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Juan Carlos Rodríguez Cohard ([jccohard@ujaen.es](mailto:jccohard@ujaen.es)). Tlf: 34-953-012069

Enrique Bernal Jurado ([ebernal@ujaen.es](mailto:ebernal@ujaen.es)). Tlf: 34-953-012067

Departamento de Economía Aplicada (Department of Applied Economics)

Universidad de Jaén (University of Jaen)

Campus Las Lagunillas, 23071-Jaén (España)

Fax: 953-012222

**E-COMMERCE AND TERRITORIAL DEVELOPMENT IN OBJECTIVE-1 SPANISH REGIONS**

**ABSTRACT**

The information and communication technology is one of the key elements of the global process. In this framework, e-commerce takes advantage of Internet to improve the competitiveness of both companies and territories. In the present scenario, e-commerce opens development possibilities for less developed regions, creating a virtual space avoiding geographical barriers. However, the use of its advantages requires infrastructures and equipment, organisational capacity and a high training level in new technologies. Despite the deficit observed in objective-1 Spanish regions in these fields to develop their own Information Society, the attitude and the efforts of the public and private agents in improving their position in the national and international context, they open optimistic expectations on the future use of the advantages offered by e-commerce for the growth and improvement of regional competitiveness in Spain. Although e-commerce cannot be considered a key element to remove territorial inequalities, it can promote the restructuring of the Spanish and European territorial pattern, where some regions will be able to improve thanks to the spreading and implementation of the digital economy while other regions will not. In any case, developed regions have a better position. All analysts point out that e-commerce is in an incipient phase and it will grow in next years. In this sense, this communication seeks to analyse the use of the possibilities offered by e-commerce, as tool to improve competitiveness in Objective-1 Spanish regions in the framework of the regional development. To achieve this objective, the theoretical links between the new information and communication technologies will be reviewed, that allow the use of the Internet as a trading channel, and promote territorial development. We will show the different approaches regarding the Information Society in connection with competitiveness. Also, the present situation

and perspectives of Objective-1 Spanish regions will be reviewed to face the challenges of technological innovations in this field. Three elements will be analysed: infrastructures and equipment; organisation, support institutions and administration initiatives; and innovation, knowledge and training.

## **1. INTRODUCTION**

Everybody agrees that e-commerce is nowadays in an incipient stage –representing a slight contribution to the volume of the global commerce of developed economies. In next years, a higher growth is expected. Therefore, according to eMarketer (2001), sales forecasts through the Net in the United States for the period 2000-2004 will be six times higher than today and, according to the *Asociación Española de Comercio Electrónico – AECE-* (2002) Spanish volume of electronic commerce in 2001 was 525,12 million Euro, with an annual growth rate of 475% since 1997.

Medium-term importance of commercial organisation of firms through the Internet opens new competitive scenarios for regions. In the case of territories already having a relative backwardness, such as autonomous regions taking advantage of European Structural Funds, new technologies can promote the existing imbalance if specific actions are not carried out to reinforce the key elements for promoting electronic commerce in particular and the Information Society in general.

In this sense, there are several new criteria to measure regional competitiveness, such as quality infrastructures and the use of the appropriate equipment, the innovative effort and the growing incorporation of population and public and private organisations in the new working strategies offered by information and communication technologies. According to that, the imbalance between regions and even within the same region can increase. Therefore, public institutions must pay a special attention to some of these key elements influencing market adjustments.

This article tries to assess the present situation of Spanish Objective-1 regions to compete in the new framework of Information Society and also assesses how exploitation of electronic commerce possibilities can be an essential tool to improve its competitiveness or if, on the contrary, the generalised use of it can menace the growth in the richness of these territories. To achieve this objective, we have reviewed the existing literature in this field and a set of indicators has been analysed, explaining the position of each region in the essential fields of the Information Society: the physical framework –infrastructures and equipment, actors –population and organisations using the Internet- and knowledge –training of population and the possibility of regional

innovation in this field. The text has been structured as follows: after this introduction, in the second section, the theoretical links between new Information and Communication technologies allowing the use of the Internet as a trading channel, and the territorial development, showing the different approaches with which the influence of the Information Society on regional competitiveness is assessed. In the third section, present situation is assessed, as well as the perspectives of Spanish Objective-1 regions to face the challenge of new technologies in this field in the three frameworks mentioned before. Finally, this article makes some conclusions about the capacity of less-developed regions to compete in the emerging digital economy.

