector level, and by looking at their positions in the various sectors.

Moving in this direction we reconstructed ex-post four large sectors of economic activity based on the NACE classification of production units, similar to what was done for the ex-ante classification used for the construction of the sample. We have made some changes to this initial classification in relation to services. The details are given in Table 1.1

The number of cases at the single cell level of analysis, important for the statistical significance of the results, is illustrated in Table 1.2.

The analysis presented mostly concerns the percentage of companies that use and/or conduct eWork. We have also introduced a new variable: the intensity rate of eWork, calculated as the number of functions conducted in the eWork mode (for the companies that make use of it) at the production unit level (min = 1, max.= 6). As an alternative, we also calculated a 'normalised' intensity based on the ratio between the number of eWorked

Table 1.1: Branch of economic activity contents

Branch of economic activity	Table label	NACE2 Correspondence
Merchandises producer sectors	Primary/manufacturing/utilities/construction	1 to 45
Market services producer sectors (except business and financial)	Trade/transport/communication	50 to 64
Business and financial market services	Business and financial services	65 to 74
Public Administration and related social services	Public admin/education/health/others	75 to 93

Source: IRES

Table 1.2: Sample's production units by country and branch of economic activity

	Primary/manuf./ util./construction	Trade/transport/ communication	Business & financial services	Public admin/ education/ health/others	Total
Austria	103	74	65	28	270
Belgium	67	19	56	107	249
Czech Republic	100	44	35	7	186
Denmark	75	30	68	108	281
Finland	132	75	44	43	294
France	209	72	167	352	800
Germany	224	181	167	228	800
Greece	84	37	8	19	148
Hungary	100	72	71	55	298
Ireland	84	79	67	71	301
Italy	235	166	168	232	801
Luxembourg	30	24	16	17	87
Netherlands	103	28	89	159	379
Poland	111	21	34	57	223
Portugal	88	57	57	89	291
Spain	185	171	152	145	653
Sweden	121	88	70	77	356
UK	218	174	151	258	801
Total	*2,269*	*1,412*	*1,485*	*2,052*	*7,218*

Source: EMERGENCE database

functions and the number of total functions conducted by the company.

At this stage in the research, in the light of considerations made elsewhere[1], the processing has been conducted on unweighted data. All averages quoted, whether at a European or national level, are therefore based on the unweighted numbers of units in the sample.

The underlying theoretical hypothesis is that structural factors regarding production organisation influence the diffusion of eWork and that the effect of such factors can be observed best at the sectoral level.

Some observations obtained from such a line of inquiry deserve, in our opinion, further attention and more refined statistical studies.

[1] The analysis of sectors has highlighted some critical elements in the weighting procedure.

1.2 General features

It clearly emerges from Table 1.3 that within each country the percentage of companies that conduct eWork varies, often significantly, according to sector. In such cases, there are margins of up to 15 to 20 percentage points between the smallest and largest diffusion of eWork. These are mostly small and medium-to-small countries. In the larger countries (France, Germany, Italy, Spain and the UK) the margins remain below 15 per cent.

In the comparison of countries, the variability of the percentage of eWork (coefficient of variation = deviation/mean) is greatest for the public administration and social services sectors (public administration/education/health/other), followed by the primary, manufacturing and construction sectors (primary/manufacturing/ utilities/construction). The least differentiation is apparent in the business and financial services sector, which is also the sector with the greatest diffusion of eWork.

Table 1.3: eWork diffusion by branch of economic activity. EU and 'New entries', % values

	Primary/manuf./ util./construction	Trade/transport/ communication	Business & financial services	Public admin/ education/ health/others	Total
Austria	41.7	60.8	58.5	64.3	53.3
Belgium	44.8	57.9	57.1	50.5	51.0
Czech Republic	77.0	63.6	74.3	85.7	73.7
Denmark	68.0	46.7	61.8	44.4	55.2
Finland	76.5	80.0	81.8	69.8	77.2
France	30.6	34.7	43.1	22.2	29.9
Germany	29.5	33.1	41.3	29.4	32.8
Greece	60.7	75.7	50.0	73.7	65.5
Hungary	51.0	77.8	71.8	69.1	65.8
Ireland	25.0	31.6	44.8	40.8	34.9
Italy	59.6	57.2	60.1	64.2	60.5
Luxembourg	26.7	37.5	31.3	11.8	27.6
Netherlands	59.2	50.0	59.6	52.8	55.9
Poland	58.6	81.0	79.4	66.7	65.9
Portugal	33.0	40.4	40.4	31.5	35.4
Spain	52.4	60.8	53.3	58.6	56.2
Sweden	57.9	65.9	61.4	49.4	58.7
UK	39.4	44.8	44.4	39.5	41.6
Total	*49.0*	*53.1*	*53.9*	*44.2*	*49.4*
Variation Coefficient (σ/μ)	0.32	0.29	0.25	0.37	0.28

Source: EMERGENCE database

Table 1.4: eWork diffusion by branch. EU and 'New entries', rank correlation coefficient (Spearman: Coeff.). 1=same order; -1=inverted order)

	Primary/manuf./ util./construction	Trade/transport/ communication	Business & financial services	Public admin/ education/ health/others
Primary/manuf./util./construction	1.00	0.71	0.80	0.78
Trade/transport/communication		1.00	0.79	0.86
Business and financial services			1.00	0.78
Public admin/edu./health/others				1.00

Source: EMERGENCE database

In general, the lesser the average diffusion of eWork in the sector/division, the greater is the gap between countries at the single sector level. The correlation in the ranking (Table 1.4) and levels of the countries' score in the various sectors appears significant but not so high, confirming a certain differentiation in position for the single sectors.

1.3 Homogeneous country groupings

The levels of diffusion of eWork by sector, led us to regroup the countries examined according to, by and large, homogeneous groups.

Geographical proximity does not always represent the unifying factor. In some cases (Austria, Belgium, Ireland, Portugal, Holland, UK, Finland, Czechoslovakia), marked similarities are not always with their 'geographical' neighbours. The groups are ordered according to average diffusion of eWork: from the country group ('Continental Model') with the least diffusion, to the one with the most (North-Western Model).

The southern European countries are clearly divided on two fronts: on the one hand, Italy, Spain and Greece present a high level of eWork, whereas Portugal presents values that can be likened to the 'Continental Model', with low diffusion of eWork. The three Mediterranean countries present a diffusion of eWork which is higher than the other members of the EU, with the exception of Finland.

The following tables and figures illustrate these groups. Table 1.5 a rundown of the composition and main characteristics of the groups pinpointed. Table 1.6 shows the percentage deviations from the European average of the indicator used.

Table 1.5: Features of countries' groups

Group	Countries	Features
Continental model	France, Germany, Ireland Luxembourg, Portugal	Diffusion of e-work in all sectors well below the European average
		Relative disadvantage in Primary/manufacturing
Continental-Nordic model	Austria, Belgium, UK	E-work diffusion about the European average
		Relative disadvantage in Primary/manufacturing
Nordic model	Denmark, Netherlands, Sweden	Diffusion of e-work above the European average
		Relative advantage in manufacturing
		Relative disadvantage in trade/transport (with the exception of Sweden)
Mediterranean model	Greece, Italy, Spain	Diffusion of e-work in all divisions above the European average with exceptions in Business & Financial Services
		Relative advantage in PA/others·
		Relative disadvantage in Business and financial services
		Fairly balanced e-work diffusion between sectors (esp. Italy and Spain)
Eastern model	Hungary, Poland	Very high e-work diffusion particularly in Services
		Fairly balanced e-work diffusion between service sectors
Eastern-Nordic model	Czech Republic, Finland	Very high percentages of diffusion of e-work in all sectors

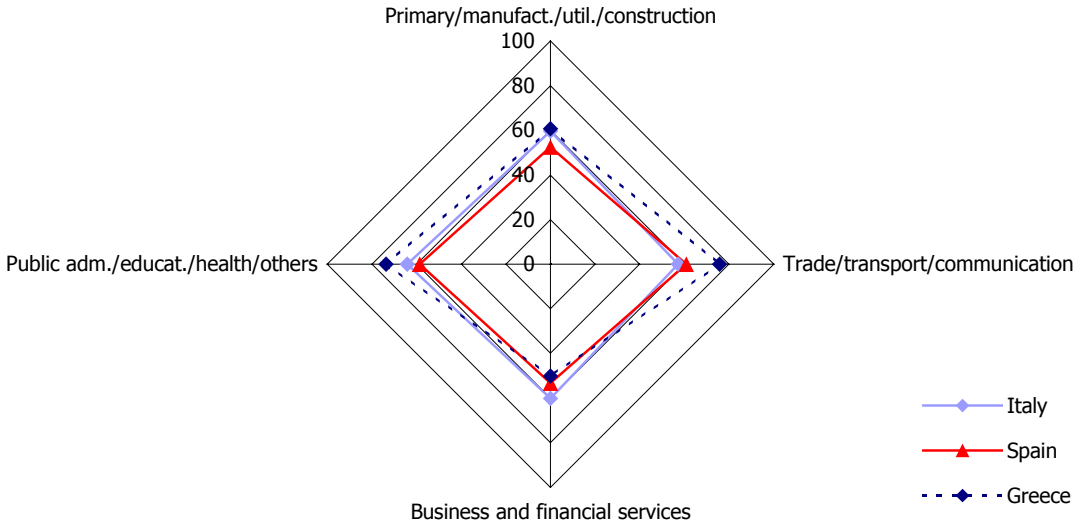
Source: EMERGENCE database

Table 1.6: eWork diffusion. Relative percentage differences from European industry average by country. EU and 'New entries, percentage values

	Primary/ manuf./util./ construction	Trade/transport/ communication	Business & financial services	Public admin/ education/ health/others	Total
Continental					
France	–37.5	–34.6	–20.0	–49.9	–39.6
Germany	–39.8	–37.6	–23.3	–33.6	–33.8
Ireland	–48.9	–40.4	–16.9	–7.7	–29.5
Luxembourg	–45.5	–29.4	–42.0	–73.4	–44.2
Portugal	–32.7	–24.0	–25.1	–28.9	–28.4
Continental-Nordic					
Austria	–14.7	14.5	8.5	45.3	7.9
Belgium	–8.6	9.0	6.1	14.1	3.2
UK	–19.4	–15.6	–17.6	–10.7	–15.9
Nordic					
Denmark	38.9	–12.1	14.7	0.4	11.6
Netherlands	21.0	–5.9	10.5	19.4	13.1
Sweden	18.1	24.1	14.0	11.5	18.7
Mediterranean					
Greece	24.0	42.5	-7.2	66.5	32.6
Italy	21.7	7.7	11.6	45.1	22.5
Spain	7.1	14.5	-1.1	32.5	13.7
Eastern					
Hungary	4.2	46.4	33.3	56.1	33.0
Poland	19.6	52.4	47.4	50.7	33.3
Nordic-Eastern					
Czech Republic	57.3	19.8	37.9	93.7	49.0
Finland	56.3	50.6	51.9	57.7	56.2
Total	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

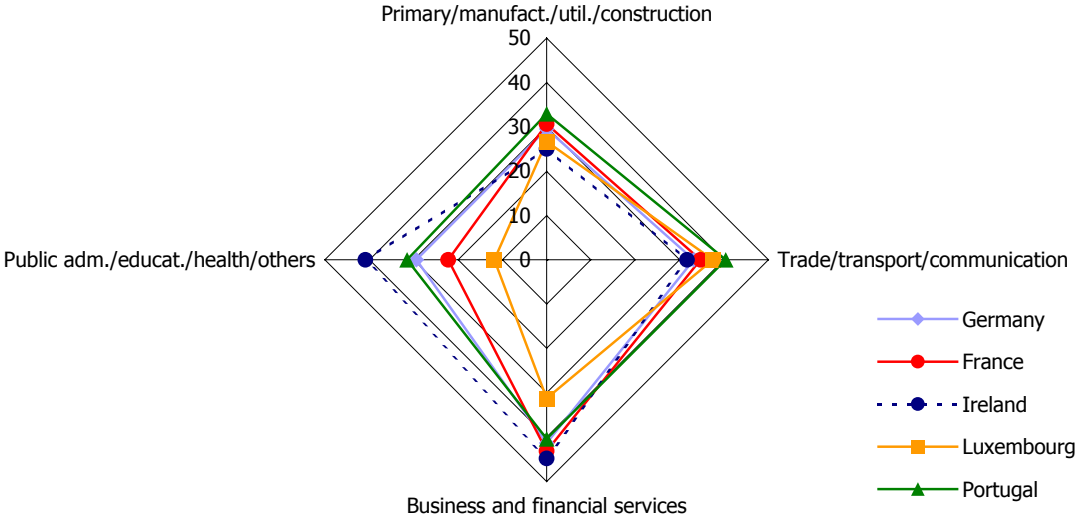
Source: EMERGENCE database

Figure 1.1: eWork diffusion by branch of economic activity. 'Mediterranean Model'. Percentage values



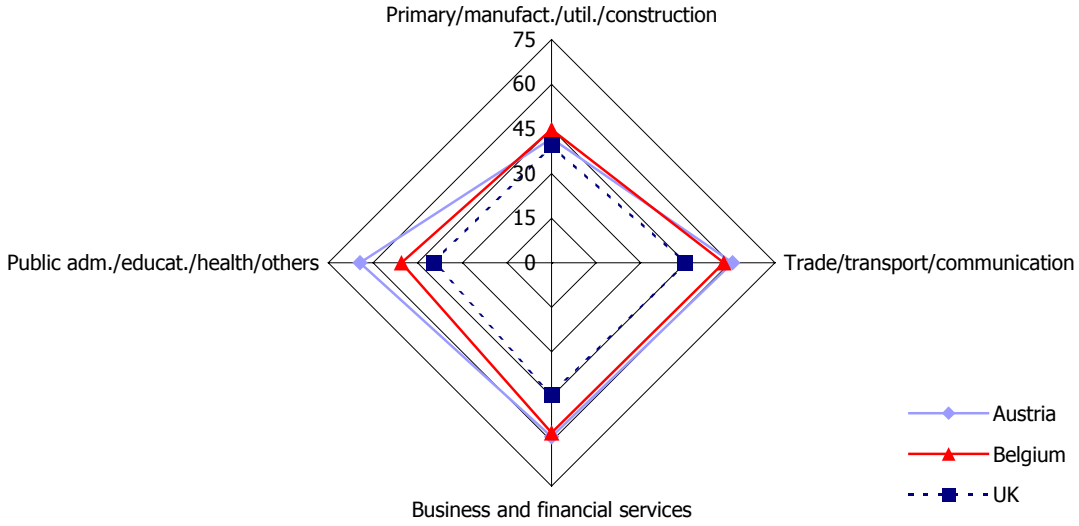
Source: EMERGENCE database

Figure 1.2: eWork diffusion by branch of economic activity. 'Continental Model'. Percentage values



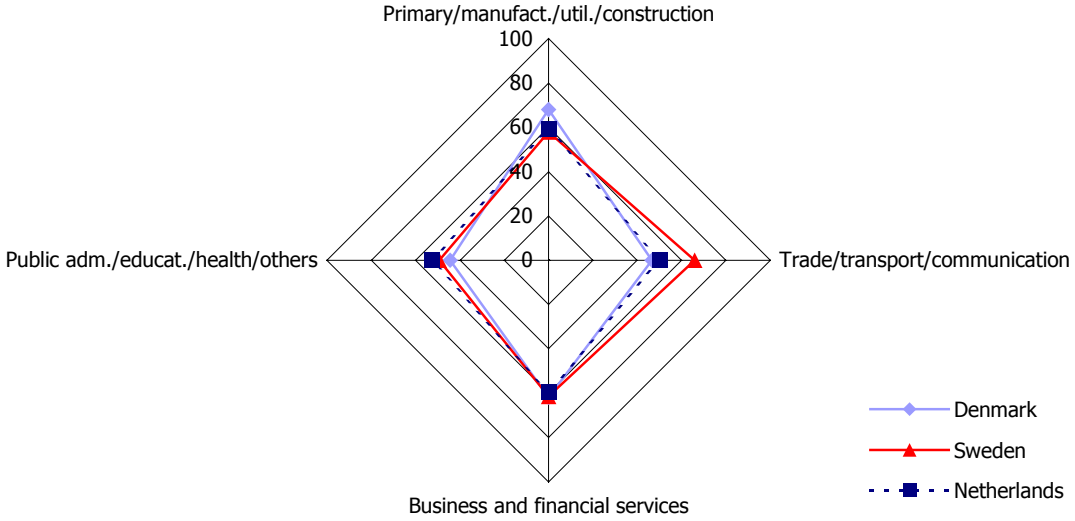
Source: EMERGENCE database

Figure 1.3: eWork diffusion by branch of economic activity. 'Nordic-Continental Model'. Percentage values



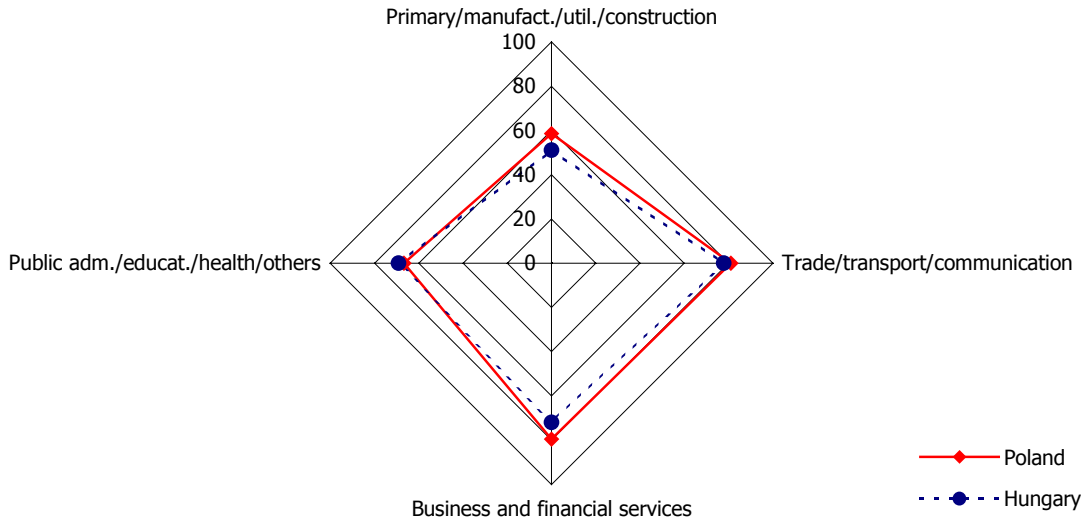
Source: EMERGENCE database

Figure 1.4: eWork diffusion by branch of economic activity. 'Nordic Model. Percentage values



