Caminhos nas Ciências Sociais: Memória, Mudança Social e Razão — estudos em homenagem a Manuel da Silva Costa, organizado por Moisés de Lemos Martins, conta com dezassete estudos. Todos se inscrevem na largueza do espírito académico do agora jubilado Manuel da Silva Costa.

A largueza de espírito do homenageado incitou esta reunião de textos, também ela uma reunião generosa. Destes artigos, alguns revisitam o passado, olhando para o actual cenário da Universidade do Minho, e também para o seu futuro (contam-se neste caso, "As Ciências Sociais na Universidade do Minho: do projecto de 1976 ao presente e além" e "Os Cultural Studies no Instituto de Ciências Sociais da Universidade do Minho"); outros são de âmbito sociológico e enquadram-se nas perspectivas das diversas áreas sociológicas (sociologia de desporto, da informação, dos media, das organizações, da política, da família, das relações e das representações sociais), havendo também artigos de âmbito mais demográfico, geográfico, antropológico e histórico.

Como bem o assinala Pessoa, o valor das coisas não está no tempo que elas duram, mas antes na intensidade com que acontecem. Foi com essa intensidade, reflectida na largueza dos textos aqui apresentados, que Manuel da Silva Costa esteve na Universidade do Minho ao serviço das Ciências Sociais. Durante mais de trinta anos partilhámos com ele esse espírito intenso de humanidade, bondade e rectidão. Ojalá esse espírito possa permanecer entre nós.

Uninversidade do Minho
Instituto de Ciência Social
IDEC - Centro de Estudos de Ciências Sociais
FCT, Fundação para a Ciência e Tecnologia

Moisés de Lemos Martins (Org.)
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A largueza do espírito académico

Diso o poeta, no livro do Desassossego, que a vida é uma viagem experimental, feita toda via involuntariamente. É uma viagem do espírito, através da matéria. E dado o facto de ser o espírito que viaja, é no espírito que vivemos.

Existem almas que vivem mais tumultuadamente que outras. E é também verdade que existem aquelas que vivem mais intensamente, ou então, mais exentamente. Pouco importa isso, porque o que sentimos é sempre apenas o que vivemos. Estamos de facto em crer que nos recallhemos tão cansados de um sono como de um trabalho visível.

Há mais de trinta anos que o professor Manuel da Silva Costa tem estado entre nós como o espírito de que temos vivido. A nossa viagem académica, de sonhos e trabalhos no Instituto de Ciências Sociais da Universidade do Minho, quase se confundiu, por um tempo, com a viagem dos sonhos e trabalhos deste homem.

Temos vivido deste espírito, um espírito de humanidade, um espírito de bondade, rectidão e justiça, um espírito de livres navegantes das viagens do conhecimento, viagens que não acabam nunca. E como seria bom que este espírito continuasse a trabalhar a Academia e a pairar entre nós, um espírito de humanidade: na ciência, no ensino, no serviço à comunidade. Se nós reclamarmos de um espírito de humanidade, não corremos o risco de naufragar, por mais incertos que sejam os tempos.

Olhando os anos que decorreram con o Professor Manuel da Silva Costa a nosso lado, ficamos com a impressão de que ele conheceu, entre nós, horas de todos os cores e asnas de todos os tamanhos. Vimo-lo sempre a desembaraçar pelas vias fora, não se bastando, nem sonhando bastar-se. Vimo-lo levando de um lado para outro, de Norte para Sul, de leste para oeste, o bravo, a honra e o orgulho de termos um passado, a intensidade de vivermos um presente e o desassossego de termos que ter um futuro. Porque as Ciências Sociais tinham que ter futuro na Universidade do Minho. Mas vimo-lo, igualmente, sempre, com sentido de humanidade, um sentido de bondade, rectidão e justiça, cortando as águas, cavaloando as encapeladas ondas, encorajando-nos na viagem, abrindo as rotas para novas paragens.

Em todos os tempos, é esta largueza do espírito que faz da Academia uma realidade nova. E é por isso que estamos gratos ao Professor Manuel da Silva Costa.