## **2. ELECTRONIC COMMERCE AND TERRITORIAL DEVELOPMENT**

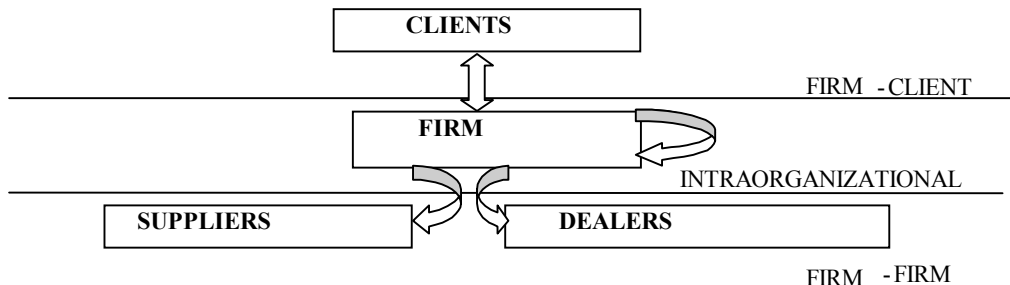
From the first applications of telematics to commercial activities, mainly referred to the rationalisation of certain administrative works in the firm, the role played by these new technologies has been developed to become a key element in the exchange of information between firms and territories, determining, to a certain extent, competition techniques (European Commission, 1997a and 1997b; Jiménez, 1998, p. 60).

In the framework of the concept of 'Information Society', electronic business is one of the more important signs of the use of the Internet for the marketing of goods and services, and can be defined as any form of transaction or exchange of information based on the transmission of data using a communication network like the Internet (*Ministerio de Fomento*, 1999). This wide concept must be defined to mention only the commercial transactions carried out through non-private networks established by means of open standards, such as the case of the Internet (*OCDE*, 1998). In this sense, electronic commerce involves not only the sales activity but also other previous and subsequent activities, such as advertising, after-sales service, exchange of information with other firms and search of data about the market.

The expected rise in the volume of electronic commerce comes mainly from the capacity offered by telecommunications networks to geometrically increase their nodes and, as a consequence, the number of potential clients and/or operators, both at a national and international level. In Spain, in the second term of the year 2000, half of the transactions carried out through the Internet by using the *4B*, *CECA* and *SERMEPA* Systems have had an international character –34% of them had a national origin and 17% a foreign origin- (*Comisión del Mercado de las Telecomunicaciones*, 2000). This shows the capacity of this channel as a means of firm internationalisation. However, we should mention that, thanks to this global character, its field of action is limited not only

to the relationship between the firm and the final consumer, but it has also an important effect on the exchange of information with other firms, suppliers and dealers, and with other plants of the same group.

**FIGURE 1**  
**TRANSACTIONAL ÁREAS ASSOCIATED WITH ELECTRONIC COMMERCE**



**Source:** Our own results.

There are three points of view to assess the impact of the Information Society, in general, and electronic commerce, in particular, on the regional development potential (Gillespie, Richardson and Cornford, 2000), mainly in the framework of the European Union.

The first approach, based on the importance of infrastructures and knowledge to best manage the opportunities offered by new ICTs, maintains that the regions with the highest personal incomes per inhabitant, agglomeration and diversity economies, increase their centripetal force thanks to the high number of specialised technicians and wide-band networks with which they can control the development of global economy (Gillespie, 1991).

On the contrary, the second approach involves the reduction of distance and space (Capello and Nijkamp, 1996). It avoids the traditional disadvantages of those regions far from the traditional development centres, thanks to the use and spreading of ICTs.