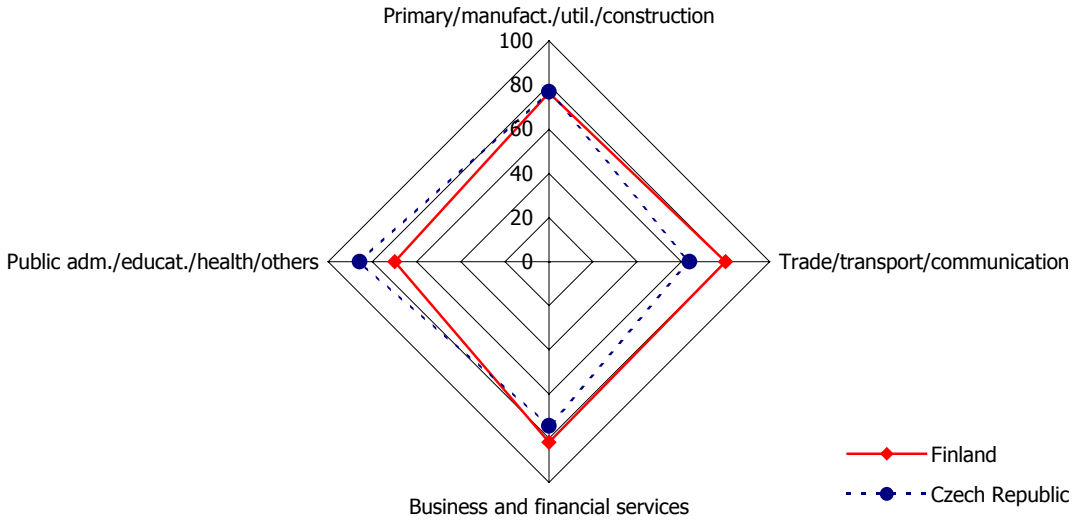
Source: EMERGENCE database

Figure 1.5: eWork diffusion by branch of economic activity. 'Eastern Model'. Percentage values



Source: EMERGENCE database

Figure 1.6: eWork diffusion by branch of economic activity. 'Nordic-Eastern Model'. Percentage values



Source: EMERGENCE database

Table 1.7: Difference in eWork diffusion percentage share (of production units) by size. 'More than 200 employees' class minus '50-200' one, EU and 'New entries'

	Primary/ manuf./util./ construction	Trade/transport/ communication	Business and financial services	Public admin/ education/health/ others	Total
Austria	–8.3	–10.2	–19.3	14.3	–9.6
Belgium	9.5	4.4	13.3	19.6	14.9
Czech Republic	–9.7	17.9	—	—	2.7
Denmark	9.6	33.3	29.6	1.5	16.6
Finland	17.6	8.1	2.8	3.2	10.8
France	7.4	–3.3	–8.4	1.4	–2.7
Germany	3.4	7.1	–3.4	–7.8	–1.0
Greece	9.3	18.5	—	–40.9	6.6
Hungary	20.0	24.7	13.8	7.6	13.6
Ireland	8.3	10.6	–9.0	1.7	4.7
Italy	1.2	10.3	–1.2	9.3	5.2
Luxembourg	34.4	37.5	–12.5	–25.0	11.8
Netherlands	–5.3	0.0	9.0	1.9	1.6
Poland	6.3	–7.1	–17.6	14.1	5.0
Portugal	2.3	-0.9	22.1	3.8	4.7
Spain	–3.5	–2.0	4.9	2.4	0.6
Sweden	10.9	12.4	–3.8	1.1	6.2
UK	1.5	6.4	11.5	13.1	8.1
Total	*4.4*	*6.4*	*1.1*	*–0.8*	*2.1*

Note: Cells with less than six cases are indoicated by —

Source: EMERGENCE database

1.4 The size factor

Table 1.7 illustrates the differences between percentage levels of eWork diffusion by company size. A minus sign indicates that the diffusion of eWork is greater in companies with 50 to 200 workers, compared with companies with over 200 workers. In the primary/manufacturing trade/transport sectors there is a tendency for an incidence of eWork in larger companies. In the other two service sectors, no such tendency is present and establishment size does not seem to play a significant role. On the whole, a pattern can be outlined whereby the larger the size of company, the greater the diffusion of eWork. Such a result can be considered coherent with the hypothesis that there is a residual 'threshold effect', limiting the possibility of eWork for smaller companies.

In the primary/manufacturing sector, the size factor does not produce any notable effect in three of the four countries in Southern Europe (Italy, Spain and Portugal). The exceptions are the Italian and Greek trade/transport sectors.

Table 1.8: Production unit's average number of functions. EU and 'New entries'

	Primary/ manuf./util./ construction	Trade/transport/ communication	Business & financial services	Public admin/ education/ health/others	Total
Austria	5.1	5.5	5.5	5.1	5.3
Belgium	4.4	4.5	4.6	4.3	4.4
Czech Republic	5.7	6.0	5.7	5.4	5.8
Denmark	4.9	4.6	5.0	4.5	4.7
Finland	5.2	5.0	5.2	5.1	5.1
France	4.0	3.8	4.2	3.4	3.8
Germany	4.7	4.8	4.9	4.4	4.7
Greece	5.5	5.5	5.4	5.1	5.4
Hungary	4.3	4.8	4.7	4.5	4.6
Ireland	4.5	4.5	5.1	4.6	4.7
Italy	4.9	4.8	4.8	5.0	4.9
Luxembourg	4.0	3.7	4.1	3.2	3.8
Netherlands	5.1	4.5	5.3	4.7	4.9
Poland	5.2	5.1	5.3	5.6	5.3
Portugal	4.4	4.1	4.2	4.1	4.2
Spain	5.3	5.0	5.1	5.0	5.1
Sweden	4.7	4.6	4.8	4.8	4.7
UK	4.9	4.9	4.9	4.9	4.9
Total	*4.8*	*4.8*	*4.9*	*4.5*	*4.7*

Source: EMERGENCE database

On the whole, the size factor is significant only for a limited number of countries. In at least one case (Austria), size seems to be inversely associated with the diffusion of eWork. In two large countries (France and Germany) size does not generally have any notable influence.

1.5 Variation by business function

We have also explored the possibility that the number of business functions performed by a company may have an influence on eWork diffusion (Table 1.8). The hypothesis can be formulated in

Table 1.9: eWork diffusion and average number of functions. Linear correlation (r) by branch

Primary/manuf./util./construction	0.75
Trade/transport/communication	0.66
Business and financial services	0.60
Public admin/education/health/others	0.89
Total	*0.79*

Source: EMERGENCE database

the following way: the greater the number of functions, the greater the use which is made of eWork. As can be seen from Table 1.9, above, such an hypothesis cannot be dismissed even if the correlation is not very high.

1.6 eWork intensity

An analysis of the 'intensity' of eWork is useful to assess the 'simple' indicator of diffusion: if greater diffusion is also associated with greater intensity, then in our view the argument that the tendency does indeed exist is strengthened. Our results actually indicate the existence of such a link.

Table 1.10 shows the values of the eWork intensity indicator. The relative dispersion between countries is considerably less than for the eWork indicator. However, the range is rather restricted, between 1 (only one function involved) and 2.2. For larger countries, the range is further reduced (1.2-1.7).

Figure 1.7 places the values of the eWork intensity indicator and those of eWork diffusion for all economic sectors on the same figure. The correlation is quite distinct: the greater the diffusion of eWork, the greater its intensity (for those companies that use it).

The correlation between the two indicators is minor (Table 1.13 — 'Absolute' data column) especially in the market services sector. To some extent, this supports the argument that the influence of 'national' factors is stronger in sectors that have less diffusion of eWork than the European average.

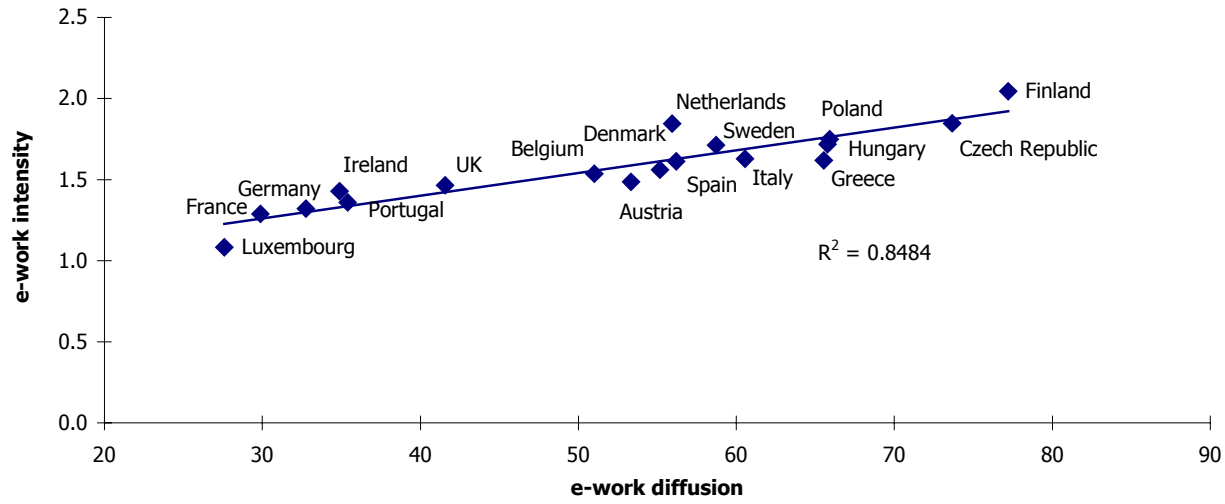
In the light of the detected correlation between the number of functions and eWork diffusion, we repeated the process, 'normalising' the number of eWorked functions with the total number of functions in a company (Table 1.11). As can be seen in Table 1.12 ('Normalised' data column) the levels of correlation remain the same.

Table 1.10: eWork 'intensity' by branch of economic activity, eWorked functions average. Production units with eWork only. EU and 'New entries'. Percentage values

	Primary/ manuf./util./ construction	Trade/transport/ communication	Business & financial services	Public admin/ education/ health/others	Total
Austria	1.3	1.4	1.8	1.5	1.5
Belgium	1.6	1.5	1.8	1.3	1.5
Czech Republic	1.8	1.9	2.0	1.8	1.8
Denmark	1.6	1.6	1.8	1.3	1.6
Finland	2.0	2.2	1.8	2.0	2.0
France	1.3	1.3	1.3	1.2	1.3
Germany	1.3	1.4	1.4	1.3	1.3
Greece	1.7	1.5	2.0	1.6	1.6
Hungary	1.7	1.7	1.9	1.6	1.7
Ireland	1.4	1.3	1.6	1.4	1.4
Italy	1.6	1.5	1.7	1.7	1.6
Luxembourg	1.1	1.1	1.0	1.0	1.1
Netherlands	1.9	2.1	2.0	1.7	1.8
Poland	1.7	2.1	1.7	1.7	1.7
Portugal	1.4	1.4	1.3	1.3	1.4
Spain	1.6	1.6	1.6	1.6	1.6
Sweden	1.8	1.7	1.7	1.7	1.7
UK	1.5	1.4	1.5	1.5	1.5
Total	*1.6*	*1.6*	*1.6*	*1.5*	*1.6*
Variation Coefficient (σ/μ)	0.15	0.18	0.16	0.16	0.14

Source: EMERGENCE database

Figure 1.7: eWork 'Intensity' and 'diffusion'. All sectors



Source: EMERGENCE database

Table 1.11: eWork 'normalised intensity' by branch of economic activity, eWorked functions/total functions ratio. Production units with eWork only. EU and 'New entries', percentage values

	Primary/ manuf./utils construction	Trade/transport/ communication	Business & financial services	Public admin/ education/ health/others	Total
Austria	25.2	26.9	31.5	30.4	28.1
Belgium	33.6	31.2	35.3	31.3	32.6
Czech Republic	31.8	32.0	35.6	33.4	32.7
Denmark	33.1	32.0	33.9	28.0	31.6
Finland	37.9	42.9	35.5	38.1	38.8
France	29.3	31.3	30.6	28.1	29.5
Germany	26.6	27.1	27.8	25.6	26.8
Greece	30.6	28.1	35.5	31.3	30.0
Hungary	35.6	33.2	37.0	32.6	34.7
Ireland	30.6	25.7	32.7	28.2	29.4
Italy	31.1	30.8	33.7	31.7	31.8
Luxembourg	24.6	24.2	26.3	20.8	24.5
Netherlands	34.9	40.4	35.7	33.3	34.5
Poland	30.9	40.5	32.8	29.1	31.9
Portugal	29.0	31.0	30.7	28.8	29.7
Spain	28.5	31.7	30.5	30.7	30.4
Sweden	37.1	33.0	34.7	35.3	35.1
UK	31.2	26.4	31.6	28.2	29.3
Total	*31.8*	*31.4*	*32.7*	*30.4*	*31.5*
Variation Coefficient (σ/μ)	0.15	0.18	0.16	0.16	0.14

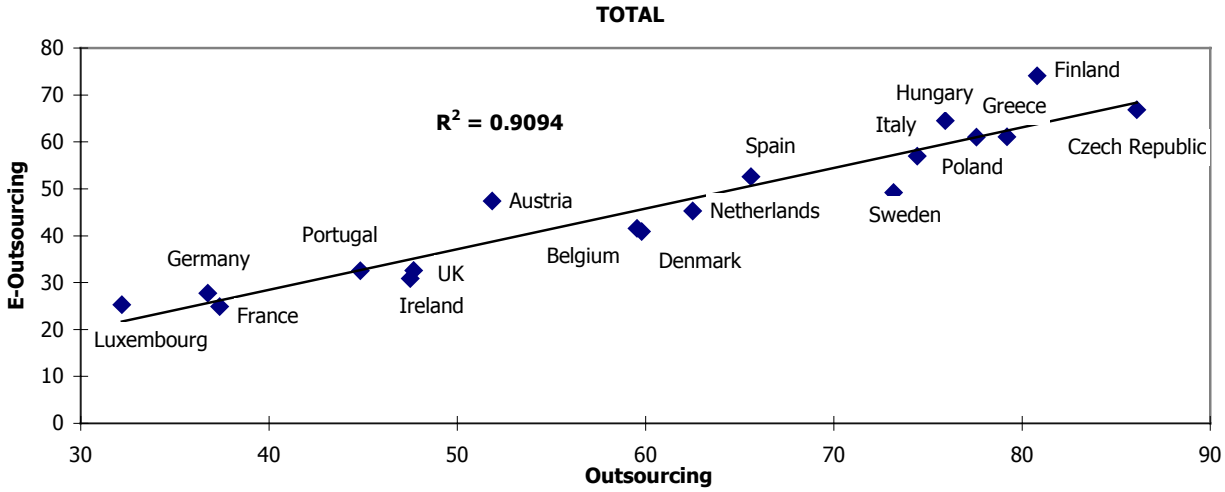
Source: EMERGENCE database

Table 1.12: eWork 'intensity' and 'diffusion'. Linear correlation (r) by branch

	Absolute	Normalised
Primary/manuf./util./construction	0.85	0.65
Trade/transport/communication	0.67	0.56
Business and financial services	0.73	0.73
Public admin/education/health/others	0.87	0.73
Total	*0.92*	*0.76*

Source: EMERGENCE database

Figure 1.8: Diffusion of Outsourcing (Any Function, Individual or Company) and diffusion of eOutsourcing by Countries. All Sectors



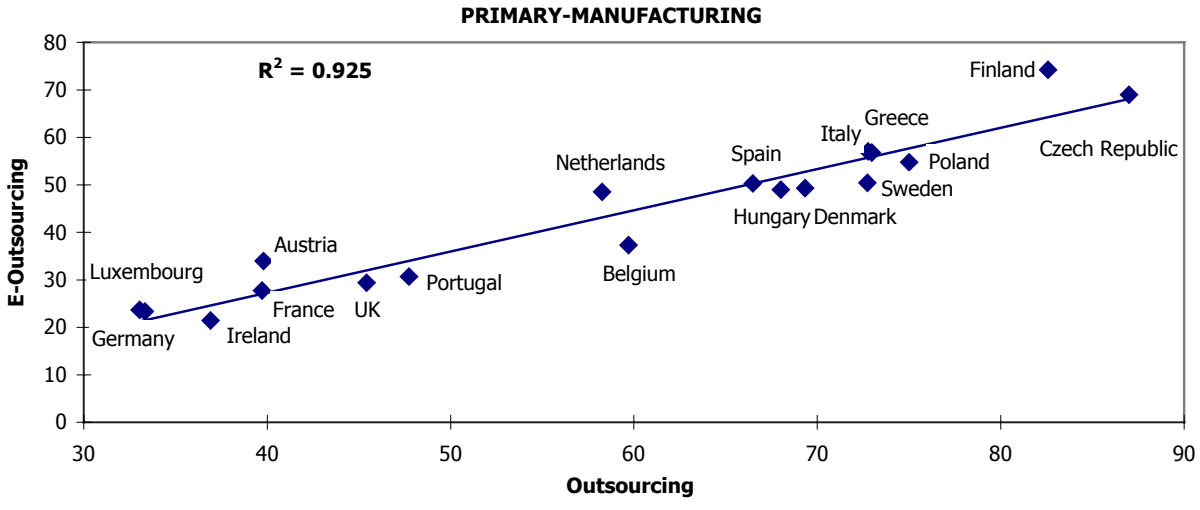
Source: EMERGENCE database

1.7 Outsourcing and eOutsourcing

Figure 1.8 demonstrates very clearly that the diffusion of eOutsourcing (which constitutes a very large share of total eWork and is defined as outsourcing using a telecommunications link for delivery of the work) appears to be strictly related to the general diffusion of outsourcing (with or without a telecommunications link). Austria and Finland seem to have a relatively high diffusion of eOutsourcing compared with the general diffusion of outsourcing. Sweden appears to have a relatively low diffusion.

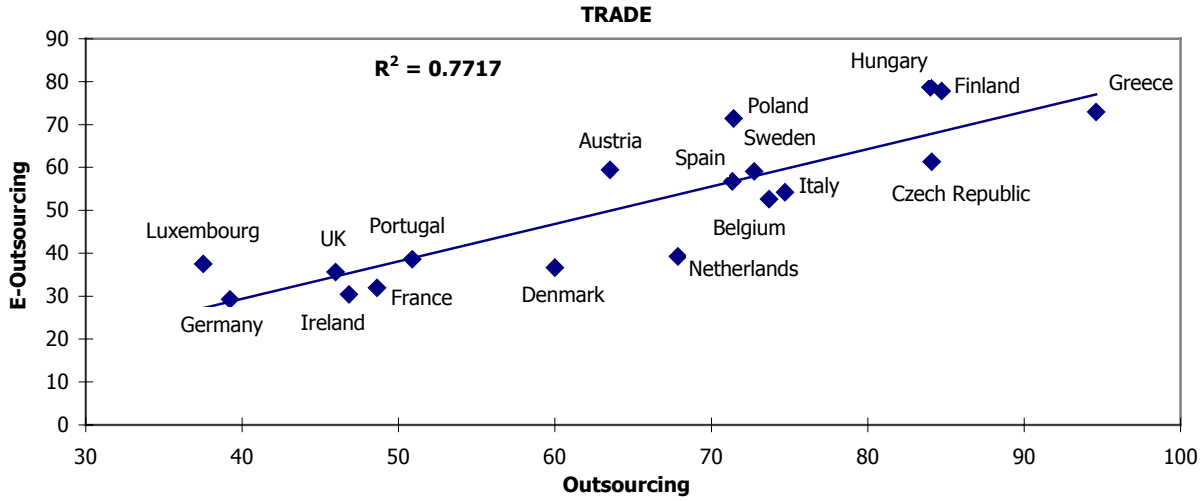
At the sectoral level, the primary and manufacturing sector presents nearly the same very strong relationship that we have

Figure 1.9: Diffusion of Outsourcing (Any Function, Individual or Company) and diffusion of eOutsourcing by Countries. Primary/manuf./util./construction



Source: EMERGENCE database

Figure 1.10: Diffusion of Outsourcing (Any Function, Individual or Company) and diffusion of eOutsourcing by Countries. Trade/transport/communication



Source: EMERGENCE database

observed for all sectors combined. In this case, Finland and Austria (but not Hungary) also present a relatively high level of eOutsourcing. Belgium has a relatively low rate of eOutsourcing diffusion in manufacturing.