Moisés de Lemos Martins

cial os Planos de Ordenamento Florestal (PROF) e Planos de Gestão Florestal (PGF), privilegiando a regulamentação dos usos do solo, envolvendo e responsabilizando neste processo as comunidades e os agentes locais e regionais, reduzindo assim desconfianças e conflitos, tornando o processo mais eficaz.

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Measuring the Portuguese ICT sector at a local level

Fábio Nunes*

1. Introduction

There is a widespread belief concerning the impact of ICT (information and communication technologies) investments in productivity and general living standards. However, several studies based on an empirical analysis have failed to find and prove that link, and in some cases a slowdown on productivity growth was actually detected, during the period in which large investments in ICT occurred (Haitiwanger and Jarmin, 2000; Moulton, 2000). Some explanations can be provided for this "productivity paradox", like the inability of official statistics to capture all the improvements in cost savings associated with information flows and reduced transaction costs between organizations, or the possible and well-known lag between investments in such innovations and the corresponding increases in productivity.

Despite the lack of ability to assess whether firms have finally had returns on their investments in ICT, it is unquestionable that technological change is the essential engine of economic growth, and since knowledge "pushes back the frontiers of technology" (Quah, 2000: 31), a knowledge-based economy is a concept and a reality which has been progressively recognised.

One broad area of research related to the knowledge-based economy aims to understand how these new forms of production and services have not only enabled businesses to do their work in new ways (promoting organizational readjustments), but like Moulton (2000: 35) explains, has led to the creation of new firms and even entire industries, which is usually defined as the ICT sector. The purpose of this paper is precisely to provide a detailed characterization of this economic sector in Portugal. To achieve this goal this research has been conducted in order to understand the organization and location patterns of these new forms of business and production, in addition to how their influence changes the economic structure, as well as their impact in local labour markets.

What kinds of activities are included in the Portuguese ICT sector? What is it dimension? How fast is it growing? How does it contribute to economic activity? How are Portuguese municipalities different in terms of their specialization in this kind of production and services provided? To answer these questions and in order to carefully identify all the firms of this economic sector, in the first section of this paper

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1 The productivity paradox draws attention to the slowdown of productivity growth during the 1970s and 1980s despite the technological improvements in computers and related ICT equipment. Moulton (2000) emphasizes the fact that the productivity slowdown was not limited to the United States, but was experienced generally across industrialized countries.
have a clearly recognized ICT sector. Acknowledging this problem, since 1997 the OECD Working Party for Indicators on Information Society (WPIIS) in collaboration with the Eurostat Task Force on Information Society Statistics, have been addressing the need for international standards for ICT statistics, with the purpose of establishing a set of definitions and methodologies to facilitate the compilation of internationally comparable data for measuring various aspects of the information economy, specifically as regards goods and services that are produced, consumed or traded and the entities involved in those activities.

While it seems to be easier to come to an agreement on the definition of the ICT services², the truth is for the ICT industry it looks appears to be more difficult to find a common ground, since difficulties arise in the borderline discussions related to specific ICT goods (Gardin, 2000). However, since it was crucial to come to a definition that could be applied to actual compilation of international data as soon as possible, the WPIIS adopted some guiding principles for the delineation of the manufacturing parts of the ICT sector:

- It should be intended to fulfil the function of information processing and communication by electronic means, including transmission and display;
- Use electronic processing to detect, measure and/or record physical phenomena, or to control a physical process.
- Components primarily intended for use in such products are also to be included. (Gardin, 2000: 3)

Table 1 shows the existing list of ICT activities according to these guidelines². Since users generally require data to be comparable over time and to be able to link domestic production data with international data, this table shows the concordance between ISIC Rev.3 (International Standard Industrial Classification) and the classification used in all European Union countries, NACE Rev.1 (Statistical Classification of Economic Activities in the European Community) and GAE Rev.2 (Portuguese Statistical Classification of Economic Activities).

One of the most important aspects of the OECD ICT sector definition is that it breaks the long-established ISIC dichotomy between manufacturing and services activities, since «activities producing or distributing ICT products or services can be found everywhere in the economy» (OECD, 2002: 81). However, this type of readjustment, which will support measures and analysis to determine the extent to which a sector has been computerized, is not consensual.