The third approach maintains that less developed regions can take advantage of the technological and organisational restructuring of the big business groups, mainly in the nineties. This advantages include the capacity to attract activities in relation with the use of ICTs to offer services to developed regions at a relatively lower price, as compared with them, as has been happening from the nineties in Ireland (Gillespie, Richardson and Cornford, 2000).

All the same, these three generalised approaches start from the basic conception of the centre-outskirts model (Friedman, 1972), as that suggested by the Reclus group (Brunet, 1989) to assess the European reality and that has had a significant effect on European

and regional planners in the last years. However, the real situation and problems of local and regional development are much more complex (Arozena, 1998).

The opportunities offered by the Internet to the poorest regions far from the decision centres of the world economy (peripheral regions in the traditional sense) allow us to build a virtual space where there are not distances, a stream space, where integration breaks economic isolation. However, as suggested by Castells (1996), the distance between regions not integrated in this space can be enormous. This is another field of competition, another sphere of relationship between firms and territories, making up virtual regions (Boisier, 1996) thanks to the use of ICTs. However, the geographical reality remains unaltered and the problems in supply and logistic organisation of products in less-developed areas can even be higher if we try to strategically use electronic commerce, since this practice requires physical distribution channels.

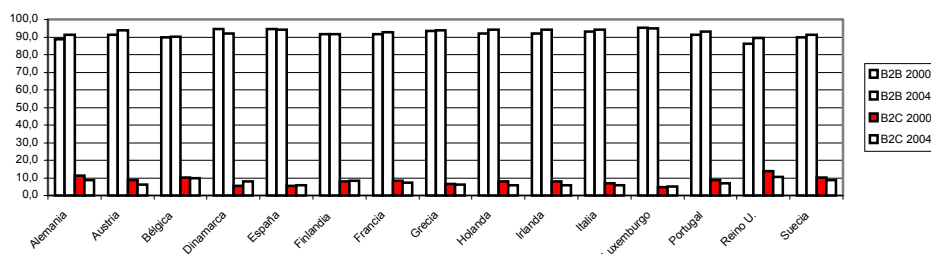
Anyway, the central and peripheral categories are not useful in the framework of globalisation to analyse territorial issues. There are centrifugal and centripetal forces interacting and configuring a polycentric reality with different spreading centres, as mentioned by Fujita, Krugman and Venables (1999). Besides, global economy is now asymmetric (Castells, 1996, p. 135). Many of the activities carried out in the privileged cities and regions, even in urban areas of the big cities away from international networks. This also allows the connection of other activities carried out in urban centres of regions far from business centres, thanks to the use of local resources to manage productivity improvements and the access of its firms to worldwide markets.

Actually, the new techniques in connection with productive organisation and the new communication systems allow the functioning of a multi-polar system of cities and regions, organised according to multiple hierarchies (Vázquez Barquero, 1993), competing with each other. Therefore, information technologies allow us to increase production and promote rising returns (Romer, 1986 and 1994; Lucas, 1998), intensify the present competition scheme, reinforcing the mechanisms of global market. This means that they promote inequalities, both in 'central' and 'peripheral' regions, both within the privileged cities, as shown by Grubestic and Murray (2002) in the case of Columbus (Ohio), and within isolated territories (Graham, 2002).

Therefore, in the present competition scheme –both global and polycentric- cities and regions are implementing activities and initiatives to support firms and inhabitants, helping them to mitigate the advance or reduce inequalities at all the levels of development. To do that, public policies must take into consideration the positioning of