In the service sectors, the relationship between outsourcing and eOutsourcing is still present but reveals weaker features. That is, more countries differ (and differ more) from the linear correlation.

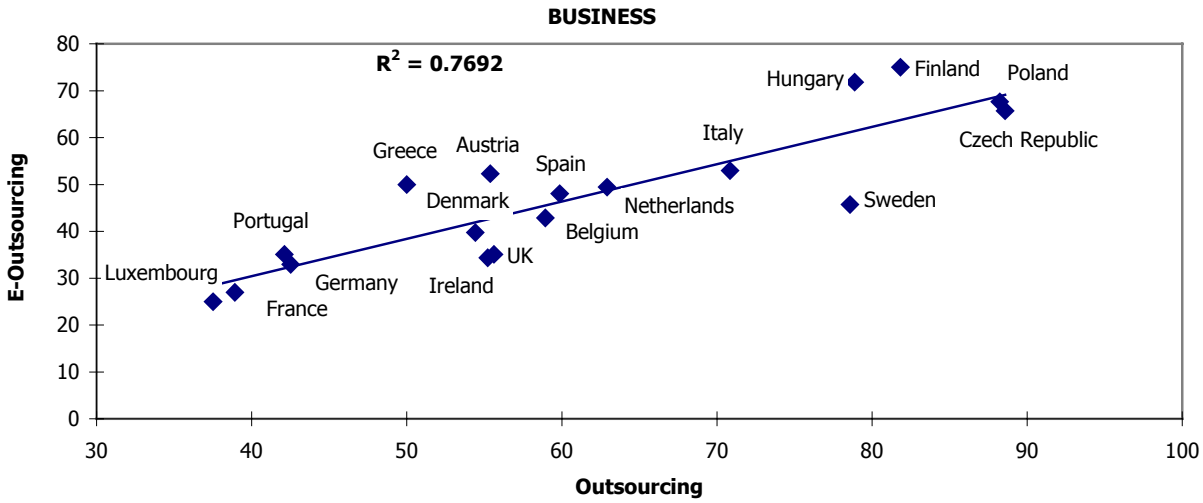
In the case of the trade/transport sectors (Figure 1.10) — in addition to Austria, Finland and Hungary — Luxembourg and Poland present a relatively high degree of eOutsourcing diffusion. The Czech Republic, Denmark and the Netherlands show a relatively low rate of eOutsourcing compared to total outsourcing.

In the business and financial services sector (Figure 1.11), we find Greece making its appearance on the upper left side of the figure, alongside Hungary, Finland and Austria, with high levels of eOutsourcing relative to its general levels of outsourcing. Sweden, on the lower right side, exhibits the opposite pattern.

In the public services (Figure 1.12), the correlation is stronger than in the other service sectors. Austria, Hungary and Finland present, again, a higher than expected eOutsourcing diffusion but in a less pronounced fashion. The Czech Republic is in this case the most remarkable outlier on the upper left corner. On the opposite side, we find Sweden and the Netherlands.

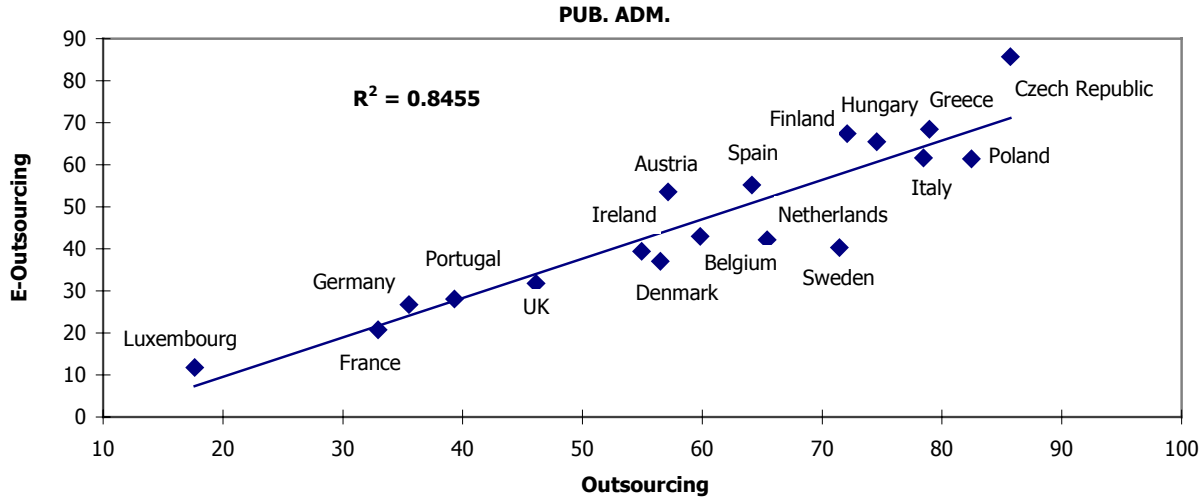
As a general remark, we can state that bigger countries (Germany, France, UK, Italy, Spain and Poland) tend to adhere more to the linear correlation. Three relatively small countries (Austria, Finland and Hungary) tend to be outliers in the upper left side. Sweden, especially in services, has a lower than expected incidence of eOutsourcing.

Figure 1.11: Diffusion of Outsourcing (Any Function, Individual or Company) and diffusion of eOutsourcing by Countries. Business and financial services



Source: EMERGENCE database

Figure 1.12: Diffusion of Outsourcing (Any Function, Individual or Company) and diffusion of eOutsourcing by Countries. Public admin/edu./health/others



Source: EMERGENCE database

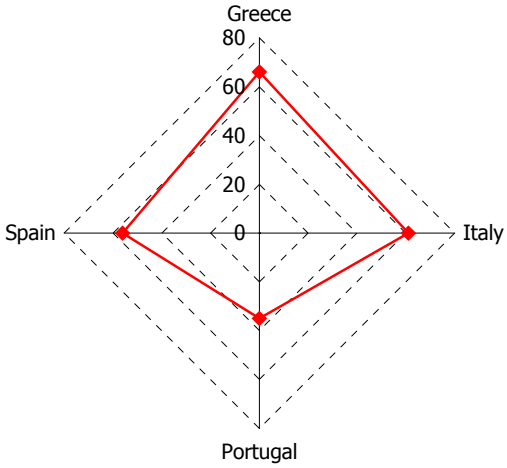
2. eWork in Southern European Countries: Similarities and Differences

2.1 Results by sector and company size

Using an analysis based on the proportion of establishments practising eWork, an initial geographical division can be ascertained which isolates Portugal from the other southern European countries. Greece, Italy and Spain, albeit with internal differences, demonstrate a particularly high diffusion of eWork, which is above the European average. Even without considering the intensity rate of eWork use in the company, it can be established that a large proportion of organisations in the Mediterranean have seized the opportunity to use eTechnology, even for the organisation of the production process.

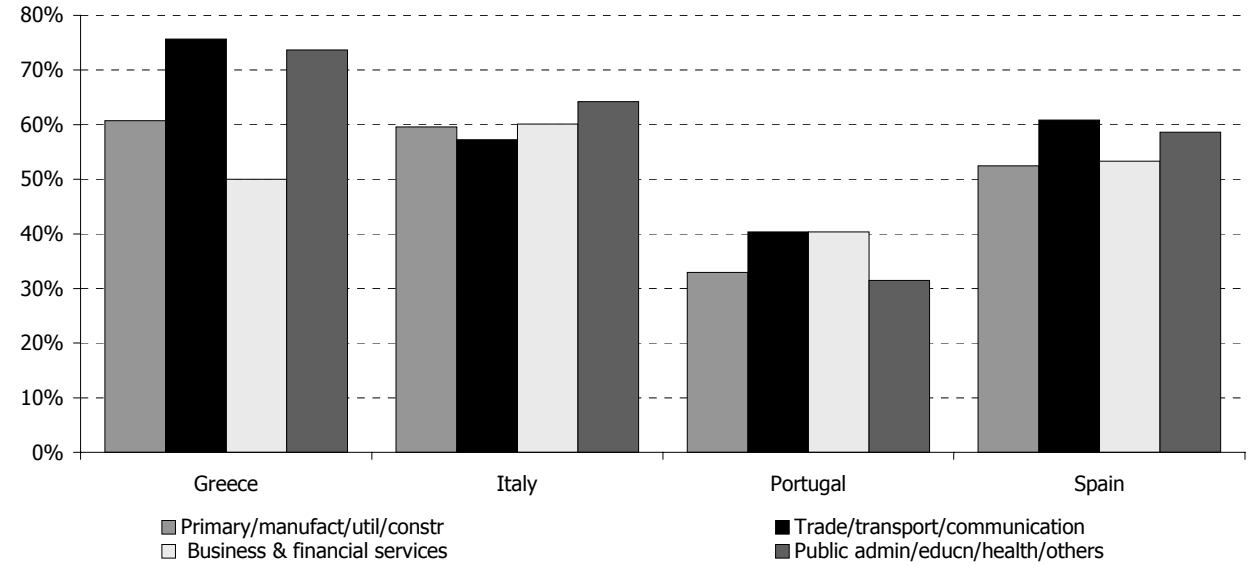
Figure 2.1 compares the primary, manufacturing and construction sectors (here described as 'industry') with the service sectors. As can be seen, an analysis of the presence of eWork by sector does not indicate specific behavioural differences between industry and the three macro service divisions. Even though there is a greater diffusion of the tertiary sector in all countries, comparing the average of the three service aggregates with that of industry, it emerges that the differential is substantial only in Greece (61 per cent industry; 72 per cent services). For the other country systems, the gap does not exceed four percentage points.

Figure 2.1: eWork use by country



Source: EMERGENCE database

Figure 2.2: Comparative analysis of the presence of eWork in macro sectors



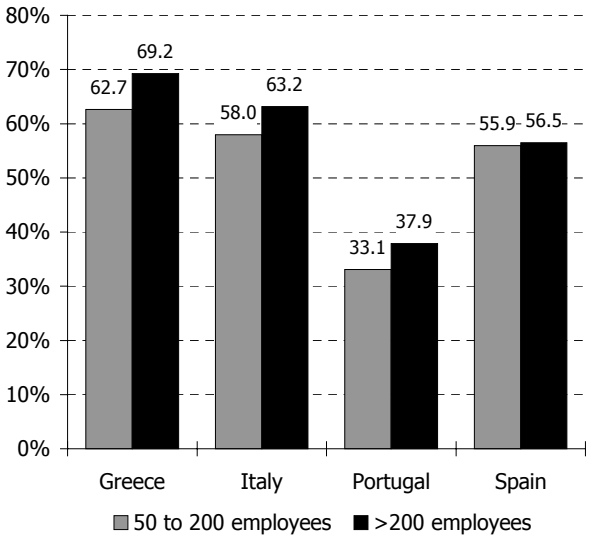
Source: EMERGENCE database

Figure 2.2 shows a breakdown of eWork prevalence by company size. Here, all four countries show a similar picture with a higher prevalence, albeit slight, in the use of eWork in companies with over 200 employees. The differential is around one per cent for Spanish companies, increasing to between five and seven per cent for the other Mediterranean countries.

From this evidence, and before carrying out further analysis, we present some interpretation of these results by geographic area and sector.

Firstly, it can be ascertained that technological obstacles to the fruition of this new form of work in these Mediterranean countries

Figure 2.3: Diffusion of eWork by company size



Source: EMERGENCE database

do not seem to exist. To be precise, as substantiated by the figures — including the lowest ones in Portugal — there seems to be an ICT standard already in place that guarantees Mediterranean countries accessibility to remote working arrangements.

High diffusion levels may be due to the quest for organisational improvement. In a systematic representation of an economic environment, the eWork procedure undoubtedly represents a strategic opportunity for rationalisation, integration and specialisation of networked units. This is especially the case in highly fragmentary economic systems where organisation is predominately based on micro and small operational units. This hypothesis enables us to interpret the widespread presence of eWork in the Mediterranean as evidence of some degree of homogeneity within these economies. More specifically, it can perhaps be attributed to the lack of a mature Fordist economic organisation, albeit with very different internal factorial advantages.

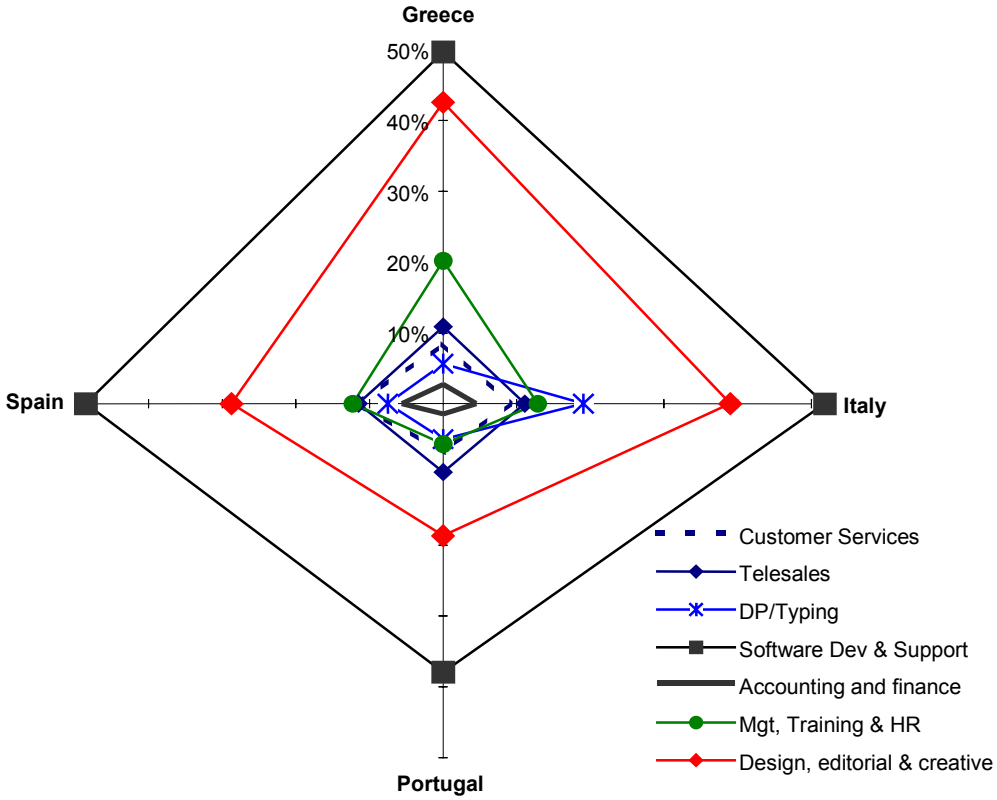
Lastly, another interesting element that emerges from our analysis is the balanced presence of eWork in all sectors, with slight differences in the manufacturing division. A possible interpretation could be that the increasing immaterial component in process and product manufacturing has made this innovation in work organisation, operating through electronic transfer, a particularly interesting opportunity even for industrial companies. Another factor is the increasing importance of strategic business functions (which we describe in more detail below) in which traditional manufacturing companies often lack internal expertise or experience. The need to seek an external source of supply for these functions creates the conditions for a continuing growth in the demand for eWork.

2.2 The functions involved in eWork

The EMERGENCE survey collected information on eWork, classified under seven different generic business service functions. Figure 2.4 presents an analysis of the data, broken down by these functions, to allow a comparative interpretation by geographical area and function.

This figure clearly demonstrates a substantial homogeneity between countries in the graduation of functions conducted through eWork. With the exception of some overlap in services where eWork is less widespread, a pattern is repeated that places software and creative services (design, editorial activities, multimedia work and other creative activities) functions at the top, relegating the other five functions to a frequency rate of below ten per cent.

Figure 2.4: eWork use by function (% of function in eWork out of total company cases where there is the selected function)



Source: EMERGENCE database

The comparison becomes even more interesting if we examine these functions in relation to the frequency with which they are conducted as eWork.

Adopting this interpretation key, great similarities between all the countries emerge, especially in the customer services, telesales and accounting functions. More precisely, the marginality of the function of financial and accounting services is clearly demonstrated. In the four areas, the activity of accounting, although present in almost all companies, plays a marginal role in eWork, with the vast majority of establishments preferring to keep the function in-house or outsourced through traditional means. Companies' policy in relation to customer services and telesales is also similar. For all countries, the percentage of establishments reporting that they organise sales and customer assistance functions through a 'remote' modality is just under ten per cent.

Nevertheless, there are some divergences between countries. As Figure 2.4 reveals, these can be noted in relation to data entry and typing, human resource management and training, creative activities and software services.

In programming and IT support, where there are peak rates in eWork for all countries, Portugal demonstrates a frequency of 38

per cent compared with approximately 50 per cent for the other three Mediterranean countries.

Just as important are the differences in 'creative activities'. In this function, which occupies second place in eWork practice, Italy and Greece display results of 40 per cent, Spain 29 per cent and Portugal 19 per cent.

Other differences include a much higher rate of eWork in Italy for data processing and typing (at 20 per cent, compared with an intensity of approximately six per cent for the other countries) and a relatively high incidence of eWork in HR management and training in Greece (at 20 per cent compared with 13 per cent in Italy and Spain and six per cent in Portugal).

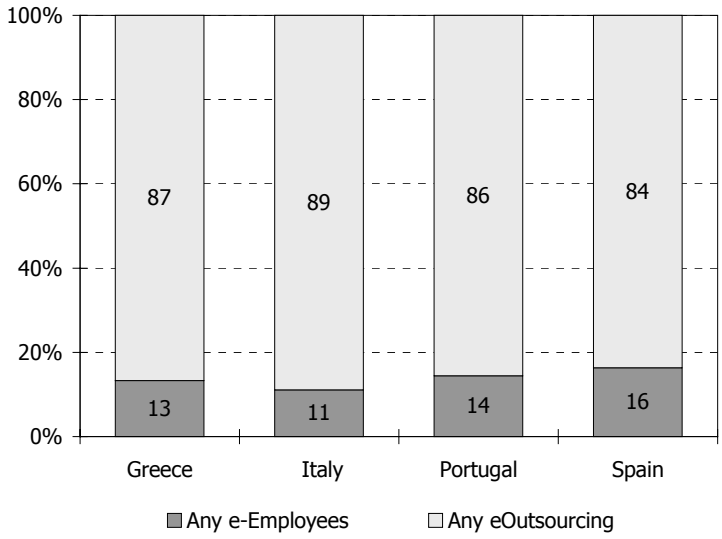
2.3 In-house vs outsourcing solutions in eWork

As demonstrated in Figure 2.5, in the Mediterranean region, eWork is almost always used on an outsourced basis. In each of the four southern European countries, more than four-fifths of eWork involves the subcontracting of telemediated business services to external companies.