² A major review of the currently used classifications of economic activities (ISIC - International Standard Industrial Classification) is expected only in 2007 (Gardin, 2000). There is a general agreement that ISIC tends among other to classify activities in terms of information content industries, since it does not have a class for publishing literature software, and the data base activities class is poorly defined (Working Group for Statistical Experts, 2001).

² Services that «enables the function of information processing and communication by electronic means» (Working Group for Statistical Experts, 2001: p. 6).

² The OECD's activity-based definition of ICT sector was established in 1998. In April 2002, it was decided that although this definition provides only a first and general idea of the ICT sector, it will be only subject to reconciliation as a later date and in the context of the major revision of the ISIC (OECD, 2002).
<table>
<thead>
<tr>
<th>ISIC Rev.3</th>
<th>NACE Rev.1 / CAE Rev.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000 - Office, accounting and computing machinery</td>
<td>3001 - Manufacture of office machinery</td>
</tr>
<tr>
<td>3002 - Manufacture of computers and other information processing equipment</td>
<td></td>
</tr>
<tr>
<td>3110 - Insulated wire and cable</td>
<td>312 - Manufacture of insulating wire and cable</td>
</tr>
<tr>
<td>3210 - Electronic valves and tubes and other electronic components</td>
<td>3211 - Manufacture of electronic valves and tubes and other electronic components</td>
</tr>
<tr>
<td>3220 - Television and radio transmitters and apparatus for line telephony and line telegraphy</td>
<td>3221 - Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy</td>
</tr>
<tr>
<td>ICT - manufacturing</td>
<td></td>
</tr>
<tr>
<td>3230 - Television and radio receivers, sound or video recording or reproducing apparatus, and associated goods</td>
<td>3231 - Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods</td>
</tr>
<tr>
<td>3312 - Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment</td>
<td>331203 - Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment</td>
</tr>
<tr>
<td>3313 - Industrial process control equipment services</td>
<td>333 - Manufacture of industrial process control equipment services</td>
</tr>
<tr>
<td>6150 - Wholesaling of machinery, equipment and supplies</td>
<td>5164 - Wholesaling of machinery, equipment and supplies</td>
</tr>
<tr>
<td>ICT - wholesales</td>
<td></td>
</tr>
<tr>
<td>6420 - Telecommunications</td>
<td>642 - Telecommunications</td>
</tr>
<tr>
<td>ICT - telecommunications</td>
<td></td>
</tr>
<tr>
<td>7120 - Renting of office machinery and equipment (including computers)</td>
<td>7121 - Renting of office machinery and equipment (including computers)</td>
</tr>
<tr>
<td>ICT - business activities</td>
<td></td>
</tr>
<tr>
<td>72 - Computer and related activities</td>
<td>721 - Hardware consultancy</td>
</tr>
<tr>
<td>722 - Software consultancy and supply</td>
<td></td>
</tr>
<tr>
<td>723 - Data processing</td>
<td></td>
</tr>
<tr>
<td>724 - Database activities</td>
<td></td>
</tr>
<tr>
<td>725 - Maintenance and repair of office, accounting and computing machinery</td>
<td></td>
</tr>
<tr>
<td>726 - Other computer related activities</td>
<td></td>
</tr>
</tbody>
</table>


Table 1: Activity-based definition of the ICT Sector

Some sceptical views of the information age, such as Christopher May's (2002), argue against general claims that everything is organized on the basis of information and knowledge and postulates that the underlying substance of our socio-economic system remains largely the same (2002: 1). This author criticizes the rearrangements of various economic and employment statistics in order to firmly establish that the information society is emerging. In his view, the emerging ICT sector is rarely concerned with new types of enterprises or products, but is more often the result of the progressive division of tasks into their constituent elements, that were spun off or outsourced. Despite the fact that this line of reasoning is very much linked to the most sceptical views of the information age, we also consider that more important than studying an economic sector in its global dimension, and corroborate international trends and patterns, it seems more relevant, in order to contribute to a more comprehensive and realistic analysis, to promote a division of ICT activities between four main categories: ICT-manufacturing; ICT-wholesales; ICT-telecommunications and ICT-business activities (see the right column of Table 1). In our opinion, this analytical approach will allow for the gathering of valuable information, in order to reliably interpret this economic sector, since it will allow for comparisons not only across time and space, but also between the various sorts of activities grouped in it.