territorial production systems within the national and international context (Helmsing, 1999). Thus, in the United States and Europe, several co-operation agreements have been signed with telecommunication firms to avoid market failures –lack of the appropriate infrastructures in rural areas or outlying areas of the big cities, where the number of potential clients is lower. This leads to the liberalisation of telecommunications, as has happened, for instance, in Alameda, Palo Alto or San Bruno, in California, Springfield, in Oregon, Lakeland, in Florida, Amsterdam, in Holland, Roubaix, in France, Bochum, in Germany, (Graham, 2002, p. 49) or in the Southern province of Jaén, Spain. This has allowed the access of infrastructures to places where it was not profitable for private initiative. Besides, many telecentres or Internet cabins for public use have been created, allowing the use of these technologies. In this framework, electronic commerce can favour the development of backward regions in four ways (Goldstein and O'Connor, 2000): making the world markets more accessible for small firms, opening internationalisation ways for local products, allowing local and regional entities to enter in the channels of electronic communication for the supply of intermediate inputs and improving the efficiency of the firms supplying services. All the studies carried out in the framework of developed countries (OCDE, 1998) show that 80 per cent of the electronic commercial transactions are carried out between firms, and this rate will increase in next years (figure 2). Thus, in Spain, for instance, (Baquía, 2001), about 50,000 entities use electronic commerce, mainly in the electrical, building and chemical industries, with a turnover of 2,500 million dollars. The growth expected in this business is 140 per cent for the period 2000-2003.

**FIGURE 2**  
**RELATIVE IMPORTANCE OF ELECTRONIC COMMERCE IN THE EUROPEAN UNION**



**Source:** Retevisión (2001, p. 143), with data by Forrester Research (2000). Our own results.

The small and medium-sized companies in less-developed regions of the European Union and Spain are very interested in these new forms of commerce. This is mainly

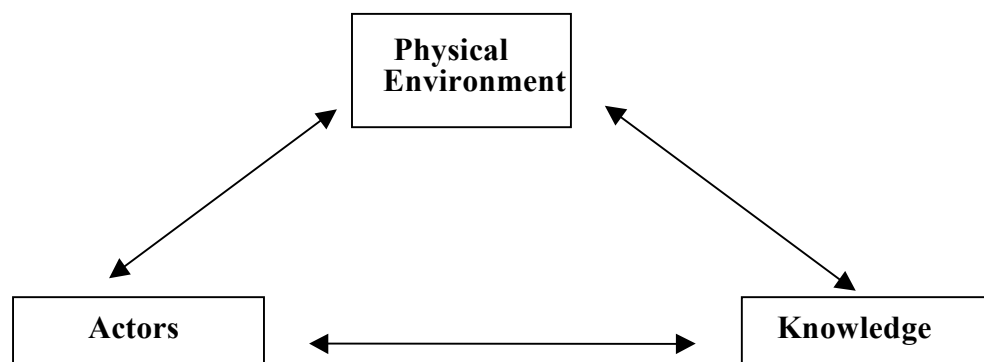
due to the substantial advantages offered by the Internet, with the creation of a virtual network, since it allows the reduction of manufacturing costs and the removal of physical and temporal barriers for orders, allowing also on many occasions the supply of products/services to clients. First of all, electronic commerce allows us to obtain scaled economies, thanks to the increase of the market dimension, since firms can have so many clients as Internet users. Secondly, it improves co-operation between firms, and can open new ways facilitating new businesses or even increasing the penetration of the Internet in local societies, since it increases the density of co-operation networks comprising regional firms. Thirdly, it reduces transaction costs between firms and between firms and consumers. This promotes commerce and increase profits (OCDE, 1998).

The reduction of transaction costs is specially relevant in the case of electronic commerce between firms (B2B), since it enhances the efficiency in four different fields (Lucking-Reiley and Spulber, 2001): first of all, the automation of transactions reduces costs, both before, during and after the exchange, thanks to the substitution of traditional forms for electronic means, thus reducing errors and telephone and post expenditures, also increasing speed in contacts. Secondly, there is no need of go-betweens in sales –but not in distribution-, because it is very easy to establish commercial relationships through the Internet. Thirdly, because it reduces entry costs for some firms in certain markets. Fourthly, since it contributes to a rapid management of the flexible organisation of production, it allows a permanent control of the outer links of the manufacturing chains in factories, thus increasing the efficiency of the firm and the local and regional economic environment.