In the light of this result, it can be easily ascertained that the role played by the telemediated organisation of work in a company's operational infrastructure is as an instrument to assist in the acquisition of factorial advantages supplied by subjects external to the company.

With this role, and in the context of market globalisation and overcoming of Fordist organisation, eWork can act as a strategic lever to improve the competitive position of companies. The need to adapt to complex and changeable market requirements makes

Figure 2.5: Internal and outsourced eWork (100 = total eWork)



Source: EMERGENCE database

flexible production more effective when it is organised in independent business units linked by the use of information technology. It is to be expected that the growth in complexity of the network due to increases in the number of activities involved in outsourcing and an extension of the geography of supply, should be followed by an intensification of relations through the practice of eWork.

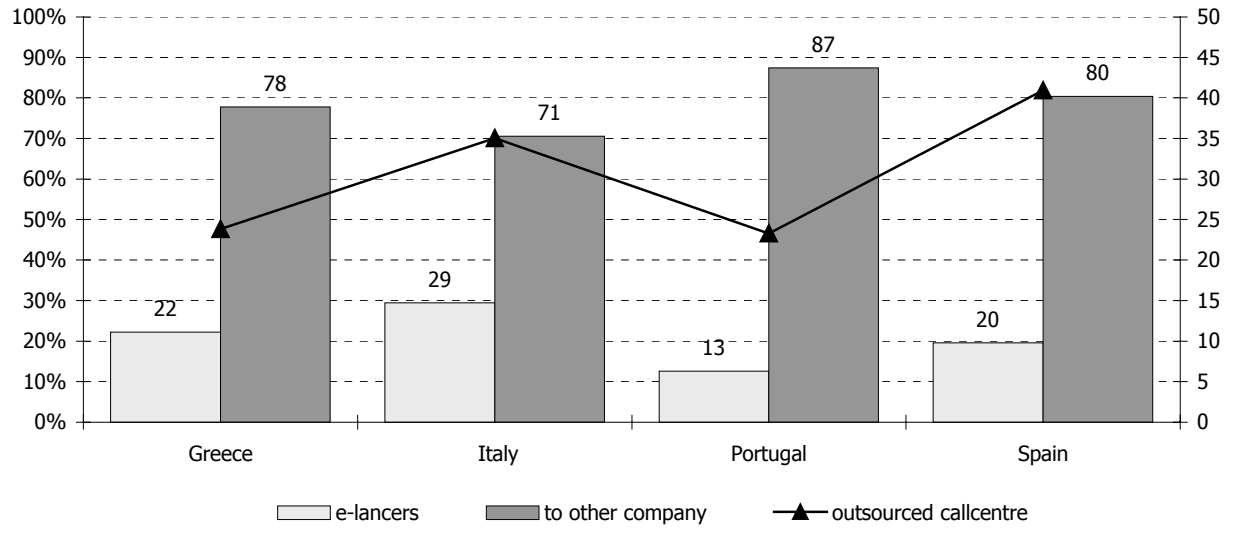
2.4 The decision to outsource business services: cost reduction and quality improvement

If eWork is to be recognised as an operational lever in a general strategy for the outsourcing of some phases of the production process, it is interesting to examine some of the options open to an organisation.

Firstly, as demonstrated in Figure 2.6, most outsourcing is to companies rather than individual freelancers. Outsourcing to individuals varies, from a maximum diffusion of 29 per cent in Italy, to 20 per cent in Spain and Greece, and 13 per cent in Portugal. There is thus a clear preference for companies, especially for call centre based operations. In particular, in Italy and Spain, around half the outsourced business services involve call centres.

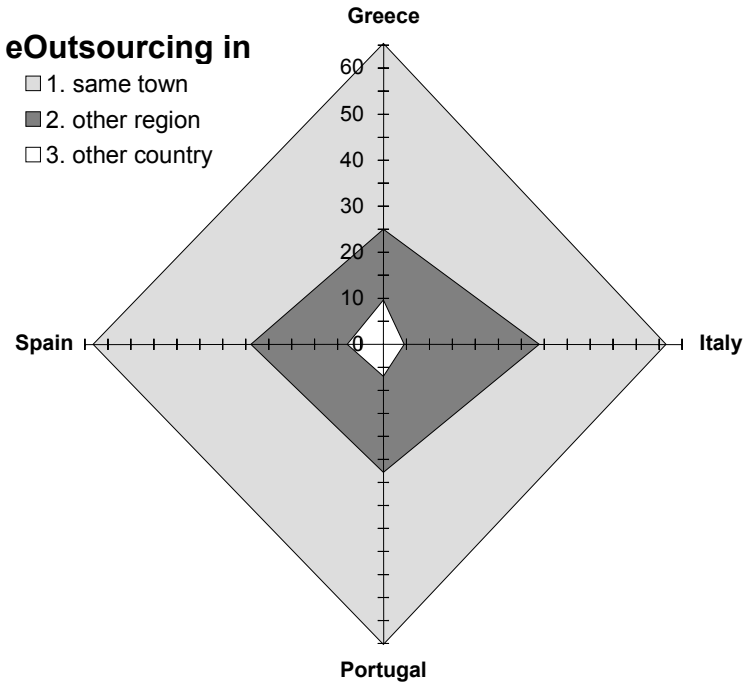
Another strong characteristic of eOutsourcing in these countries relates to its relatively narrow geographical scope. Even in a phase of accelerated international relations, only a small number of companies go beyond their national borders for the outsourcing of their services. In all the Mediterranean regions, for over 60 per cent of cases, there are factorial conditions (cost advantages, service quality, organisational opportunities) sufficient to justify eOutsourcing in the same city or region where the contractor company is located; whilst over 90 per cent of eOutsourcing takes

Figure 2.6: Framework of eOutsourcing



Source: EMERGENCE database

Figure 2.7: Territorial framework of eOutsourcing (index base = 100)



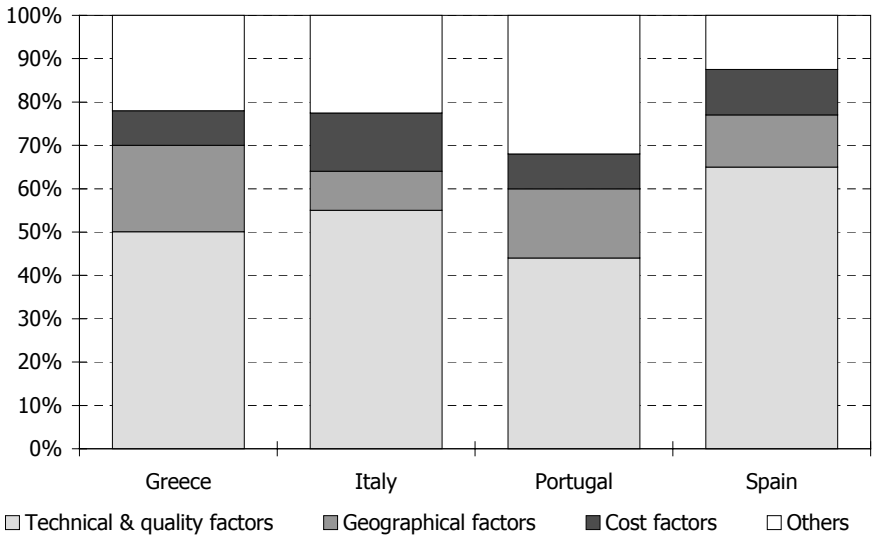
Source: EMERGENCE database

place within the same country.

It is evident that operating mostly in an adjacent geographical area, contractor companies do not resort to eOutsourcing because of the more favourable cost structures to be obtained in other local economies nor to take advantage of logistic opportunities.

As illustrated by Figure 2.8, there are very few cases in which the justification for eOutsourcing depends on cost or geographical proximity to a partner or customer. This type of behaviour is even

Figure 2.8: Reasons for eWork in outsourcing



Source: EMERGENCE database

apparent in Italy and Spain, although with slight differences. This is surprising given that both countries are characterised by regional differences in costs, where the evident cost advantages to be found in the less developed regions would justify alternative choices.

By analysing this behaviour, it is possible to outline an hypothesis of eOutsourcing that can be traced back to an objective of process organisation — the selection of production units whose size and specialisation offers better results for service quality and quick adaptability to market. The fact that technical and service quality factors are often used to justify eWork confirms this hypothesis.

Again, looking at Figure 2.8, it can be ascertained that technical/ qualitative aspects are dominant among the reasons given to justify the choice to eOutsource. Even though there are no national differences that can be interpreted as evidence of dissimilar strategic behaviour, the frequency varies from a minimum of 44 per cent in Portugal, to 50 per cent in Greece and 55 per cent in Italy, reaching a peak of 65 per cent in Spain.

2.5 The national contexts

The information and communication technologies (ICT) sector has become fundamentally important in the international economic context. Since the mid-90s, through the use of such technologies, the USA has started to experience significant growths in productivity. Even European companies — albeit with great dissimilarities between them — seem to have introduced ICT as a fundamental strategic factor to improve their own competitive position. The new transmission and elaboration of services that characterise the development of the ICT system have opened up extraordinary opportunities to improve organisational quality, and improve the level and diffusion of the 'information' factor — both elements that contribute to the operating efficacy of the company. eWork as broadly defined in the EMERGENCE project provides a striking illustration of this.

It is in this context that we consider it opportune to give a picture of the level of diffusion of the production of goods and services that today characterise the knowledge economy.

3. Italy

3.1 The ICT sector in Italy as revealed in ISTAT census statistics on firms and workers in the period 1991-96

The sources that have been analysed to give this synthetic framework of ICT in Italy, and its position compared with the main EU and extra EU economies are as follows: ISTAT; SMAU, EITO; OECD; EUROSTAT.

To delimit the area of this production branch, we will use the principle adopted by the OECD agreed in April 1998 at the Working Party on Indicators for the Information Society (WPIIS), successively approved during the meeting of the Committee for Information, Computer and Communication Policy. On the basis of such a principle, three sectors can be categorised as ICT sectors: ICT manufacturing activities (equipment for offices, accounting and computers; manufacture of wires and cables; tubes, valves and other electronic components; radio and TV transmitter devices; television and radio reception devises, cameras, video recorders, instruments and devises for measuring, control, monitoring, navigation; equipment for the control of industrial processes); services connected to ICT and 'related goods' (wholesale of ICT machinery, equipment and goods; hiring of office machinery and equipment, including computers); and ICT intangible services (telecommunications, computers and related activities).

Starting out from the OECD classification, in 1996, the Italian interim Census on industry and services registered 72,180 companies and 568,400 workers in the ICT sector. The result was achieved after a growth of 26 per cent (compared with 1996) for companies and a seven per cent loss in workers for the same period[1] (Table 3.1). At the sector level, 17.4 per cent of companies and 31.8 per cent of workers belonged to the ICT manufacturing sector; 18.1 per cent of companies and 15.3 per cent of workers in the sector linked to ICT goods. Lastly, as regards the average size of companies, the shift from 1991 to 1996 presents for all the sectors a process of further fragmentation towards micro production units.

[1] For more information see Stefano Palmieri, 'secondo rapporto sul mezzogiorno; scenari, dinamiche del lavoro e dell'imprese' IRES CGIL Nazionale, Giugno 2002.

Table 3.1: Information and communication technologies sector; companies and workers in:

	Total ICT		ICT manufacturing industry		ICT 'related goods' services		ICT intangible services	
	Firms	Workers	Firms	Workers	Firms	Workers	Firms	Workers
Absolute values: 1996	72,180	568,400	12,548	180,846	13,039	87,211	46,593	300,343
Percentage composition: 1996	100.0	100.0	17.4	31.8	18.1	15.3	64.6	52.8
Percentage variation 1996/1991	25.7	–7.2	0.5	–23.9	–1.5	–6.5	47.0	6.8

Source: IRES processing of data from the intermediate census on industry and services

For the entire ICT economy, there is a shift from almost 11 workers per company in 1991, to eight workers in 1996. The sector that had the greatest influence on this dynamic is manufacturing, which went from 19 to 14 workers per company (Table 3.2).

Table 3.2: Average company size in the Italian ICT sector (workers per company)

	1991	1996
Total ICT	*10.7*	*7.9*
ICT manufacturing industry	19.0	14.4
ICT 'related goods' services	7.0	6.7
ICT intangible services	8.9	6.4

Source: IRES processing of data from the intermediate census on industry and services

3.2 The Italian ICT occupational position in Europe: a regional comparison regarding the 'high tech' and 'knowledge intensive' sectors[1]

The situation described in the previous paragraph, if compared with European figures, highlights a delay for Italy. In 1999, Italian regions were among the European regions with only a moderate occupational presence in high tech manufacturing and service sectors, as well as knowledge intensive sectors.

The high tech sector[2] in Europe includes approximately 17 million workers (11.7 per cent of the labour force) with occupation rates

[1] For more information see Stefano Palmieri, 'secondo rapporto sul mezzogiorno; scenari, dinamiche del lavoro e dell'imprese' IRES CGIL Nazionale, Giugno 2002.

[2] For this part of the report, Eurostat data and definitions have been used. However it should be noted that the Eurostat definition of 'high-tech' differs from the OECD definition due to the greater presence in the manufacturing sector (this is the case for sectors dealing with the fabrication of chemical products and synthetic and artificial fibres, mechanical machines and equipment, vehicles, trailers) and the services sector (Research and Development).

Table 3.3: Classification of European regions based on the percentage of high tech occupation in the manufacturing sector out of total occupation – first 20 and last 20 regions – 1998

First 20				Last 20			
Rank	Code	Region	% high tech occupation out of total occupation	Rank	Code	Region	% high tech occupation out of total occupation
1	DE11	Stuttgart	20.44	166	PT12	Centro (P)	2.99
2	DE14	Tubingen	18.25	167	DE8	Mecklemburg-Vorpommeren	2.88
3	DE91	Braunschweig	17.33	167	ITB	Sardegna	2.73
4	DE12	Karlsruhe	17.14	169	BE35	Namur	2.62
5	DEB3	Rheinhessen-Pfalz	15.95	170	NL32	Noord-Holland	2.52
6	FR43	Franche-Comté	15.62	171	NL31	Utrecht	2.45
7	DE25	Mittelfranken	15.49	172	ITA	Sicilia	2.44
8	DE13	Freiburg	15.24	173	ES42	Castilla la Mancha	2.40
9	DE26	Unterfranken	15.07	174	ES12	Principado de Asturias	2.37
10	DE71	Darmstadt	14.43	175	ES61	Andalucia	2.35
11	DE27	Schwaben	13.95	176	ES62	Region de Murcia	2.34
12	IT11	Piemonte	13.94	177	FR81	Languedoc-Roussillon	2.18
13	UKG3	West Midlands	13.43	178	UKI1	Inner London	2.05
14	FR42	Alsace	13.18	179	PT14	Alentejo	1.82
15	DE22	Niederbayern	12.78	180	LU	Luxembourg (Grand-Duché)	1.62
16	DE21	Oberbayern	12.71	181	GR1	Voreia Ellada	1.59
17	DE23	Oberpfalz	12.66	182	ES53	Islas Baleares	1.35
18	DEA2	Koln	12.22	183	GR2	Nentriki Ellada	1.31
19	UKD2	Cheshire	12.02	184	IT93	Calabria	1.29
20	BE22	Limburg	11.97	185	GR4	Nissia Aigaiou, Kriti	0.13

Source: IRES analysis of Eurostat-Regions data 2001

that vary — within the EU member states — from 3.9 per cent in Greece, to 14.3 per cent in Germany (Italy is at 10.8 per cent). In 2000, the high tech sectors created 570,000 jobs, contributing to a 20 per cent growth in occupation in the EU (EUROSTAT, 2000).

If we look at the 185 European regions, for which it is possible to give the occupation rate in the high tech manufacturing sector for 1998 (a quota that varies from 20.44 per cent in the German region of Stuttgart, to 0.13 per cent in the Greek region of Nissia Aigaiou, Kriti), it can be ascertained that Italy occupies the 12th position, with Piemonte (13.94 per cent).[1] If we look at the first 20 regions

[1] The other Italian regions are classified in the following way: 22nd Lombardy (11.38%); 30th Emilia Romagna (10,87%); 44th Veneto

(Table 3.3) for the presence of high tech manufacturing production, it can be seen that Germany has a considerable occupational advantage, with 14 regions. Of the remaining six: two are French (Franche Comté, Alsace), two British (Cheshire and West Midlands) and one Italian (Piemonte).

If we carry out the same procedure for the last 20 in the list, there are: five Spanish regions (Castilla la Mancha, Principado de Asturias, Andalucia, Region de Murcia, Islas Baleares), three Italian regions (Sicilia, Sardegna, Calabria), three Greek regions (Voreia Ellada, Nantriki Ellada, Nissia Agaiou, Kriti), two Portuguese regions (Centro, Alentejo), one German region (Macklemburg-Vorpommeren), two Dutch regions (Utrecht e Noord Holland), one Belgian region (Namur), one French region (Languedoc Roussillon), one British region (Inner London) and lastly Luxembourg.

Even regarding the high tech service sector, things do not seem to be better for Italy (Table 3.4). In 1998, for the 173 European regions examined, there was a range in variations for this sector which went from 7.72 per cent in the English region of Berkshire, Buckinghamshire and Oxfordshire, to 0.60 per cent in the Portuguese region of Centro. On the basis of such a classification, only Lazio got into the first 20 'leader' regions in the sector. Other Italian regions with relatively high levels of high tech occupations are to be found at the 60th and 64th positions in the classification, where there is Piemonte with 3.08 per cent and Liguria at 2.84 per cent.[1]

A closer analysis of the results shows that businesses with a high tech content tend to be concentrated in the large metropolitan areas of Europe: Stockholm, London, Paris, Rome, Amsterdam and Madrid.

Furthermore, a polarisation of macro geographical areas can be noted. In this context, the 20 regions with the highest proportions of high tech occupations are in central-northern Europe (17). Of these leading regions for high tech services, seven are in the UK (Berkshire-Oxfordshire; Bedfordshire-Hertfordshire; Outer London; Surrey-East; West Sussex; Inner London; Hampshire;

(9,66%); 67th Liguria (7,87%); 103rd Molise (6,51%); 110th Basilicata (6,38%); 116th Marche (6,21%); 117th Toscana (6,19%); 126th Abruzzo (5,93%); 136th Umbria (5,10%); 142nd Campania (4,75%); 148th Lazio (4,34%); 161st Trentino Alto Adige (3,65%); 162nd Puglia (3,55%).