Just before beginning our empirical analysis, it is important to clarify that despite the structural changes in our labour force and in our economy, the ICT sector is just one of the categories used in measuring knowledge-based economies. In the last forty years several studies emphasized the substantial increase of workers engaged in tasks that require skills in the production and distribution of knowledge, exposing a lack of synchronization in terms of the activities included in knowledge-based economies (for instance: education; R&D; media; financial services; biotechnology; ICT activities...). Despite this lack of agreement on the workforce engaged in knowledge - or information - intensive occupations, the ICT sector has been always a common reference, since some of the more common orientations in the information society studies are those that focus on the spread of computer and telecommunications technologies as the defining characteristics. In the opinion of Foray and Lundvall (1996: 13), the basic features of the knowledge-based economy, like ‘the new dynamics in the formation of tacit and codified knowledge; the growing importance of networked knowledge; and the acceleration of processes of interactive learning’, are based on the increasing use of ICT’s.

In this research, the option to study only the ICT sector is mainly related with this general assumption that both phenomena (ICT and the advent of the knowledge-based economy) are strongly interrelated, as well as the well-known relevance of the impact of these activities on local economic development, which goes far beyond the growth of high technology companies. Nowadays, all over the territory...
all kinds of firms are integrating computers and computer-controlled tools into their operations, as well as increasing the use of web-based purchasing technologies, with comparable competitive advantages. Like Fuller and South (1999: 290) said, the major reason for the interest that policymakers have on the take-up of ICT by small firms is associated with contemporary notions of regional and national competitiveness. This means that the companies' changing needs should be acknowledged for the whole Portuguese territory, and that ICT services (wholesale, telecommunications and business activities) should be offered locally.

On the other hand and according to previous studies (Carayannis & Sagi, 2002), ICT enables high technology companies (most of them big multinationals firms, or great national companies traditionally located on the biggest urban regions) to expand key-functions throughout the world, in order to cut costs and obtain a higher level of efficiency, profitability and competitiveness. Even small and peripheral countries, like Portugal, especially if they are able to offer some local advantages such as a qualified workforce and technological infrastructures or tax incentives, can now focus on and compete for vital functions, whether they involve manufacturing, research and development, logistic or sales. But has Portugal been an attractive destination for this kind of investments? Where are they located? How large is the workforce involved in this kind of activities?

3. Measuring the Portuguese ICT sector at a local level

In 2000 Portugal had 3221 ICT firms (occupying 63090 employees), corresponding to 1% of the Portuguese total firms.

Figure 1 represents the Portuguese municipalities, comparing two main indicators: the relative importance under the ICT total firms and its dimension in terms of employees. Analysing this map we can conclude that more than 25% of the total municipalities do not have ICT activities, and those are especially located in the less developed areas: Douro, Pinhal Interior Norte, Pinhal Interior Sul and Alto Alentejo. Almost all ICT establishments (including the biggest ones in terms of employees) are located in the metropolitan areas and some middle-sized cities. In order to better demonstrate this obvious concentration on the municipalities with the best levels of accessibility, we should mention that around 60% of all municipalities with ICT firms have less than 0.1% of the Portuguese total ICT firms.

---

1 Carayannis (2004) highlights the two changes that the world economy is experiencing: technological advances in computing and communications, and the breaking down of barriers in trade and investments.

2 In Portugal, the best source of information for keeping track of the changing structures of markets, in terms of location of enterprises, size and workers characteristic, is the Labour, Employment and Professional Training Statistics Department (Ministry for Social Security and Work). This database is currently updated (with answer to compulsory questionnaires) and monitors the universe of all Portuguese firms, with base estimates by municipality.

3 This percentage may be as high as 85% if we consider the municipalities with less than 0.5% of the Portuguese total ICT establishments.

---

Figure 1: ICT establishments according to their dimension and municipalities relative importance under the Portuguese total ICT establishments (2000)
To exemplify this general trend we can say that around 42% of those firms are located in only four municipalities, three of which belong to Lisbon Metropolitan Area (Lisbon, Oeiras and Sintra) and the other to the Porto Metropolitan Area (Porto). Lisbon claims its status as capital city, and is also the leading financial and administrative centre, concentrating a large and mixed set of advanced services, with the head offices of the largest domestic and multinational firms. Porto’s productive structure is not so rich or diverse in terms of services, and its industrial profile is more traditionally based, but strongly export oriented.