Electronic commerce, as a consequence of the innovations in the mechanisms of information exchange, contributes to the strategic adjustment of the organisation of firms and, within the framework of the globalisation process, characterised by the consolidation of integration agreements between countries and the commercial liberalisation, can be used by firms and territories in the context in which their economies take place, to improve their competitiveness and, therefore, their positioning in the market or in the national or international system of regions and cities. In this sense, to allow the presence of firms –specially small firms- in the Internet and take advantage of its advantages and improve their development potential, public institutions must promote its spreading, taking into consideration its main elements (see figure 3): the physical environment, the actors and their degree of organisation and their

knowledge of infrastructures, technology and equipment; the creation of supporting organisations and institutions; the promotion of innovation and the training of population.

**FIGURE 3**  
**KEY ELEMENTS FOR THE DEVELOPMENT OF THE INFORMATION SOCIETY**



Source: Our own results.

### **3. PRESENT DEVELOPMENT OF THE INFORMATION SOCIETY IN OBJECTIVE-1 REGIONS AND STRATEGIC ADJUSTMENT INITIATIVES**

In the mid-2000 the Commission of European Communities (1999) passed an action plan entitled ‘*eEurope 2002. An information society for everyone*’ in order to ‘turn Europe into the most competitive and dynamic economy in the whole world’, taking advantage of all the opportunities offered by the New Economy and, specifically, the Internet. In this document, they explained that the implementation of this ambitious objective implied the establishment of measures to facilitate the access of its population and its firms to the Internet (making the net cheaper, faster and safer), to train its population in the use of these technologies and promote their use. This is an example of the fact that the factors favouring the development of electronic commerce go beyond the economic field and mainly depend on the environment in which it will be developed, that is, the infrastructure and equipment installed to fulfil these objectives, to the quality and availability of staff and the circumstances under which services are offered to users.

The lack of standard criteria about what should and should not be included within the concept ‘electronic commerce’ and about the indicators to be used to measure it (*Asociación Española de Empresas de Tecnologías de la Información –SEDISI-, 2000*) leads to the existence of disparities between the different estimates to determine the



volume of work associated with this type of commerce and in the forecasts for next years. It is necessary to mention that the search for a consolidated metric of the Information Society at a national and international level is still unsolved (García-Legaz, 2001). Many factors have contributed to this situation, such as the inaccuracy of the concept of Information Society, the fast pace of technological changes, the diverse paths by which users can use ICTs, production mobility or immateriality (SEDISI, 2000). At a regional level, this issue is aggravated due to the lack of statistics. However, in this section we will try to explain these aspects in the territory of Spanish Objective-1 regions. To do that, the information of some key indicators of the regions, which are essential to measure the development of the Information Society in a region, are analysed: the physical environment –the level of infrastructures and equipment-, the actors –people, organisations and supporting institutions- and the knowledge –the degree of innovation and training-, shown in table 1.

### **3.1. INFRASTRUCTURES AND EQUIPMENTS**

One of the main elements to take into consideration as regards the infrastructure is the degree of development of the industry of ICTs in every single region, since it is the basis for the advance of Information Society in every one of them (SEDISI, 2000, p. 35). As regards this point, interregional comparison of the market value of products and services of ICTs as a percentage of the GDP have a low relative weight in Spanish ICT industry, equivalent to 40% of the national average and 30% in the case of developed Spanish regions.

On the other hand, another necessary element, but not sufficient, for an effective development of the IS, the existence of an appropriate infrastructure to support its services is. Within this infrastructure we must consider, together with the dimension of the telephone cable network, its degree of digitalisation, since it promotes capacity, functionality, quality and efficiency of the services offered in the sector of ICTs (SEDISI, 2000, p. 41). On the other hand, the emergence of alternative infrastructures, such as cable networks, allows us to offer services at a local environment, associating an offer of audio-visual contents and the connection to the Internet, among other possibilities.