[1] It is particularly significant that seven regions are grouped together in positions that range from 107th to 124th, highlighting substantial similarities in the sector: 107th Toscana (2.38%); 108th Umbria (2.37%), 109th Trentino Alto Adige (2.36%); 112th Emilia Romagna (2.29%); 120th Marche (2.22%); 123rd Campania (2.20%); 124th Calabria (2.19%). The other regions are Veneto at 130th position (2.07%), Sardegna at 136th (2.04%) and Sicilia at 143rd (1.94%).

Table 3.4: Classification of European countries based on percentage of High tech occupation in the service sector out of total occupation – first 20 and last 20 regions – 1998

First 20				Last 20			
Rank	Code	Region	% high tech occupation out of total occupation	Rank	Code	Region	% high tech occupation out of total occupation
1	UKJ1	Berkshire, Buckinghamshire and Oxfordshire	7.72	154	IT71	Abruzzo	1.63
2	UKH2	Bedfordshire and Hertfordshire	7.31	155	DEG	Thuringen	1.62
3	SE01	Stockholm	6.96	156	IT91	Puglia	1.55
4	FR1	Ile-de-France	5.61	157	ES13	Cantabria	1.51
5	SE07	Mellerstra Norrland	5.51	158	ES62	Region de Murcia	1.48
6	UKI2	Outer London	5.31	159	ES41	Castilla y Leon	1.43
7	UKJ2	Surrey, E & W Sussex	5.23	160	ES7	Canarias	1.40
8	FR62	Midi-Pyrénées	5.17	161	ES11	Galicia	1.35
9	UKI1	Inner London	5.08	162	ES43	Extremadura	1.34
10	BE24	Vlaams Brabant	5.06	163	ES12	Principado de Asturias	1.30
11	NL23	Flevoland	4.88	164	GR4	Nissia Aigaiou, Kriti	1.29
12	IT6	Lazio	4.79	165	ES24	Aragon	1.23
13	SE02	Ostran mellansverige	4.59	166	ES61	Andalucia	1.19
14	FI15	Pohjois-Suomi	4.50	167	ES53	Islas Baleares	1.14
15	NL33	Zuid-Holland	4.42	168	ES52	Comunidad Valenciana	1.08
16	UKJ3	Hampshire and Isle of Wight	4.41	169	GR2	Nentriki Ellada	1.07
17	ES3	Comunidad de Madrid	4.33	170	PT11	Norte	1.03
18	BE31	Brabant Wallon	4.30	171	GR1	Voreia Ellada	0.96
19	BE34	Luxembourg	4.27	172	ES42	Castilla la Mancha	0.81
20	UKK1	Gloucestershire, Wiltshire and North Somerset	4.25	173	PT12	Centro (P)	0.60

Source: IRES analysis of Eurostat-Regions data 2001

Gloucestershire), three in Sweden (Stockholm, Mellerstra Norrland, Ostran mellansverige), three in Belgium (Vlaams Brabant, Brabant Wallon, Luxembourg), two in France (Ile-de-France, Midi-Pyrénées), two in Holland (Flevoland, Zuid Holland), one in Spain (Comunidad de Madrid), one in Finland (Pohjois-Suomi) and one in Italy (Lazio).

The situation is completely reversed for the last 20 regions in the classification, all of which, with the exception of the German region of Thuringen, are in Southern Europe: two Italian (Abruzzo and Puglia), 12 Spanish, three Greek and two Portuguese.

Table 3.5: Classification of European regions based on the percentage of high knowledge intensive occupation out of total occupation – First 20 and last 20 regions - 1998

First 20				Last 20			
Rank	**Code**	**Region**	**% KIS occupation out of total occupation**	**Rank**	**Code**	**Region**	**% KIS occupation out of total occupation**
1	FI2	Ahvenanmaa/Aland	58.28	186	ES62	Region de Murcia	19.83
2	UKI1	Inner London	55.68	187	GR21	Ipeiros	19.35
3	SE01	Stockholm	52.23	188	PT15	Algarve	18.93
4	UKI2	Outer London	48.40	189	ES42	Castilla la Mancha	18.56
5	SE08	Ovre Norrland	47.30	190	ES11	Galicia	18.55
6	UKJ2	Syurrey, E & W Sussex	46.19	191	PT2	Acores	18.48
7	BE1	Region de Bruxelles-Capitale	45.91	192	ES23	La Rioja	17.84
8	BE31	Brabant Wallon	45.65	193	GR14	Thessalia	17.52
9	NL31	Utrecht	45.04	194	GR43	Kriti	17.52
10	SE07	Mellerstra Norrland	44.76	195	GR22	Ionia Nissia	17.37
11	FI16	Usimaa	44.13	196	PT14	Alentejo	16.81
12	NL32	Noord-Holland	43.98	197	GR23	Dytiki Ellada	16.34
13	FR1	Ile-de-France	43.45	198	GR13	Dytiki Makedonia	16.26
14	SE04	Sydsverige	42.89	199	PT3	Madeira	16.08
15	SE0A	Vastsverige	42.35	200	PT12	Centro (P)	14.69
16	SE06	Norra mellansverige	42.33	201	GR11	Anatoliki Makedonia, Thraki	14.47
17	UKJ1	Berkshire, Buckinghamshire and Oxfordshire	42.18	202	GR25	Peloponnissos	13.89
18	NL33	Zuid-Holland	41.49	203	PT11	Norte	13.32
19	UKH2	Bedfordshire and Hertfordshire	41.09	204	GR42	Notio Aigaio	12.57
20	UKD5	Merseyside	41.02	205	GR24	Sterea Ellada	11.98

Source: IRES analysis of Eurostat-Regions data 2001

Lastly, for knowledge intensive services, EUROSTAT has estimated a volume of occupation — for 2000 — of approximately 32 million workers in the EU. As a percentage of all national occupations, these range from 19.7 per cent in Portugal, to 45.9 per cent in Sweden. Between 1999 and 2000, there was an increase of 1.3 million jobs, representing approximately half of all the occupational growth within the EU (Table 3.5).

At the regional level for this sector, occupation rates (1998) ranged from 58.28 per cent in the Finnish region of Ahvenanmaa/Aland to 11.98 per cent in the Greek region of Sterea Ellada. No Italian regions feature in the top or lowest sections of the classification.

The Italian regions tend to be between the 129th and 183rd positions in the classification, out of 205 EU regions; a better position is registered only by Lazio at the 73rd position (32.82 per cent) and Calabria at the 98th position (30.01 per cent).[1]

3.3 Latest results on ICT progress in Italy

This section gives an analysis of the evolution and diffusion of ICT in Italy in the last decade, up to 2000. For this phase, all data on the progress of ICT spending (Table 3.6 and Figure 3.1) confirms that the process of transition from the old to the new economy, which started in the USA and that has spread all over the industrialised world, has progressively affected Italy. In fact, it is evident that the awareness of the advantages of productivity offered by the acquisition of ICT technical progress is taking hold in Italian companies.[2]

In Italy, the ratio between spending on ICT and GNP grew from 3.7 per cent, to 5.5 per cent, from 1996 to 2000. Such a ratio registered an average annual growth rate of 11 per cent, compared with a rise of one per cent in the USA. All this indicates a decisively expansive trend in the Italian ICT market.

Table 3.6: Value of spending in ICT as percentage of GNP

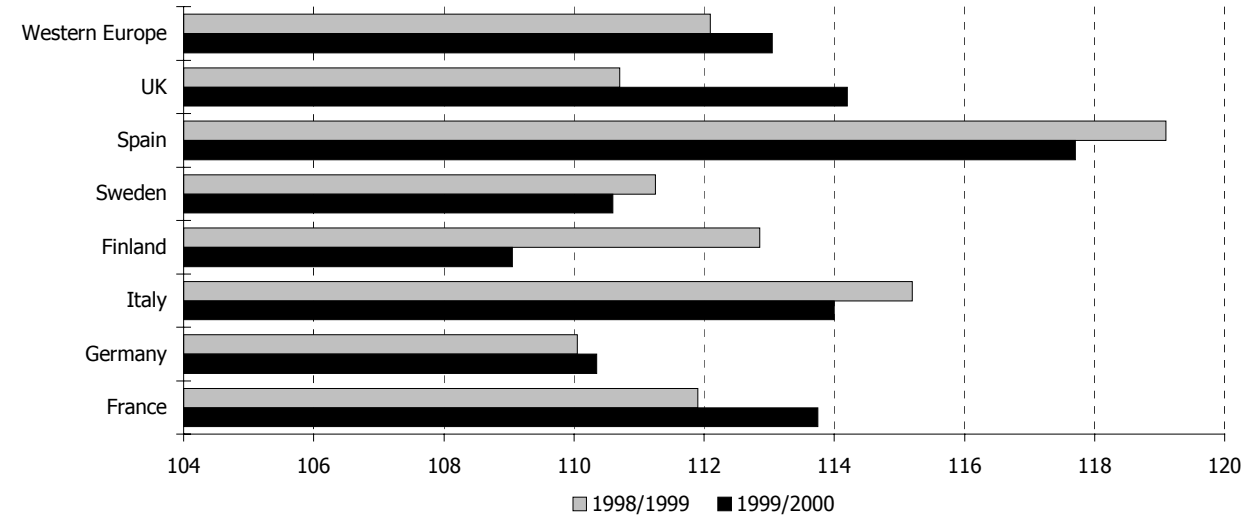
Country	1996	1997	1998	1999	2000
Italy	3.6	3.9	4.5	5.0	5.5
Western Europe	4.6	5.0	5.4	5.9	6.3
USA	8.1	8.2	8.5	8.7	8.8
Norway	4.8	4.9	5.3	5.7	5.1
Sweden	6.0	6.5	7.3	7.8	8.3
Finland	5.0	5.5	5.8	6.3	6.4
Ireland	5.6	5.7	5.4	5.5	5.4

Source: EITO (from Iammarino S, Jona-Lasinio C, Mantegazz S, 2002)

[1] The classification is as follows: 129th position is Sicilia (26.98%); 133rd Campania (26.67%); 137th Lombardia (26.17%); 143rd Sardegna (25.59%); 144th Valle d'Aosta (25.43%); 147th Trentino Alto Adige (24.95%); 148th Molise (24.86%); 157th Emilia Romagna (24.35%); 158th Piemonte (24.29%); 159th Friuli Venezia Giulia (24.29%); 164th Toscana (23.56%); 166th Puglia (23.42%); 171st Abruzzo (22.93%); 172nd Umbria (22.77%); 173rd Veneto (22.72%); 175th Basilicata (22.27%); 183rd Marche (20.68%).

[2] For further information, see Iammarino S, Jona-Lasinio C, Mantegazza S, 'Competitività e sostenibilità dei modelli di innovazione del sistema produttivo italian: ruolo dell'ICT', in *Competitività e sostenibilità dei modelli di innovazione del sistema produttivo italiano l'innovazione nei settori di specializzazione. il ruolo delle pmi e dei distretti. il sistema-moda*, HERMES LAB report for CNEL, June 2002.

Figure 3.1: Growth rates in the ICT market: 1998-2000



Source: EITO (from Iammarino S, Jona-Lasinio C, Mantegazz S, 2002)

Furthermore, in the 1998-2000 period, data on growth rates in the ICT market in Europe register a positive variation of 15.2 per cent and 14.0 per cent respectively. If we associate this with the fact that the share of the Italian ICT market in Western Europe is 11 per cent, compared with 21 per cent in Germany, 19 per cent in the UK and 16 per cent in France, it can be seen that the development of ICT is assuming considerable proportions in Italy. This vigour in the growth of the ICT market, according to the latest surveys conducted by ASSINFORM[1], is confirmed for 2001. The variation is 8.3 per cent, higher than the growth rates both of other European countries and of the USA. Italy is thus recovering quickly from the delay accumulated over previous years compared with more advanced countries.

3.4 Observation of ICT practice by sector: telecommunications, IT, electronic commerce, financial services

Given the 'horizontal' nature of ICT, and its cross-sectoral infiltration across the general economic fabric, it is interesting to proceed with a sectoral analysis. Here, we can start out by stating that the telecommunications and information sectors represent the hub of new technologies as they are both producers and users of ICTs; whereas sectors such as the financial and commerce services sector that seem to be affected more than others by the ICT revolution, as they are important users, are the vectors of the diffusion of new technologies in manufacturing activities (for

[1] This is the national association of the main ICT companies operative in the Italian market. In the association, the leading companies of the following sectors are present: IT products and services, telecommunications products and services and multimedia contents.

Table 3.7: Indicators of ICT penetration by sector

	Per capita IT spending (Euro) 2000	IT/PIL (%) 2000	Per capita CT spending (Euro) 2000	CT/PIL (%) 2000	Internet users (% of global total) 2000
Italy	358	1.8	707	3.6	3.0
Western Europe	640	2.9	750	3.4	25.4
US	1,635	5.5	967	3.3	35.5

Source: EITO (from Iammarino S, Jona-Lasinio C, Mantegazza S, 2002)

services provided to companies) as well as the entire economic system (for the direct contribution to added value).[1]

Table 3.7 illustrates the main indicators related to the CT and IT sectors. The analysis of per capita spending and percentage of GNP compares three geographical aggregates: Italy; Western Europe (EU+Norway and Switzerland); and the USA.[2]

In relation to the telecommunications sector, it is possible to disaggregate this into telecommunications services and telecommunications networks. The former comprises home phone services, Internet, data transmission services and mobile phone services, whilst the latter includes terminals and systems for private telecommunications, and infrastructures for public telecommunications networks.

For all the divisions selected here, the trend is a process of continuing growth between 1998 and 2000. Telecommunications services illustrate a more stable behaviour over the four years, with biennial variations of approximately ten per cent. However, the pattern is more complex for private telecommunications systems as well as for equipment and networks for public telecommunications. In the former, the growth rate reached a peak of 17 per cent in the first two years, followed by a slowdown, stabilising at ten per cent for the second period. The same variability is registered in the public sector, except that there was an inversion of performance for the two two-year periods.

The factors that contributed most to the growth (the variation of total user spending in 2001 was 8.5 per cent compared with the previous year) and the transformation of the CT sector in Italy in 1998-2000 are an increase in the number of operators (in companies other than Telecom Italia); and consequently a sharp rise in competitiveness in the internal market; the extension of the range of innovative services offered, especially those connected to the Internet; and the consolidation of new technologies that have

[1] For further information see Iammarino S, Jona-Lasinio C, Mantegazza S, 2002.

[2] Data and information indicated in the paragraph have been obtained from SMAU (2000), EITO (2001) and Assinform (2002).

generated an increase in investments for conversion from analogue (TACS) to digital networks (GSM and UMTS).

The rise of the Internet as a factor of innovation and motor of growth clearly emerges even in Italy. Spending in the hardware division has been by the PC sector. In 2001, 86.4 per cent of companies with ten or more workers had IT equipment (PC or terminals). Recent data confirms a continuing growth, even by smaller companies, in the use of the PC, Internet and other technologies that permit forms of electronic connection with the external environment. In general, online connections for simple functions are extremely widespread in all sizes of company, although the range of users reduces when the use is extended to the construction of a website and online purchase (Table 3.8).

The development of e-commerce in Italy[1] has registered huge growth rates: in 1999 the variation in the volume of transactions was 455 per cent of the previous year, whilst the number of Web buyers increased by 167 per cent, going from 360,000 buyers in 1998 to 960.000 in 1999 (almost 12 per cent of total Web users). However, recourse to e-commerce is still limited: in 2000, 11.6 per cent of companies conducted purchases online through the Internet and other networks. The percentage of online purchases out of total purchases is 1.9 per cent; 3.6 per cent of companies sold their own products and services online, amounting to less than one per cent of their total turnover. In general, the percentage of companies that offer online sales is significantly less that those that purchase online, although differences in terms of the value of transactions are contained.

Financial services represent one of the most dynamic segments of business-to-consumer e-commerce in Italy.

This can be broken down into two broad categories:

- Online banking — including all banking products and services (front office services, with the exception of security boxes) as well as insurance and loans (mortgages, credit, *etc.*); and
- Online trading — financial broking (and information) services.

[1] E-commerce is defined as the sale and contextual purchase of products and services (excluding financial services) via the World Wide Web. To be classified as e-commerce, a transaction must stem from the net. The Web buyer is thus the person that purchases via Internet directly (order and payment conducted through traditional means) or indirectly (all phases of the transaction conducted online) (SMAU, 2000).

Table 3.8: Diffusion of ICT technologies among the companies – 2001. Percentages of computerised companies

Business Sectors	Firms with Internet	Firms with web site	Firms that make online purchases
Food, drink and tobacco industries	83.4	40.1	10.0
Textile and clothing industries	69.2	30.4	6.0
Leather tanning, leather industries and the like	70.6	32.5	2.8
Wood and wooden products industry	82.9	33.7	6.4
Manufacturing of paper and derivatives; printing and publishing	86.5	43.6	13.0
Manufacturing of chemical products and synthetic and artificial fibre	94.4	50.8	11.7
Manufacturing of articles in rubber and plastic materials	88.6	42.3	9.0
Manufacturing of products from the processing of non metallic minerals	88.8	48.6	6.9
Manufacturing of metal and products in metal	80.6	39.5	6.8
Manufacturing of machines and mechanical equipment	91.0	59.8	13.5
Manufacturing of electric machines and electric and optical equipment	86.3	50.8	20.4
Manufacturing of vehicles	86.2	37.3	14.5
Other manufacturing industries	81.2	40.1	5.5
Wholesale and retail trade	84.1	34.6	12.8
Hotels and restaurants	77.6	50.4	13.5
Transport, storage and communications	86.2	32.0	11.4
Rentals, IT and other professional activities	95.6	37.6	22.1
Total manufacturing industries	82.2	42.2	9.2
Total services	84.9	36.8	15.1
Total	*84.0*	*40.1*	*11.6*
Number of workers			
10-49	81.6	37.1	10.8
50-99	93.2	57.6	15.3
100-249	95.7	61.2	18.8
250+	97.8	65.2	20.8

Source ISTAT (from Iammarino S, Jona-Lasinio C, Mantegazza S, 2002)

With regard to online banking, it is well known that the development of online banking services is still at an early stage in Italy compared with the other main European countries. This is not only due to structural impediments but also to the recent restructuring of the banking sector. This also leads us to suppose that the number of online banking users is destined to grow exponentially in the short term.

Online trading has taken hold alongside the more general development of financial markets and the diversification of investments, observed in particular in the last decade. Italy occupies eight of the top 50 positions in a ranking of top European online trading companies in terms of number of users: the top-ranked Italian company is in the 14th position whilst the others are grouped together between the 33rd and 45th positions.

Germany, the UK and France occupy almost all the highest positions in the ranking; in particular, the top five European online trading companies are all German. In terms of volume of transactions, online trading in Italy represented between five and ten per cent of total transactions in the sector.

3.5 ICT development dynamics in Italy

In this section, we look at ICT development dynamics in Italy in the last decade using an analysis of data on investment in ICT goods.

As already noted, during the 1990s there was a substantial transformation in products and production processes in Italian companies. Albeit slowly and later than other European companies, these companies have progressively adapted, although this has been by means of investment choices different from those used in the previous decade and better adapted to the new technological and market conditions created by the ICT revolution.