In terms of dimension, the Portuguese ICT sector is mainly composed of micro-firms. Over 70% of ICT firms have less than 9 employees, and only 16 companies have more than 500 employees. This small dimension has been reinforced over recent years. Between 1995 and 2000 only the smallest firms have increased their number of workers. It is an economic sector with a low intensive use of workers, as the majority of the Portuguese firms.

In terms of recent evolution, this economic sector is nowadays one of the most dynamic of the Portuguese economic sectors. While between 1995 to 2000 the firms growth rate for the all tertiary activities was 39.9%, in the ICT sector that rate was 87.23%. Such an expressive growth was only comparable with the one recorded on real estate, renting and business activities (86.4%) and construction (81.4%).

ICT employment had a much slower growth by comparison with the dynamics of establishments. However, in 2000 it represented almost 2.5% of Portuguese employees, which represents more workers than the whole of the Portuguese primary sector.

Even so, these positive dynamics of employment should be analyzed in more detail, since it covers dramatic and significant situations of unemployment in some municipalities. Figure 2 illustrates that in recent years a decrease in this kind of employment was recorded in 53 municipalities. Valongo, Sintra and Castelo Branco are the three municipalities with the biggest declines (Table 2), each of them leaving behind over a thousand employees in a period of only five years.

The more recent facts of ICT employment are characterized by a gradually and clear super-concentration in the two metropolitan areas. All the municipalities with huge increase of ICT employees are located in the Lisbon Metropolitan Area (the most dynamic is Oeiras with almost 5 thousand new employees just in five years) or the Porto Metropolitan Area or nearby (Ovar, an adjacent municipality, is the most dynamic, with around 1300 new employees).

This territorial agglomeration can also be confirmed by the large employment decrease on all non metropolitan middle-sized cities, which had in 1995 a significant number of ICT employees (Braga, Guimarães, Guarda, Castelo Branco, Aveiro, Coimbra and Faro), being the only exception Évora, where the ICT activities created almost 400 new jobs.

To better understand this figure we should not forget that we are dealing with a sector composed by emerging activities, and the established sectors should not be expected to have such high growth rates.
nments industry) employed the majority of ICT-employees, and the manufacturing activities gather the highest number of employees by co-This straightforward analysis allow us to state that the enormous growth of ICT establishments presented above cannot be explained by the appearance of new ICT manufacturing activities. Indeed, the whole ICT industry lost 33 establishments between 1995 and 2000. All other ICT activities, with the exception of Data Processing, have increased their values, especially wholesaling of machinery, equipment and supplies (from 625 to 1013 establishments), as well as telecommunications activities (from 201 to 662 new establishments, with the highest jump between 1996 and 1997).

To complete the evaluation of the Portuguese ICT sector and concerning the sales volume, we can state that 0.9% of all Portuguese enterprises is responsible for around 13.5 billion EUR, which is almost 6% of the all national sales volume.

Comparing this one with other sectors we can conclude that ICT's have a very high productivity rate (Table 3). Note that, for instance, despite the well-known importance of tourism in Portugal, the ICT sales volume is twice the amount recorded by tourism activities, particularly hotels and restaurants.

---

10 In this database the sales volume is collected by enterprises. One single enterprise may group several establishments.