**TABLE 1**  
**INDICATORS OF THE DEVELOPMENT OF INFORMATION TECHNOLOGIES IN SPANISH OBJECTIVE-1 REGIONS**

	YEAR/SOURCE	SPANISH TOTAL	TOTAL OF OBJECTIVE-1 REGIONS	REMAINING AUTONOMOUS REGIONS.	OBJECTIVE-1 REGIONS								
					ANDALUCÍA	ASTURIAS	CANARIAS	CASTILLA-LA MA.	CASTILLA -LEÓN	C. VALENCIANA	EXTREMADURA	GALICIA	MURCIA
<b>INFRASTRUCTURES AND EQUIPMENTS</b>													
<i>ICTs Market (% s/GDP Autonomous region)</i>	2000/ N- economía		<b>0,6</b>	<b>2,1</b>	0,62	0,69	0,51	0,75	0,39	0,66	0,80	0,61	0,74
<i>Telephone lines (per 100 inhabitants of the Autonomous region)</i>	1999/RETE	<b>43</b>	<b>36</b>	<b>51</b>	34	41	40	40	38	47	-	35	36
<i>Digitalisation of telephone network (% s/lines autonomous region.)</i>	1999/RETE	<b>86</b>	<b>87</b>	<b>80</b>	88	79	91	86	84	83	-	96	85
<i>Cabled Houses/Spanish total (% s/Total Spain)</i>	1999/RETE	<b>100</b>	≈57	≈43	< 1	15	< 1	< 1	25	9	-	< 1	6
<i>PC penetration in firms (% S/total of firms)</i>	1997/MH	<b>1,3</b>	<b>nd</b>	<b>nd</b>	0,7	1,0	1,1	0,6	0,8	1,2	0,5	1,0	1,0
<i>PC penetration in firms (Spain=100)</i>	1997/MH	<b>100</b>	<b>nd</b>	<b>nd</b>	54	77	85	46	62	92	39	77	77
<i>Houses with PCs (% s/houses autonomous region.)</i>	2000/N- economía	<b>27</b>	<b>23</b>	<b>32</b>	26	23	23	23	20	26	24	22	21
<i>Houses with cellular phones (% s/houses autonomous region)</i>	2000/N- economía	<b>62</b>	<b>59</b>	<b>66</b>	63	61	65	51	53	68	53	49	61
<i>Houses with telephone (% s/houses autonomous region)</i>	2000/N- economía	<b>96</b>	<b>95</b>	<b>99</b>	94	98	94	95	97	97	93	92	95
<b>ORGANIZATION AND ACTORS</b>													
<i>Population with access to the Internet (% total popul. autonomous region)</i>	2000/AIMC	<b>12</b>	<b>10</b>	<b>15</b>	10	11	12	8	9	13	7	8	8
<i>Population purchasing through the Internet (% total popul. auton. region)</i>	2000/N- economía	<b>5</b>	<b>4</b>	<b>6</b>	1,2	1,2	1,9	0,7	1,5	1,3	1,2	1,0	1,5
<i>Firms with electronic commerce (% s/total firms in autonomous region)</i>	2000/N- economía	<b>11</b>	<b>9</b>	<b>13</b>	10	12	8	5	2	10	8	9	14
<i>Firms with Web pages (% s/total of firms in the autonomous region)</i>	2000/N- economía	<b>32</b>	<b>29</b>	<b>36</b>	31	33	20	18	27	33	19	37	27
<i>ICT firms (% s/total of firms in the autonomous region.)</i>	2000/N- economía	<b>1,1</b>	<b>0,7</b>	<b>1,5</b>	0,8	0,9	0,9	0,5	0,6	0,9	0,5	0,7	0,8
<i>Firms with a high technology (% s/total firms in autonomous region)</i>	2000/N- economía	<b>1,7</b>	<b>1,2</b>	<b>2,2</b>	1,1	1,1	0,8	0,8	1,1	1,7	0,9	1,3	1,5
<b>INNOVATION, KNOWLEDGE AND TRAINING</b>													
<i>Population of more than 18 years old with a high educational level (%)</i>	1996/INE	<b>15</b>	<b>13</b>	<b>18</b>	12	14	14	11	15	14	11	12	14
<i>Expenditure in innovation of telecom. services (thousands pesetas/inhabitant.)</i>	1998/INE	<b>3</b>	<b>1</b>	<b>6</b>	1	1	2	1	2	1	3	1	1
<i>Number of posts offered in the field of ICT per autonomous regions (thousands of posts)</i>	2000/Sánchez y otros	<b>23</b>	<b>5,3-13,9</b>	<b>9,1-17,7</b>	2,8-4,6	0-0,8	0-0,8	0-0,8	0-0,8	1,7-2,8	0-0,8	0,8-1,7	0-0,8
<i>Working population in R&amp;D (% working population)</i>	2000/N-economía	<b>0,7</b>	<b>0,5</b>	<b>1,0</b>	0,6	0,5	0,4	0,2	0,8	0,5	0,3	0,5	0,4
<i>Number of ICT specialists (% Spanish total)</i>	2000/CERPREDE	<b>100</b>	<b>33</b>	<b>67</b>	9	2	2	2	3	8	1	4	2
<i>R&amp;D expenditure percapita</i>	1997/INE	<b>14,9</b>	<b>7,7</b>	<b>nd</b>	7,9	8,8	7,4	8,9	6,5	8,7	3,3	7,2	7,7
<i>R&amp;D Expenditure/PIB pm (%)</i>	1999/INE	<b>0,9</b>	<b>0,6</b>	<b>1,0</b>	0,7	0,6	0,5	0,3	0,6	0,6	0,4	0,5	0,7
<b>OTHER REFERENCE INDICATORS</b>													
<i>GDP autonomous region/GDP total (%)</i>	1999/INE	<b>100</b>	<b>44</b>	<b>54</b>	13	2	4	6	3	10	2	6	2
<i>Population autonomous region/Total population (%)</i>	1999/INE	<b>100</b>	<b>54</b>	<b>48</b>	8	3	4	6	4	10	3	7	3