It emerges from sector studies[1] that in the IT area, during the period 1998-99, the software sector was the most dynamic, representing more than 20 per cent of the total ICT market. Hardware constituted approximately 15 per cent of investment spending, mainly due to considerable investment in PCs and new NT servers in particular, albeit increasing less than the sector as a whole. A clear downward trend in spending can be observed in the so-called office hardware segment (corresponding to the 'manufacturing of office machinery' sector) which had exceptionally low variation rates in the period under consideration.

In CT, the most consistent spending in investment goods was in telecommunications systems and networks. These can be subdivided into 'private telecommunications' (with approximately 70 per cent of the CT market) and 'infrastructure investments' or public networks, whose development in Italy is expected to rise in the next few years. In fact, it should be noted that the growth in operators present on the market, together with the consolidation of new technologies aimed at improving the speed of transmission

[1] SMAU 2000.

and extending the range of services offered, have brought about particularly significant transformations in the structure of infrastructure investments, both on the supply and demand sides, and will increasingly do so in the future.

Despite the fact that aggregating sectors into macro groups allows the available data to be more easily interpreted, it seems interesting to explain the trend of some of the individual purchasing sectors so as to supply a more detailed overview of ICT investments in the country during the 1990s. In particular, it is interesting to note how the rise in spending in investments in the new economy has mostly occurred in national specialisation sectors — especially the 'made in Italy' brands — that have been more subject to pressure from competition on international markets. This investment can be understood as part of innovative strategies to guarantee the maintenance (or strengthening) of competitive positions.

When compared with other sectors, it can be seen that higher growth rates have been registered in some branches within traditional sectors (food, textiles, clothing, leather goods and footwear). High growth rates are also to be found in the case of paper products, printing and publishing, products in plastic and glass, and above all, machine tools.

To sum up the analysis, it is interesting to examine the breakdown of spending by macro-branch of business. The percentage breakdown of spending in ICT investment goods, illustrated in Table 3.9, highlights how a third of the total stems from the industrial processing division, although the percentage falls considerably in the period under consideration, going from 40 per cent of the total in 1992, to 33.8 per cent in 2000. Forecasts of the SMAU observatory for subsequent years indicate a progressive erosion of the quota in the sector, although it remains the main

Table 3.9: ICT investment assets purchased, percentage composition by business

	Year 2000 %
Services + PA	26.2
Communications	17.6
Transport	2.2
Hotels	0.8
Trade	11.3
Credit	4.5
Construction	1.7
Industrial processing	33.8
Energy	1.7
Agriculture	0.1

Source: ISTAT (from Iammarino S, Jona-Lasinio C, Mantegazza S, 2002)

buyer of IT products thanks to the computerisation process linked to the improvement of competitive positions, not only by large companies but also, and increasingly so, by SMEs.

As for the tertiary sector, the divisions that contribute most to ICT spending are the public administration and communications services. In public administration, the areas that have mostly attracted ICT investments in recent years have been the construction of integrated statistical archives between the various administrative bodies and the distribution of innovative services to citizens: this is linked to the restructuring process of the Italian public sector during the 1990s, the modernisation of technological equipment and a sharp rise in the penetration of the Internet in all the main services offered.

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4. The General Dynamics of Employment Relocation in the Iberian Peninsula

In the Iberian context, eWork can only be understood within a broad context, that takes account of the ways in which telematics has facilitated the displacement of work and the relocation of employment. eWork is linked to jobs in which ICTs are used, such as information technology, administrative work, translation, call centres, some liberal professions, *etc*. However, the subject of study is not always displacement of workers in itself, but the relocation or delocalisation of employment, in the sense of closing business in one place and opening it in another, terminating employment in one place and creating it in another.

Furthermore, this process is facilitated by the new business relations (corporate groups, outsourcing, subcontracting, *etc*.).Though the appearance of eWork in the new economy has only been a significant phenomenon since the 1990s, certain features can already be detected. ICTs have penetrated Portugal and Spain less than other European countries, due to certain obstacles to their introduction, and to the relatively dependent situation of these economies in Europe.

The types of work impacted by ICTs in these ways can be divided into two broad categories: those involving relatively uncodified knowledge work, typified by design, marketing and administration functions (analysts, engineers, consultants, *etc*.), and those involving codified knowledge, in more routinised and standardised processes related to production (immediate or direct), and above all to post-production (repairs, maintenance, operators).

Across Iberia, the large cities act as centres of attraction for business, for the location of company headquarters, and for the generation of more dynamic markets. In general, the processes of design (multimedia, marketing, finance and accounting, *etc*.) are concentrated in areas of activity and business in which commercial proximity is crucial. Another major factor is proximity to centres of public administration and headquarters of major companies. In this case, Madrid and Lisbon are the main nuclei. In the international circuit Barcelona is also a major hub due to its tradition of contacts with Europe and its active business economy.

The large cities such as Madrid, Barcelona and Lisbon are poles of attraction for this type of activity, and in their orbit small, nearby towns are used to locate ICT workplaces. One reason for this is that they maintain a balance between the distance from the main business and administration centres and the costs of infrastructures and land. Though they are often no cheaper than other towns in rural areas or small cities, proximity is extremely important.

Both the functions of design, marketing and administration and the standardised processes tend to be concentrated in or near the large cities in the business circuit of semi-peripheral Europe, the former in the heart of the cities and the latter in the satellite cities that lie around them.

Technology parks that concentrate companies and work centres on an industrial estate are not common in Spain or Portugal, though there are a few isolated cases of geographical dispersion thanks to local government initiatives of offering cheap land for research and development. The aid offered by the European Objectives 1 of the Structural Funds is dependent on the relocation of centres. An example of this is the town of Boecillo, near Valladolid. When standardised processes are decentralised, they are located in medium-size towns near provincial capitals rather than in rural areas.

Due to the labour situation in the Peninsula, employee turnover is very high, particularly in call centres and basic programming, in which the quality of the jobs is very low, so workers do not stay in the sector long. Therefore, the need for pools of manpower forces companies to locate near large towns.

Also, the dependence of Spain and Portugal on European markets and capitals explains the idiosyncratic development of ICTs in the two countries. eWork is far less developed in the design functions, which depend largely on foreign investment, than in the standardised process functions, which create less added value and are less strategic for the progress of the economy. Furthermore, the use of computer equipment is growing more slowly than in other European countries, which is why both countries are lagging behind in the ICT development indicators.

However, there are differences between the two countries. Portugal develops ICTs oriented towards progress in its communications infrastructure, whereas Spain tends to develop ICTs in the area of services, and particularly in distribution. In the next section we look more closely at each country.

5. Characteristics of Spain

5.1 Penetration of the ICT society

In Spain, ICTs are being introduced very slowly, and though in recent years the situation has improved, it is still far behind that of other countries in the European Union. According to the Bank of Spain, 32.5 per cent of Spanish homes had a computer in March 2001, and only 20.3 per cent of the population had access to the Internet — a very low level in comparison with the European average.

According to figures from the *e-Europe Benchmarking Report*[1], on average, about 50 per cent of the population in the European Union have access to the Internet, including all habitual places of access such as homes, workplaces, schools and public places.

According to this source, the introduction of new technologies in homes and schools is very low in Portugal and Spain, which together with Greece have the lowest percentage of homes connected to the Internet. Spain is below the European average in the number of computers connected to the Internet in schools.

This slow introduction is partly due to the difficulties of cheap access to communications networks and, particularly in Spain, to

Table 5.1: Access paths per 100 inhabitants,1999*

	Fixed channels	Cellular mobiles	Average annual growth rate 1995-99
Spain	45.0	37.8	19
OECD	51.7	32.4	13
EU	54.3	39.6	14

* Telecommunication access paths include the total of fixed access channels (standard telecommunication lines and ISDN connections) and cellular mobile subscribers.

The latest data available for publication (1999) do not reflect major developments in network infrastructure, especially in the wireless segment. More recent data (2001) will be published in the biennial Communications Outlook (forthcoming 2003).

Source: OECD

[1] *e-Europe Benchmarking Report*, 5 February 2002, COM (2002) 62 final

the lack of effective competition in the telecommunications market, which keeps prices high. An effort must be made to promote education in IT, especially among adults.

With regard to access to ICT devices, Spain is below the EU average for fixed and mobile telephones. However, it has progressively closed the gap in recent years.

The penetration of broadband ADSL (number of DSL, cable modem lines and other broadband lines per 100 inhabitants) is very low, and here Spain at 0.46 even lags behind its neighbour, Portugal with 0.56 (OECD figures).

Another significant indicator is the number of secure servers per 100,000 persons. Spain has a ratio of 1.9 secure servers per 100,000 persons, which is only higher than that of Italy (1.4) and Greece (0.8), and is far behind the EU average of 4.4 secure servers per 100,000 persons.

The number of Internet hosts is only just over half the EU average, and the difference is even greater if compared with the OECD as a whole.

Table 5.2: Number of Internet hosts per 1,000 inhabitants, gTLDs adjusted* July 1997-July 2001

	1997	Difference 2001	Current 2001	OECD % share July 2001
Spain	4.01	22.17	26.17	0.01
EU	12.25	40.79	53.04	0.18
OECD	20.33	80.28	100.60	1.00

* Global top-level domains (gTLDs) are distributed to the country of location

Source: OECD

5.2 Infrastructures of ICT development

In Spain, the cost of telephone access to the Internet are above the European average, and the cost of broad-band ADSL access —the most widespread system, particularly in areas with no cable connection — is among the highest of all EU countries.

Table 5.3: Price of leased lines,* May 2002

Spain	121
Germany	57
France	67
Greece	75
Italy	100

* Charges for a basket of national leased lines of 2 megabits per second, OECD average=100

Source: OECD

A factor that particularly hinders the development of Internet employment is the high price of the flat rate, which in Spain (121) and Portugal (122) is double the price of other European countries.

Though Internet service providers are free in Spain, the use of telephone communication is comparatively very high, though it is lower than in Portugal.

Table 5.4: Price of 40 hours of Internet use at peak times, August 2001, in PPP dollars

	Fixed telephone charge	Telephone usage charge	Internet service provider
Spain	13.0	55.1	0.0
EU	13.8	37.9	10.8

OECD Internet access basket for 40 hours at peak times using discounted PSTN rates. In some countries ISP and PSTN usage charges are bundled and included under the ISP charge.

Source: OECD

The prices of access are also higher (even higher than in Portugal, 66.8), but the number of Internet hosts per 1,000 inhabitants is far lower than in other countries (but higher than in Portugal, 13.8).

Table 5.5: Internet access prices and Internet hosts*

	Average price for 20 hours Internet access 1995-2000, in PPP dollars	Internet hosts per 1,000 inhabitants July 2001
Spain	78.3	26.1
OECD	56.4	100.6

* Internet access costs include VAT and cover both peak and off-peak

Source: OECD

The main barriers perceived by computer user companies with ten or more employees are the instability and slowness of computer systems, and, as could be expected, the high cost of Internet access.

Table 5.6: Barriers perceived by businesses, 2001. Spain

	% computer users with >=10 employees
Lack of security (viruses, hackers)	38.0
Data communications too slow or unstable	43.4
Lacking qualification of personnel/lack of specific know-how	14.1
Costs to make it available too high	14.8
Internet access charges too high	23.1

Source: OECD based on Eurostat E-commerce Pilot Survey, 2001

This means that in 2001, according to the OECD, only 67 per cent of Spanish companies had access to the Internet, a ratio even lower than Portugal's 72 per cent.

According to Eurostat, computer users in both large and small Spanish companies stress that the cost of Internet access is a greater barrier than the cost of equipment.

Lack of qualifications is twice as serious a problem in companies with 10 to 49 workers than in companies with over 250 workers.

Table 5.7: Lacking qualification of personnel/lack of specific know-how; % computer users, Spain

No. employees	%
10-49	14.80
50-249	10.26
250+	7.67

Source: OECD based on Eurostat E-commerce Pilot Survey, 2001

5.3 Investment

When examining investment in ICTs measured as non-residential gross fixed-capital formation, Spain is slightly below the EU average, (including Portugal, 11.4 per cent in 2000), and is falling further behind.

Table 5.8: ICT investment[1], 1980-2000, % of non-residential gross fixed capital formation, total economy

	1980	1990	2000
Spain	5.6	11.9	10.1
EU	6.9	12.3	16.9

Source: OECD

Though Spain invests more in software and IT equipment, Portugal invests more in communications equipment. Therefore, it seems that the main shortcoming in Spain is in communications equipment, due to the low level of investment in this area.

Table 5.9: ICT investment by asset[1] 2000, Percentage of non-residential gross fixed capital formation, total economy

	Software	Communication equipment	IT equipment
Spain	3.9	2.8	3.4
Portugal	3.5	5.2	2.7

Source: OECD

[1] ICT equipment is defined here as computer and office equipment and communication equipment; software includes both purchased and own account software.

According to the OECD, the expenditure of companies on R&D in industrial ICT, as a percentage of GDP, decreased from 0.11 per cent to 0.06 per cent between 1990 and 2000. On ICT in the service sector, on the other hand, it rose from 0.02 per cent to 0.06 per cent. The percentage that ICT represents in total R&D fell from 29.4 per cent in 1990 to 17.2 per cent in 2000.

5.4 Employment

The figures on employment are not statistically unified and come from several sources. According to the employers' association SEDISI, direct employment in IT and telecommunications rose from 52,826 persons in 1992 to 68,759 (30 per cent) in 1998 and 76,933 in 1999.[1] The more comprehensive estimates of the employers' association ANIEL give a figure of 131,000 workers, as can be seen in Table 5.10.

Table 5.10: Spanish electronics and telecommunications industry in 1999

	Direct employment	Personnel devoted to R&D
Consumption	4,609	322
Electronic components	6,505	325
Professional electronics	5,638	979
Telematics	34,337	5,597
Operators and suppliers of telecommunications services	80,199	1,127
TOTAL	*131,288*	*8,350*

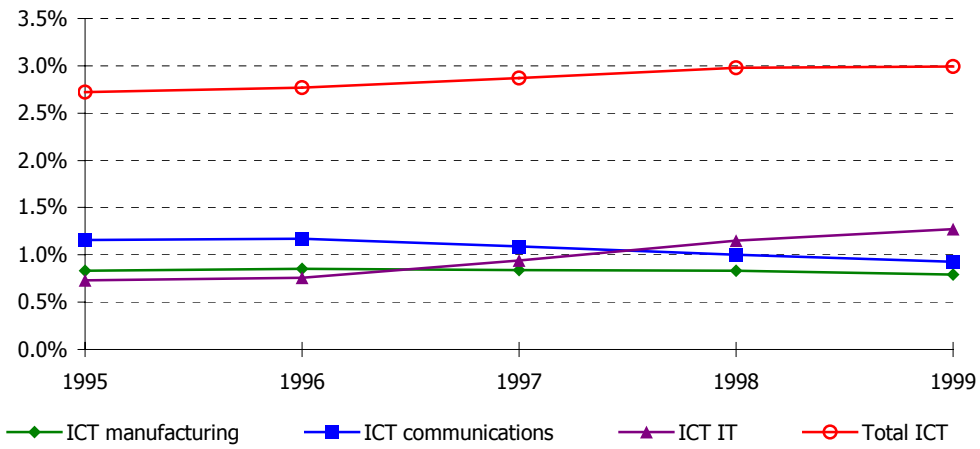
Source: CIREM using data from the employers' association ANIEL

This would give a total of 139,638 workers in the sector in 1999, representing 1.01 per cent of the active workforce in Spain. According to thorough, and internationally comparable, figures from the Bank of Spain, ICT jobs are increasing slightly as a proportion of total employment. However, within the ICT sector, jobs in IT are increasing in proportion, and those in manufacturing and communications are decreasing (Figure 5.1).

The proportion of IT workers among occupied persons (employees and employers) rose from 0.53 per cent to 0.92 per cent between 1995 and 1999. It is lower than the EU average, but higher than that of Portugal.

[1] Ministry of Science and technology/SEDISI, *Las tecnologías de la información en España 1999*.

Figure 5.1: ICT wage earner, % of total market economy, Spain



Source: Bank of Spain

Table 5.11: Computer workers, share of total occupation, 1995 and 1999

	1995	1999
Spain	0.53	0.92
Portugal		0.64
EU 14*	1.01	1.42

* 1995 estimated. Ireland is excluded from the EU average

Source: OECD, based on the Eurostat Labour Force Survey

The proportion is higher in private sector employment, but is still lower than the EU average.

Table 5.12: Share of ICT employment in business sector employment, 2000 (%)

	1995	2000
EU 11*	5.3	6.0
Spain	3.6	4.3

* Greece, Iceland, Ireland, Luxembourg missing

Source: OECD

On the other hand, the proportion of ICT employment in manufacturing employment fell from 1995 to 2000.

Table 5.13: Share of ICT employment in manufacturing employment, 2000 (%)

	Computer and office equipment	Other ICT manufacturing	Total ICT manufacturing	Change in the share 1995-2000 %
Spain	0.5	2.1	2.7	–0.1

Source: OECD

ICT employment in the service sector has increased by one percentage point. This is particularly due to the importance of computer-related services, which represent a high proportion in this sector.

Table 5.14: Share of ICT services in market services employment, 2000 (%)

	Telecommunication services	Computer and related services	Other ICT services	Total ICT services	Change in the share 1995-2000
Spain	1.4	2.1	1.6	5.1	1.0

Source: OECD

In summary, though employment in ICT in Spain has increased in recent years, and employment in IT in the service sector has grown, the growth is far from strong. Employment in telecommunications and manufacturing related to ICT has, in fact, decreased. Therefore, the growth in ICT employment is only occurring in the service sector. Though there is technological innovation in Spain, it is taking place at a slower rate than in other countries.

5.5 Development of the Spanish industrial fabric and the introduction of ICT

According to the study *Measuring the ICT sector of the OECD*, carried out in 1998, there were a total of 1,642 companies involved in ICT manufacturing in Spain. The Spanish IT sector is growing at a rate of 15 per cent per year (2nd quarter of 2000; according to the employers' association SEDISI), showing particular vitality in consumables (53.9 per cent), software (18.5 per cent), computer services (14.8 per cent) and hardware (12.2 per cent), and less in hardware maintenance (6.6 per cent). The Spanish ICT sector represented 1.93 per cent of GDP, according to SEDISI. EITO 2000 places it at 1.88 per cent also for 1999. However, it seems that the start of a general economic recession is particularly affecting technological companies, whose prospects are falling.

Economic growth was, until recently, the reason for the increase in employment in this sector. In the sectors traditionally associated with ICT, all the indicators suggest a moderate increase in recent years in Spain. There may, however, be some stagnation due to the crisis in this sector, for which there are two main reasons: exaggerated expectations of its evolution together with saturation of the market involving restructuring and concentration; and the oligopoly of the main telephone operator, which has prevented the development of new generations of production processes and product innovation.

According to the employers' association, CEOE, 52 per cent of companies are connected to the Internet in Spain, based on the figures of the Eurobarometer for March 2002, which is well below the EU average of 71 per cent.