---

**Source:** Data collected in Labour, Employment and Professional Training Statistics Department, 2003

**Figure 3:** Activities included in Portuguese ICT sector, 2000 (as listed in Table 1)

**Table 3:** The recent evolution of enterprises and total sales in the different Portuguese economic sectors

<table>
<thead>
<tr>
<th>Enterprises</th>
<th>Total sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portugal - Total</td>
<td>39,8</td>
</tr>
<tr>
<td>Portugal – ICT sector</td>
<td>82,8</td>
</tr>
<tr>
<td>Primary sector</td>
<td>30,7</td>
</tr>
<tr>
<td>Secondary sector</td>
<td>42,1</td>
</tr>
<tr>
<td>Tertiary sector</td>
<td>39,2</td>
</tr>
<tr>
<td>Agriculture, hunting and forestry</td>
<td>31,5</td>
</tr>
<tr>
<td>Fishing</td>
<td>8,6</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>18,9</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>19,5</td>
</tr>
<tr>
<td>Electricity, gas and water supply</td>
<td>43,8</td>
</tr>
<tr>
<td>Construction</td>
<td>85,8</td>
</tr>
<tr>
<td>Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods</td>
<td>25,7</td>
</tr>
<tr>
<td>Hotels and restaurants</td>
<td>36,2</td>
</tr>
<tr>
<td>Transport, storage and communication</td>
<td>70,9</td>
</tr>
<tr>
<td>Financial intermediation</td>
<td>45,8</td>
</tr>
<tr>
<td>Real estate, renting and business activities</td>
<td>85,2</td>
</tr>
<tr>
<td>Public administration and defence; compulsory social security</td>
<td>25,0</td>
</tr>
<tr>
<td>Education</td>
<td>39,4</td>
</tr>
<tr>
<td>Health and social work</td>
<td>85,3</td>
</tr>
<tr>
<td>Other community, social and personal service activities</td>
<td>50,1</td>
</tr>
<tr>
<td>Private households with employed persons</td>
<td>0,0</td>
</tr>
<tr>
<td>Extra-territorial organizations and bodies</td>
<td>0,0</td>
</tr>
</tbody>
</table>
5. The effect of the automobile industry and the Taguspark on the progress of Portuguese ICT activities

Since the early 60's, with the compulsory adjustment of all cars to the national market and with the arrival of the Renault companies, the Portuguese car components industry flourished. However, the consolidation of this economic sector was only to happen with the AutoEuropa company, which was established in the municipality of Palmela in 1981, thanks to a joint venture between Ford and Volkswagen11. This investment in Palmela involved a volume of production around 130 thousand vehicles per year and has changed the way firms operate in a network, with a larger impact on Portugal's productive structure12. These new methods are based on a high quality guarantee and on a very efficient logistic system that facilitates frequent deliveries (from the components suppliers) to a supplier-park located next to the assembly plant, which allows for a sequential just-in-time production.

AutoEuropa has been instigating a dramatic effect in terms of the emergence of several important firms of automobile components suppliers, and we should underline that some of the more important ICT-manufacturing activities, like manufacture of electronic components13, manufacture of cables14 or manufacture of radio receivers15, are part of the network of institutions and firms throughout Portugal that have developed new forms of cooperation with the automobile industry.

Two particularly important companies producing electronic components for the automobile industry are located in the municipality of Évora, and help us to explain its ICT importance in spite of being a non metropolitan middle-sized city. Both of them come as a direct result of Siemens' strong investments, which began in 1969 with the construction of a manufacturing facility for communications products and the hiring of approximately one thousand employees. In 1999, Tyco International bought the relay production unit in Évora, and the manufacture of electro-mechanical relays for the automobile industry continued. This firm became the top automotive relays manufacturing unit in Europe, after high-tech manufacturing equipment and a third fully-automatic production line were added. At another site in Évora, in 1997, Siemens built a new factory (EPICOS) for the production of tantalum chip capacitors with joint-venture partner Matsushita. The success of this

11 Although since 1999 VW took over the company
12 From the 65 suppliers of AutoEuropa, 44 of them are located in Portugal (Vega, M., 1999, cited in Caridian, A., 2002)
13 The manufacture of electronic components located in Portugal produces items almost exclusively for the automobile industry. Some examples of multinational companies present in Portugal are Delphi (belonging to General Motors), Yaski (Schuman, Grundling, Siemens, Proh, Bordonstein, United Technologies Automotive or Ford Electromotronics, power and export of cables, O(abstal, Lour and Lembach are the main cable producers established in Portugal.
14 The national producers of radio receivers are not exclusively dedicated to the automobile industry and export the majority of their goods. The Portuguese production of car radios is concentrated in only four firms, three of which are located in the Lisbon district and belong to three of the biggest European multinationalos: Bosch, Grundling and Ford Electromotronics.

firm is the consequence of the use of these chip capacitors in automotive industry and computer industries, but also of the increased demand for these electronic components in order to produce cellular telephones. Initially Eastern Europe was also considered for the construction of the new tantalum factory, but the distribution infrastructure already established by the Siemens electromechanical factory was a key-point for choosing Évora.

As we have already demonstrated, Évora is the most dynamic municipality concerning the creation of new ICT employments. This fact is strongly related to the Taguspark, established in the municipality in 1992. This is the oldest and largest science park in Portugal, and had in 2002 about 5,000 people employed in 190 companies. The main factors that can be identified as critical to its successful operation are: its location, near Lisbon and close to the capital's highway network, the infrastructures developed by the local authorities covering several aspects of the development of Taguspark and the surrounding area, the combination of public and private sector partners and the development of Taguspark's image as a prestigious location. The first priority for the development of Taguspark was to attract large ICT 'anchor' occupants, such as Portugal Telecom or the call centre and IT operations of a major bank (BCP). After this, the emphasis was laid on attracting smaller technology-based companies. Since 1999, the business incubator began operating, and nowadays it provides assistance to some 120 companies; ICT is the main activity, but there are also electronics, energy-related, biotech and other new enterprise projects, some of them with strong links with academic institutions.

6. Conclusion

The Portuguese ICT sector is very heterogeneous as regards its contents. While it is essentially composed of micro-firms and this small dimension has been reinforced during recent years, there are also several huge companies that are part of the TOP Portuguese companies. As a result of the limited size of their local market, some of these Portuguese ICT firms with growth ambitions have already started a successful strategy of internationalisation, obtaining economic profits as well as establishing new cooperation links. The main foreign target markets are public administrations and local telecommunication enterprises, located in countries with some cultural and geographic proximity: Portuguese speaking African countries (Angola and Mozambique), EU countries (some of them in Eastern Europe), and Brazil (Valente, 2002).

Similarly to the Portuguese ICT enterprises that are present in other markets, there are also some multinational ICT manufacturing companies that distribute key functions throughout Portugal, especially firms of components supplying the automotive industry, which is a major application for ICT in Portugal. This explains the fact that the relative specialisation of some municipalities in ICT production
depends largely of foreign affiliates, as for instance Évora with Tycos Electronics and Vila do Conde with Infineon Technologies.

The importance of the ICT sector in the Portuguese economy grew significantly over the last few years. It has been an important growth promoter for various establishments, and a less important but still relevant factor of employment growth.

Partly as a result of being composed of emergent activities, ICT is the more dynamic Portuguese economic activity sector in terms of emergence of new establishments. Even so, our geographic detailed analysis allows us to say that these global positive dynamics conceal some dramatic and significant situations of unemployment in some municipalities, with strong economic and social impacts in local communities.

All throughout Portugal this economic activity sector has a pattern of dispersion of smallest telecommunications establishments, but with very little relevance on the main national statistics. A thorough analysis points out that it is an urban activity sector, which is gradually becoming a metropolitan activity sector. In Portugal the dimension of the two metropolitan areas enables the ICT establishments to benefit from a variety of agglomeration factors, like population, businesses, employment, R&D institutions, high qualified workforce, infrastructures and transport services.

It is progressively acknowledged that the growth of economies is in some way fuelled by ICT adoption, since it has altered the way businesses and consumers interact. Thereby, more important than to analyse if the ICT sector already accounts for a relative share of Portuguese total volume sales, is to understand that it can give a relatively large contribution to growth and productivity performances in the rest of the economy. To achieve this goal there is the need to generalise the access to modern means of information and knowledge and enable firms to efficiently and profitably use those new technologies. However, the local unavailability of ICT businesses activities in the Portuguese less developed and peripheral areas make somewhat difficult the adoption of outsourcing tasks as services capable to process information and communication by electronic means, which may have some negative impact when ICT’s are no longer just innovative tools but also vehicles of further innovation.

While we are aware that the development of ICT activities depends on the demand, we can expect that Portuguese non-urban firms are much slower in the progressive process of learning how to re-adapt their organizations to the ICT challenges. In these municipalities, various policies and efforts are needed to help the rapid diffusion of ICT’s and to get companies to adopt them.