The introduction of ICTs varies greatly according to the size of the company. In small companies (about 98 per cent of the companies in Spain are SMEs with fewer than 50 workers, representing about

55 per cent of the workforce) the use of ICT is far lower and the rate of introduction is far slower.

Whereas almost 100 per cent of companies with over 250 wage earners are connected to the Internet, only 42 per cent of small companies—the vast majority in Spain—are connected.

24 per cent of the companies connected to the Internet have a web page.

An optimistic figure was presented by the 'Comparative Assessment of eEurope Action', which stated that 90 per cent of the companies with more than ten employees in the EU are connected to the Internet, and 60 per cent have their own web page.

Table 5.15: Number of companies with wage-earners in Spain (by size of company)

Size	Total	1 to 9 wage-earners	10 to 49 wage-earners	more than 50 wage-earners
No. of companies	1,236,525	1,078,778	134,513	23,234
% of total	100.00	87.24	10.88	1.88

Source: DIRCE 2001 Instituto Nacional de Estadística (National Statistics Institute)

In terms of the connection technology used, only 0.8 per cent of Spanish companies used an ADSL connection in October 2000, though this figure is expected to rise considerably. Cable connection through a new broadband network is progressing slowly and selectively (in the areas around some large cities) possibly due to the dominant position of the main telephone operator in Spain. According to the Eurobarometer, the penetration of this technology was 1.3 per cent in October 2000, which is far below the EU average of 7.8 per cent.

The percentage of e-commerce is also very low. In November 2001, fewer than 10 per cent of Spanish companies were selling online. The European average is 22.9 per cent.

With regard to the use of ICTs by the workers in companies, a general figure of the Eurobarometer of November 2001 indicates that in Spain just over 40 per cent of workers use computers at work, whereas the European average is over 50 per cent.

Finally, Spain underwent a late industrialisation but has become progressively synchronised with Europe in the introduction of information and communication technologies, particularly in large cities. It is still far behind, however, in small cities and rural areas, and in small companies. Late industrialisation, early restructuring and dependence on industrial technology models may have facilitated the introduction of new European forms of work organisation, particularly in metropolitan areas, where the

localised development model was fragile, particularly in the last few decades.

Some cities (Madrid, Barcelona, Bilbao, Valencia, La Coruña, Santander, Seville, Valladolid, *etc.*) are completely interconnected with the international economy. However, there are some regional differences, with 'itineraries and circuits of economic progress' in which some regions obtain clear advantages and others are in a situation of vulnerability that leaves them far behind. When the data are broken down by region, it can be seen that over 60 per cent of companies are connected to the Internet in Madrid, the Canary Islands, Catalonia, Valencia and La Rioja, whereas the level of connection is low in Andalusia, Castilla y León, Galicia, Extremadura and Murcia.

The development of information and communication technologies made a decisive leap forward in the 1990s, particularly in the last half. However, exaggerated expectations led to a severe crisis, above all in the main sectors of its development, and there was also a slow-down in its development in industry as a whole.

The use of these technologies has involved a radical remodelling of work systems and organisation (currently in a situation of stand-by) rather than intra-regional physical delocalisation. Furthermore, there is a great physical concentration of workers, at least in the satellite towns of the large cities. This is because these cities have a critical mass that attracts business capital (infrastructures, sufficient number of qualified workers, moderate pay, language skills, competitive local policies, attractive tax structures, *etc.*) and are centres of decision-making and business.

At the same time, network companies or 'light' companies have developed by using subcontracting, new relations of dependence, and more flexible employment relations. The workforces are mainly located around the large cities, particularly in large business and technology parks where the most characteristic tasks of the ICT sector are concentrated, such as the satellite city of Madrid, Tres Cantos, where they take advantage of economies of scale and proximity and the formation of 'new technology factories'.

Furthermore, the relative dispersal of companies is associated with flexible business and employment relations (network companies, unstable employment and mobility) and location in places with low prices, rather than with the generalised use of new technologies. Most companies (and all large and medium-size companies) use mobile telephones, computers, e-mail and the Internet in their administration, communications, accounts and management, but this does not necessarily involve regional relocation.

The processes of relocation must be understood at an international level. Spain competes with eastern European countries, and even

with North African countries, as a place of investment in auxiliary industries or post-production technological services with European capital. The reason for these major relocations is cost competition, which gives a comparative benefit to the new semi-peripheries and markets around the extended EU.

5.6 Conclusions on the case studies in Spain

In Spain, companies continue to concentrate management and decision making in large cities such as Madrid and Barcelona, with branches in provincial capitals and production centres in small orbital districts.

Spain is a host and intermediate country for transnational investments, though the decision making, design, administration and marketing are located in Madrid, where the public administration is based. Barcelona is the centre for mediation towards Europe, with an environment of innovation, and forms a second hub for interchange in Spain.

5.7 Models of employment relocation in Spain

The analyses that have been made show the profile of three business models through three case studies.

5.7.1 The innovative model of outsourcing

This case concerns a company working in multimedia design of web pages, advertising and consultancy in online markets. It is located in Madrid, was founded in the 1990s, and has an aggressive policy of outsourcing, subcontracting and developing technological alliances in its different areas of business in order to minimise its commitments in case a branch fails. However, it maintains all the co-ordination of the business in one centre with young skilled workers employed under a new labour model who are creative and have a strong culture of loyalty to the company and teamwork.

This is a company specialised in the Internet that advises the internal departments of large companies on the formation and development of portals and their commercial design. Around 40 per cent of the jobs are filled by people who have emigrated from different cities to Madrid (Seville, La Coruña, Valencia, Vitoria, Bilbao, *etc*.) and also from Holland, France and Great Britain.

Over a period of 18 months, the company expanded from 13 workers to 66, though in the holding there are over 85. It creates indirect employment for independent programming companies, which are subcontracted, and this is difficult to quantify, but might at peak times of activity amount to 200 jobs.

The design functions are concentrated at the company's headquarters in Madrid, whereas programming, which is standardised, routine, unstable and requires a large staff, is located on the outskirts of the city and in provincial capitals.

5.7.2 The model of transnational relocation

This case concerns a company offering telecommunications support services (call centres) which emerged when the main telephone company in Spain relocated its local call centres to the main provincial capitals (where they use a model of flexible employment and low job qualifications), to the outskirts of Madrid, and even to North Africa.

Currently, the process of relocating the activity of customer services developed by the company is divided into two types: those which take place within the country and those involving international relocation.

As an example of the first type, during its recent relocation processes the company set up three large call centres in medium-sized towns in Spain. The most recently founded centre opened in 2001 in Cáceres (a provincial capital of 80.000 inhabitants).

The opening of a large call centre in the city resulted from direct action taken by the autonomous institutions (Junta de Extremadura), taking advantage of a sufficiently developed technological and telecommunications infrastructure to offset the cost of these elements as a factor in choosing the destination.

In selecting the location, considerable importance was given by the company to the availability of a well-qualified, young workforce (the company claims that 80 per cent of the workers have studied at university, and in Cáceres 43 per cent of the population are under 30, compared with 39 per cent for the whole of Spain), and a labour market with a high rate of unemployment (23.9 per cent in Extremadura, compared with 13,4 per cent in Spain).

The other type of relocation involves a move overseas. One example of this is the diversion of customer services calls to new call centres located in northern Morocco. In this case, in addition to the institutional support shown by the local authorities, workers who can take calls in a variety of different languages, mainly Spanish, are available. It must be remembered that northern Morocco, which was a Spanish colony until the 1950s, is the source of a great deal of trade and emigration into Spain and Spanish is still taught in the schools of the urban areas in the region.

Among the reasons for choosing this location are also purely economic factors, such as lower labour costs than if workers were

contracted in Spain, and of no lesser importance is the fact that companies which set up in northern Morocco enjoy generous tax exemptions.

5.7.3 The model of transition and consensus

Another case concerns a company providing outsourced services to a large motor manufacturer, which had taken on all the workers of the financial, accounting, technological, administrative and other services of the subsidiaries.

In this case, the activity was concentrated in a provincial capital of the Basque Country, in Lisbon and in Madrid. The medium-term plan of the company was to centralise all European accountancy of the group in the outskirts Madrid.

Because the collective agreement did not provide for geographic mobility, the company designed a model that involved replacing older workers with younger ones, transforming the work culture (qualified work, teamwork, technology, *etc*.), and giving incentives for workers to move to another town in the medium term through a process of negotiation and consensus.

The result was no immediate structural relocation of employment, but a change of culture, organisation and generation has been introduced that may make this possible in the future. Meanwhile, the three centres maintain a virtual relation to each other, specialising in complementary tasks and maintaining a functional co-ordination through telematics as a pilot experience. The company has adopted this project as an interim solution because the workers are firmly opposed to geographical mobility.

6. Characteristics of Portugal

To describe the situation in Portugal more fully and comprehensively, we have differentiated several areas of importance in order to observe the development of ICT. As far as possible, we attempt to present a comparison with other countries in Europe. We analyse successively the introduction and spread of the use of ICT among the population: the level of access; the situation of the infrastructures; indicators of economic effort in the development of ICT; the situation of employment in the area; and the size of the industrial fabric devoted to ICT.

6.1 Penetration of ICT in Portuguese society

In Portugal, ICTs are being introduced very slowly, and though in recent years the situation has improved, it is still far behind that of the other countries of the European Union. In the European Union, Portugal has the lowest number of computers connected to the Internet. Access using fixed channels is low, but the expansion of mobile telephones is far higher than in other European countries (Table 6.1).

With regard to the penetration of broadband access, in June 2001 the number of ADSL lines, cable lines and other types of broadband access was, according to the OECD, far higher, for example, than in Spain (0.56 per 100 in habitants, compared with 0.46 in Spain). However, the number of Internet hosts per 1,000

Table 6.1: Access paths* per 100 inhabitants, 1999†

	Fixed channels	Cellular mobiles	Average annual growth rate 1995-99
Portugal	42.3	46.8	22
OECD	51.7	32.4	13
EU	54.3	39.6	14

* Telecommunication access paths include the total of fixed access channels (standard telecommunication lines and ISDN connections) and cellular mobile subscribers.

† The latest data available for publication (1999) do not reflect major developments in network infrastructure, especially in the wireless segment. More recent data (2001) will be published in the biennial Communications Outlook (forthcoming 2003).

Source: OECD

Table 6.2: Number of Internet hosts per 1,000 inhabitants, gTLDs adjusted*, July 1997-July 2001

	1997	Difference 2001	Current 2001	OECD share (%), July 2001
Portugal	3.11	10.71	13.82	0.00
EU	12.25	40.79	53.04	0.18
OECD	20.33	80.28	100.60	1.00

* Global top-level domains (gTLDs) are distributed to the country of location

Source: OECD

inhabitants is considerably lower than the EU average, though it has increased greatly in recent years (Table 6.2).

Another significant indicator is the number of secure servers per 100,000 persons, with a ratio of 1.2 per 100,000 persons in Portugal, compared with the EU average of 4.4 per 100,000 persons. With regard to the use of ICT by the workers in companies, a general figure of the Eurobarometer of November 2001 indicates that in Portugal fewer than 30 per cent of the workers use computers at work, whereas the European average is over 50 per cent.

Indeed, there is an unequal expansion of the use of ICT in Portugal. Their use is spreading among the population, but in the working environment and in the entrepreneurial initiative to develop ICT, Portugal still lags far behind the rest of the EU.

6.2 Infrastructures

The infrastructures and prices may be hindering the introduction and development of ICT in Portugal. For example, as in Spain, the flat rates are considerably higher than those of other EU countries, which hinders open use of the Internet.

The prices of Internet access are also far higher than the EU average. There is no doubt that this is also a factor that limits the expansion of Internet use.

Table 6.3: Price of 40 hours of Internet use at peak times, August 2001, in PPP dollars. OECD Internet access basket for 40 hours at peak times using discounted PSTN rates*

	Fixed telephone charge	Telephone usage charge	Internet service provider
Portugal	18.4	57.4	0.0
Spain	13.0	55.1	0.0
EU	13.8	37.9	10.8

* In some countries ISP and PSTN usage charges are bundled and included under the ISP charge

Source: OECD

Table 6.4: Price of leased lines, May 2002. Charges for a basket of national leased lines of 2 megabits per second, OECD average=100

Portugal	122
Spain	121
Germany	57
France	67
Greece	75
Italy	100

Source: OECD

The prices of Internet access are high (but lower than in Spain), and the number of Internet hosts per 1,000 inhabitants is very low.

Table 6.5: Internet access prices and Internet hosts*

	Average price for 20 hours Internet access 1995-2000, in PPP dollars	Internet hosts per 1,000 inhabitants July 2001
Portugal	66.8	13.8
Spain	78.3	26.1
OECD	56.4	100.6

* Internet access costs include VAT and cover both peak and off-peak

Source: OECD

The main barriers to Internet use, as perceived by companies with ten or more employees, are the lack of security, instability and slowness of computer systems. These are considered far more important than the high cost of Internet access and the lack of qualified staff (Table 6.6).

The lack of qualified staff seems be a comparatively important problem in Portugal, particularly in smaller companies (at least in

Table 6.6: Barriers perceived by businesses, 2001. % computer users with ten or more employees

Lack of security (viruses, hackers)	Portugal	50.4
	Spain	38.0
Data communications too slow or unstable	Spain	43.4
	Portugal	32.1
Lacking qualification of personnel/lack of specific know-how	Portugal	21.3
	Spain	14.1
Costs to make it available too high	Portugal	15.7
	Spain	14.8
Internet access charges too high	Portugal	23.5
	Spain	23.1

Source: OECD based on Eurostat E-commerce Pilot Survey, 2001

Table 6.7: Lacking qualification of personnel/lack of specific know-how, % of computer users

	Portugal	Spain
10-49	21.47	14.80
50-249	18.48	10.26
250+	15.35	7.67

Source: OECD based on Eurostat E-commerce Pilot Survey, 2001

comparison with Spain). However, it is not the main barrier perceived by Portuguese entrepreneurs.

6.3 Investment

Another important variable for the real economic development of ICT, is the level of investment devoted to its expansion. Portugal practically doubled its investments in non-residential gross fixed-capital formation in the 1980s, but the evolution was slower in the 1990s.

Table 6.8: ICT investment[1], 1980-2000,% non-residential gross fixed capital formation, total economy

	1980	1990	2000
Portugal	6.1	10.6	11.4
EU	6.9	12.3	16.9

Source: OECD

This investment is mainly in communications equipment (to a far greater extent than in Spain), whereas there is little investment in IT equipment and software.

Table 6.9: ICT investment by asset[1] 2000, % non-residential gross fixed capital formation, total economy

	Software	Communication equipment	IT equipment
Spain	3.9	2.8	3.4
Portugal	3.5	5.2	2.7

Source: OECD

6.4 Employment

Employment can be studied by subsector. In the Manufacturing and Services ICT subsector, between 1985 and 1998 there was a decrease in the number of workers from 107,018 to 78,546.

[1] ICT equipment is defined here as computer and office equipment and communication equipment; software includes both purchased and own account software.

However, it must be stated that the Portuguese Standard of Economic Activity Classification (CAE) has undergone major changes, and whereas in 1985 postal and telephone services were reported together, they are now separate.

Considering only Manufacturing ICT, the number of workers fell from 30,350 to 17,376 in the same period. Another factor to be taken into account is that in 1985, part of the industry was reclassified as services. In the area of commerce, the number of workers rose in this period from 12,242 to 27,861, whereas in the service-providing sector it fell from 19,999 to 10,577. These figures, however, may not be fully reliable because in the national statistics, small companies do not tend to respond to surveys of this type.

In the subsectors that are not part of the ICT sector but require ICT services, such as telematics and telecommunications service operators and suppliers, 23,944 persons were involved in professions within the ICT sector in 1998. Of these, 8,316 worked as electronics and telecommunications technicians. These professions were basically distributed in the following areas: postal services and telecommunications, air transport, manufacture of radio, TV and communications devices; manufacture of transportation material; and wholesaling and commercial agents.

There are 15,628 individuals classified as programmers, computer operators, and the like. These are distributed throughout the wholesale and commercial trade, retail, computer-based activities and similar, and other activities providing services to companies. (Source: EIRO[1] based on Department of Labour, Training and Professional Statistics, Ministry of Labour and Solidarity Departamento de Estatística do Trabalho, Emprego e Formação Profissional, Ministério do Trabalho e da Solidariedade, DETEFP)

Furthermore, Portugal has a lower proportion of computer workers than the EU average, and even lower than that of Spain.

Table 6.10: Computer workers, share of total occupation, 1995 and 1999

	1995	1999
Spain	0.53	0.92
Portugal		0.64
EU-14*	1.01	1.42

* 1995 estimated. Ireland is excluded from the EU average

Source: OECD, based on the Eurostat Labour Force Survey

[1] Cristovam ML (2001), 'Eiro Comparative Study on industrial relations in the information and communications technology sector: The case of Portugal'. www.eiro.eurofound.ie

In the private sector ,the proportion of employees in occupations related to ICTs is also lower than the EU average, and has even decreased in recent years.

Table 6.11: Share of ICT employment in business sector employment, 2000 (%)

	1995	2000
EU 11*	5.3	6.0
Portugal†	3.8	3.7

* Greece, Iceland, Ireland, Luxembourg missing

† Rental of ICT goods (7123) is not available

Source: OECD

The share of ICT manufacturing in manufacturing employment has decreased, and in computer and office equipment it is practically nil.

Table 6.12: Share of ICT manufacturing in manufacturing employment, 2000* (%)

	Computer & office equipment	Other ICT manufacturing	Total ICT manufacturing	Change in the share 1995-2000 %
Portugal	0.0	2.4	2.5	–0.1

* Rental of ICT goods (7123) is not available

Source: OECD

Finally, in services, the share of this type of employment has fallen in recent years. The share of 'other ICT services' is the highest within this service sector.

Table 6.13: Share of ICT services in market services employment, 2000* (%)

	Telecommunication services	Computer and related services	Other ICT services	Total ICT services	Change in the share 1995-2000 %
Portugal (4)	1.4	0.8	2.3	4.5	–0.2
Spain	1.4	2.1	1.6	5.1	1.0

* 'Other ICT manufacturing' includes communication equipment, insulated wire and cable and precision instruments. 'Other ICT services' includes wholesale and rental of ICT goods

Source: OECD

6.5 Development of the Portuguese business fabric and the introduction of ICTs

Although the actual number of workers has decreased, the number of companies in consumer goods, electronic components and professional electronics increased from 1,917 to 4,397 between 1985 and 1998. This may have been sparked by:

- the decrease in companies in the industry sector and the increase in companies in the service sector
- the restructuring that has taken place in sectors such as communications, which has led to the fragmentation of certain companies.

With regard to the use of ICTs by companies, the *eEurope Benchmarking Report* states, for example, that almost 90 per cent of companies in the European Union with more than ten employees use the Internet, and 60 per cent of these companies have a web page. On this point, it makes specific mention of Portugal 'where the Internet is used in only about two-thirds of all companies and only about one-third have a web page'. In 2001 the figure was 72 per cent, still below the EU average but above that of Spain.

Table 6.14: Businesses with Internet access, 2000-2001*, percentage of businesses with ten or more employees, 2001

Portugal	72.0
Spain	67.0

* Beginning 2001

Source: OECD, ICT database and Eurostat, E-Commerce Pilot Survey 2001, August 2002

The percentages of e-commerce are also very low according to the Eurobarometer. In November 2001, only three per cent of Portuguese companies were selling online, compared to the European average of 22.9 per cent.

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7. Characteristics of Greece

We begin this section by summarising the results of the EMERGENCE employer survey in Greece, and then proceed to contextualise this information with background data on the Greek economy, including the penetration of ICTs, business and labour market characteristics, and Government policies.

7.1 eWork in Greece

The EMERGENCE employers' survey carried out in 2000 was unfortunately only able to address enterprises with more than 50 employees. In most European countries this created a lack of total representativeness. This was especially true in Greece, where large companies constitute a very small minority (just 0.6 per cent) of all enterprises, and have behaviour which is highly differentiated from that of the traditional micro-enterprises. Very small enterprises constitute the vast majority of the enterprises employing up to 49 persons (97.7 per cent of Greek enterprises employ less than ten persons).

Table 7.1: Enterprises by size in Greece (1997)

TOTAL	0-49	50-299	300+
465,552	462,351	2,531	256

Source: National Statistical Service of Greece, 1998

In the case of the large (>50 employee) establishments covered in the EMERGENCE survey, Greece is a country with high levels of eWork and call centre use, with 74 per cent of all enterprises practising some type of eWork. Outsourcing is a usual practice, justified by the fast pace of technological developments, the lack of experienced staff in-house and the high costs for creating a new service internal to the organisation. The limited (well below average) supply of eServices revealed by the survey probably hides a dominance of micro-businesses in the provision of services (functioning as subcontractors).

The fact that labour in Greece, compared to other European countries, is 'low-cost', which in turn implies the ability to compete successfully for competitive tenders, leads the region of Attica to be one of the top destinations for data processing and

typing, a type of services that is directly related to labour costs as a major, or the sole, selection criteria. When 'expertise' is the main selling point, in all cases ('financial and accounting services', 'software development and support', 'financial and accounting services') apart from the 'creative functions', Greece is not a highly preferred location.

Recent research literature shows a concentration of ICT activities in the large cities of Athens, Thessaloniki, Heraklion, Patras (capitals of the respective regions of Attica, Central Macedonia, Crete, Western Greece).

7.2 The ICT sector in Greece

The use of information and communications technologies in Greece is constantly expanding. The total expenditure on ICT as a percentage of GDP has increased from 2.4 per cent in 1992 to almost five per cent in 2000.

It is important to note, though, that the major share of ICT expenditure was invested on the upgrading of the telecommunications infrastructure IT expenditure, at 1.2 per cent,

Table 7.2: Expenditure on Information Technology as a percentage of GDP

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
US	4.45	4.54	4.55	4.70	4.93	5.03	5.21	5.31	5.47	5.30
Japan	3.83	3.42	3.23	3.24	3.60	3.81	3.86	3.57	3.80	4.00
EU15	*3.03*	*3.23*	*3.13*	*3.13*	*3.17*	*3.43*	*3.57*	*3.9*	*4.17*	*4.17*
Belgium	3.38	3.45	3.35	3.18	3.34	3.65	3.97	4.33	4.48	4.48
Denmark	3.94	4.05	3.85	3.98	4.10	4.26	4.77	5.04	5.38	4.99
Germany	2.94	3.02	2.97	2.84	2.96	3.28	3.62	3.95	4.25	4.22
Greece	**0.71**	**0.8**	**0.84**	**0.92**	**0.9**	**0.93**	**1**	**1.09**	**1.22**	**1.2**
Spain	1.62	1.66	1.56	1.54	1.56	1.66	1.78	1.85	1.96	1.94
France	3.59	3.75	3.60	3.67	3.74	4.11	4.09	4.33	4.65	4.75
Ireland	2.35	2.37	2.29	2.27	2.18	2.01	2.38	2.47	2.43	2.25
Italy	1.80	1.92	1.85	1.88	1.78	1.87	2.01	2.21	2.41	2.48
Luxembourg	:	:	:	3.87	4.21	4.94	5.37	5.26	5.45	5.44
Netherlands	3.96	3.95	3.86	3.74	3.84	4.14	4.83	5.20	5.31	5.19
Austria	2.73	2.82	2.76	2.78	2.80	3.09	3.30	3.52	3.82	3.78
Portugal	1.24	1.34	1.33	1.48	1.48	1.49	1.73	1.86	1.96	1.93
Finland	2.93	3.29	2.05	3.16	3.36	3.54	3.89	4.34	4.52	4.38
Sweden	4.37	5.17	4.97	4.82	4.73	5.25	6.24	6.48	6.92	6.77
UK	4.43	4.83	4.64	4.83	4.90	4.89	4.82	5.15	5.56	5.62
Iceland	:	:	:	:	:	:	:	:	:	:
Norway	3.24	3.31	3.20	3.29	3.26	3.48	3.96	4.30	3.88	3.66

Source: Eurostat, 2003

Table 7.3: Percentage of high tech and medium-high tech manufacturing in total employment in 2001: EU-15 averages and regional extremes

Average		Region with the highest percentage		Region with the lowest percentage	
EU*	7.6				
Belgium	6.6	Antwerpen	9.3	Bruxelles-capitale/Brussels hoofdstad	3.2
Denmark	7.0				
Germany	11.2	Stuttgart	21.0	Mecklenburg-Vorpommern	3.7
Greece	**2.2**	**Attiki**	**3.5**	**Dytiki Ellada**	**1.4**
Spain	5.5	Comunidad Foral de Navarra	11.2	Canarias	0.8
France	7.2	Franche-Comté	16.6	Languedoc-Roussillon	1.6
Ireland	7.3	Border, Midlands and Western	7.4	Southern and Eastern	7.2
Italy	7.4	Piemonte	13.8	Calabria	1.4
Luxembourg	1.2				
Netherlands	4.3	Limburg	8.0	Noord-Holland	1.9
Austria	6.5	Oberösterreich	9.0	Burgenland	4.6
Portugal	3.6	Lisboa e Vale do Tejo	4.8	Centro	3.2
Finland	7.4	Etelä-Suomi	9.0	Itä-Suomi	4.2
Sweden*	7.9	Västsverige	10.5	Stockholm	5.8
United Kingdom	7.2	Herefordshire, Worcestershire and Warwickshire	13.3	Inner London	1.5

Source, Eurostat, 2002

is the lowest in EU-15, but telecommunications expenditure, at 3.8 per cent is the highest in EU-15 (Table 7.2).

According to the findings of the first large-scale survey into the demand for occupations and skills (Ministry of Labour, 2000), the demand for occupations related to ICT is almost negligible in Greece (although PC literacy is a prerequisite for most jobs) apart from in the four cities mentioned previously ,and their peripheral (satellite) locations, where the demand for a range of ICT-related occupations is becoming 'visible'.

In the case of Heraklion and Patras, the existence of academic communities highly active in ICT research, has boosted ICT-related business activities.

When making a comparison with other member states regarding the level of employment in high-tech and medium high-tech

Table 7.4: Percentage of knowledge intensive services in total employment in 2001: EU-15 averages and regional extremes

Average		Region with the highest percentage		Region with the lowest percentage	
EU*	32.9				
Belgium	38.1	Vlaams Brabant	45.6	Hainaut	32.3
Denmark	42.7				
Germany	31.0	Berlin	43.1	Niederbayern	23.8
Greece	**22.8**	**Attiki**	**30.1**	**Anatoliki Makedonia, Thraki**	**13.1**
Spain	24.9	Comunidad de Madrid	36.5	Galicia	19.2
France	35.0	Île de France	45.3	Centre	27.8
Ireland	31.9	Southern and Eastern	34.1	Border, Midlands and Western	25.3
Italy	26.9	Lazio	33.7	Abruzzo	21.6
Luxembourg	35.8				
Netherlands	40.0	Utrecht	49.2	Noord-Brabant	34.2
Austria	29.3	Wien	41.5	Burgenland	25.0
Portugal	19.1	Lisboa e Vale do Tejo	26.2	Centro	14.9
Finland	39.1	Åland	49.4	Väli-Suomi	34.9
Sweden*	45.7	Stockholm	53.2	Småland med öarna	39.8
United Kingdom	40.3	Inner London	61.1	Cumbria	30.0

Source, Eurostat, 2002

manufacturing[1] as a proportion of total employment, Greece is behind all other member states, except Luxembourg (Table 7.3).

Greece ranks lowest among the EU-15 countries as regards employment in knowledge intensive services (KIS). It should also be noted that the region of Greece with the highest percentage of employment in KIS (Attiki, with 30.1 per cent) is below the EU average (32.9 per cent)

In the public sector, significant developments have taken place in the recent past, boosting the use of ICTs from almost negligible levels to 20 per cent among public sector employees.

[1] High tech and knowledge intensive industries include the following activities (NACE at the 2 digit level):

High tech manufacturing: Manufacturing of office machinery, computers, radio, television, communication equipment, medical precision and optical instruments, watches and clocks

Medium-high tech manufacturing: Manufacture of chemicals, machinery and equipment n.e.c., electrical machinery and apparatus n.e.c., transport equipment

High tech services: Post and telecommunications, computer and related activities, research and development

Table 7.5: Number of business PCs per 100 white collar workers

Norway	110
US	105
Sweden	85
Ireland	84
Switzerland	83
Denmark	68
Netherlands	64
Finland	63
Austria	62
UK	57
EU	54
France	54
Belgium/Luxembourg	52
Germany	51
Spain	50
Italy	46
Greece	**37**
Portugal	27
Japan	24

Source: Ministry of National Economy, 2001

Buying and selling over the Internet is not a widespread practice in Greece, which occupies the last position in member states as regards e-commerce. While almost 60 per cent of all enterprises with ten or more employees use the Internet, less than three per cent of place orders over the Internet, while the number of those that receive orders is negligible. The main obstacle here is the lack of trust and legislative gaps regarding the security of electronic transactions.

Greece falls below the EU average as regards the costs both of local and national phone calls (at 0.36 and 0.98 respectively, compared with EU averages of 0.41 and 1.15, respectively). The prices of the Internet-related market (design of web pages, cost of maintaining a web page, *etc.*) were until recently discouraging for enterprises, but there is a notable downward trend due to the large competition that has arisen. However, this is soon expected to change. The government has launched a programme that co-finances such activities, for enterprises that wish to acquire internet access, a corporate internet site and an Internet address.

The introduction of new technologies into homes and schools is notably low, well below the EU average: in 2001 just ten per cent of all households had access to the Internet (as compared with an EU average of 37.7 per cent). Table 7.6 shows the relevant data from 1998.

Table 7.6: Home-based PC and communication systems (% of population) — 1998

	PC	CD ROM	Fax Modem	Internet
Belgium	33.0	19.1	10.1	8.2
Demark	56.7	44.8	24.5	24.6
W Germany	31.9	23.7	11.2	7.7
E Germany	25.3	19.7	6.3	4.9
Germany total	30.5	22.9	10.2	7.1
Greece	**12.2**	**7.0**	**2.4**	**2.9**
Estonia	28.4	17.9	4.6	5.0
France	22.8	17.1	5.5	3.9
Ireland	26.3	16.6	9.0	8.4
Italy	26.6	16.8	7.0	6.1
Luxembourg	42.5	34.5	15.0	14.0
Netherlands	58.8	39.5	24.7	19.6
Austria	30.8	24.3	9.6	6.8
Portugal	18.4	10.9	4.2	3.4
Finland	38.6	27.3	17.7	17.2
Sweden	59.8	49.5	34.3	39.6
UK	35.2	19.7	9.3	10.7
EU-15	30.8	20.8	9.3	8.3

Source: Ministry of National Economy, 2001

Relevant information from a different source (World Competitiveness Yearbook 1998) shows a higher percentage as regards internet use. OECD figures for more recent years (OECD, 2002) show a sharp increase in internet connections , with the figure reaching 17,7 per cent of the population.

The presence of computers and access to the Internet in primary schools is approximately three per cent, while at the secondary education level the situation is considerably better, with 59 per cent of schools fully equipped with PCs and 38 per cent with access to the Internet). Higher education institutions offer access to PCs and the Internet to 42 per cent of the members of the academic community.

In general, the main obstacles to the large-scale diffusion of ICTs in Greek households have been the lack of computer literacy, and questions of access, quality of services and cost of purchase.

Table 7.7: Computers (hosts) connected to the Internet per 1,000 inhabitants

	1992	1993	1994	1995	1996	1997	1998
Austria	1	2	3	7	11	14	19
Belgium	0	1	2	3	7	11	18
Denmark	1	2	4	10	21	33	55
Finland	3	7	14	41	56	63	89
France	0	1	1	3	4	6	8
Germany	1	1	2	6	9	14	17
Greece	**0**	**0**	**0**	**1**	**2**	**3**	**4**
Ireland	0	1	2	4	8	11	14
Italy	0	0	1	1	3	3	6
Luxembourg	0	1	1	5	9	12	17
Netherlands	2	3	6	11	18	26	38
Portugal	0	0	1	1	2	4	5
Spain	0	0	1	1	3	5	7
Sweden	3	5	9	17	27	29	46
UK	1	2	4	8	12	18	24
Norway	4	7	11	20	35	68	72
Switzerland	3	5	7	12	19	27	33
USA	N/a	N/a	4	17	29	35	N/a
Canada	N/a	N/a	N/a	N/a	N/a	29	N/a

Source: IMD 1997,1998

7.3 Policies currently implemented in Greece to promote ICT

The Greek government attaches a particular importance to promoting the information society (IS) in Greece; an Operational Program for the Information Society (OPIS) for the period 2000-2006 is being implemented, with a budget of 2.8 billion Euro (public and private expenditure).

A number of government initiatives are aimed at improving the exploitation and use of new technologies in the economy, at the development of electronic commerce, and at the promotion of co-operation between enterprises and research entities.

The policies currently implemented cover five major areas of intervention listed below.

1. Technology diffusion to individuals and households:
    a) Equipping all schools with the necessary IT, network and audio-visual equipment, creation/upgrading of IT labs in universities and technical colleges.

b) Creation of public Internet access points — upgrading of the role and the services of public libraries (transformation to open information access centres).

c) Greater competition in local access networks and unbundling of the local loop reduced leased lines tariffs, lighter licenses granting requirements.

2. Technology diffusion to businesses:

a) Adoption of new business practices that will improve quality of services and promote electronic businesses.

b) Reinforcement of support mechanisms for small and medium enterprises (SME) in all sectors of the economy.

c) Introduction of electronic tendering procedures, including by public administration.

d) The New Economy Development Fund S.A. The purpose of the company is to co-finance the formation of venture capital funds, which will be investing in innovative businesses.

3. Government development and demonstration projects:

a) Development of local access network infrastructure.

b) Support the development of broadband services for the public sector.

c) Improved quality services to citizens and firms by the public administration, (Government on line).

4. Education and training initiatives:

a) Development of basic IT skills for the wider population .

b) Training of 5 000 people on advanced IT skills — increase the number of jobs in the ICT sectors by 80 per cent.

c) Support of telework and teletraining pilot applications.

d) Creation of training packages accessible by all.

e) Training of teachers in the use of Internet and multimedia resources as an educational tool.

5. E-content development:

a) Creation and dissemination of digital content and information (databases, libraries, *etc.*)

b) Support of the development and dissemination of tutorial multimedia material and promotion of the certification of scholarly software applications.

The quantified objectives of the 2000-2006 policy are presented in Table 7.8.

Table 7.8: Operational Programme for the Information Society 2000–2006, operational objectives

	2000	2006
EDUCATION		
Schools equipped with PC		
Primary education	3%	72%
Secondary education	59%	100%
Schools connected to the Internet	5%	100%
Primary education	3%	100%
Secondary education	38%	100%
Students/PC	51/PC	10/PC
Primary education	1,097/PC	12/PC
Secondary education	31/PC	9/PC
IT users at universities	42%	100%
Training for teachers (ECDL[1] type)	8,000	100,000
Beneficiaries from teletraining applications	2,000	50,000
PUBLIC SECTOR		
Employees/PC	20	70
Interconnected Public Services		
Ministries	75%	100%
Prefectural governments	2%	100%
Municipalities	0.2%	c
Public hospitals with internet access	22%	100%
Local Health Centers with internet access and relevant equipment	0%	100%
EMPLOYMENT AND DEVELOPMENT		
Internet user/100 individuals	5	50
ICT expenditure (% of GDP)	4.1%	6.2%
e-commerce (enterprises)	negligible	15%
Secure web servers	negligible	30%
Employment in ICT sectors	47,850	87,000

Source: Ministry of National Economy, 2001

7.4 Conclusions from the case studies in Greece

In the framework of the EMERGENCE research project, three case studies have been carried out in Greece. These cases are representative examples of relocation.

[1] European Computer Driving Licence

Case study 1: a transregional relocation model

The first case study concerns a major public hospital that, in 1989, installed a telemedicine system to link up with 39 remote health centres in order to cope with the huge demand from remote areas for specialised health services.

The initiative had a positive impact on employment (new staff hired at the local health centres) and is a predecessor of a wide trend in the public sector to exploit ICT in order to improve quality of life in remote areas.

Case study 2: a case of cross border relocation

The second case study concerns an international company with a subsidiary in Greece (as well as in other European countries) that decided to centralise its IT and accounting function at their headquarters, located in an EU country, in order to exploit the potential for economies of scale.

The decision led firstly to a better organisation of the information flow (the information flow between the subsidiaries and headquarters is standardised and harmonised on the basis of well defined procedures). It also led to the development of advanced knowledge management: the new central service is partly staffed by the best IT experts previously working for the subsidiary companies.

This is also a representative case for Greece; the country is usually the host of multinational activities, and not the core, and there are many examples in the recent past of relocation of subsidiary companies to other more 'advantageous' countries.

Case study 3: a case of outsourcing

In this case, a private, software development company, affiliated to one of the largest IT groups in Greece, decided to outsource large-scale projects involving innovative software development to a former USSR republic, where a team of highly skilled programmers was based. The main motives for this decision were firstly the lower costs of labour (70 per cent lower than Greece). and secondly the shortage of qualified programmers in the Greek labour market.

This case is representative for a number of Greek enterprises that outsource part of their production to EU Accession countries in order to take advantage of low labour costs.

Many enterprises of the new economy have expanded their activities to other Balkan countries and to the former USSR republics.

7.5 Conclusions

A number of general conclusions can be drawn from this research:

- In Greece, as regards cross-border relocation, only rarely does it constitute the 'destination' point.
- Within the country, on the basis of a clearly targeted policy, the ICT is promoted to erase the disadvantages stemming from difficulties of access due to geographical or socio-economic factors.
- In many cases, a decision for relocation is not a product of a well organised plan, or part of a specific strategy of the enterprise. It occurs out of a coincidence, or due to an individual's motivation or will.
- In the private sector, it seems that 'cost' is the main determinant for relocation.
- There is no evidence that social partners play a significant role in any decision on relocation.
- So far, for all cases examined, the impact on employment seems not to be significant.

7.6 Bibliography

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