**Note:** The autonomous cities of Ceuta and Melilla are not included in this analysis.

**Source:** CEPREDE (2001), Asociación Española de Comercio Electrónico (AECE, 2001), Asociación para la Investigación de Medios de Comunicación (AIMC, 2001), Instituto Nacional de Estadística (www.ine.es), Retevisión (RETE) (2001), Ministerio de Hacienda (MH, 2000). Sánchez y otros (2001). N-Economía (2001). Our own results.

The information regarding Objective-1 regions shows the efforts required to improve telecommunication infrastructures. The mountainous relief of these regions has contributed to this situation, as well as the spreading of population in wide rural areas (*Ministerio de Hacienda*, 2000, p. 46). Thus, in these regions, except for the case of the Autonomous Region of Valencia, there is a number of basic telephone lines per capita much lower than that of the nation as a whole (17% lower than the national average and 30% lower than that in most developed regions). However, the rate of houses with telephone line (59 per cent) is closer to that of the whole nation (62 per cent).

However, the data about the cabled houses in Objective-1 regions present a different outlook. Thus, while in Asturias, Murcia and, above all Castilla-León there is a rate of cabled houses that goes beyond its importance in terms of population, every autonomous region, except Valencia, represent at least a one per cent of the national total. On the contrary, apart from the high degree of digitalisation in regions such as Andalucía, Canarias and Galicia, Objective-1 regions have lower levels as compared to the national average, being specially delicate the situation of Castilla-León, Castilla-La Mancha and Asturias.

The report of the *Plan de Desarrollo Regional 2000-2006* (*Ministerio de Hacienda*, 2000, pp. 43-44), suggests that the low level of telephones in regions with wider rural centres, which use to be the less developed regions, is mainly due to the high relative costs of investment in communications in these areas, as compared with urban areas. Besides, we must take into consideration that the improvement of telecommunication networks must be done, basically, by private investments, and its spreading depends on profitability criteria analysed by companies competing in this market. This has provoked market failures in certain regions. However, as shown by Newlands and Ward (1999) for the case of Scotland, the provision of advanced telecommunication infrastructures is sufficient to assure attractiveness and business development. Therefore, the promotion and development of the Information Society must be a responsibility of public institutions, and the role played by local and regional governments is essential. In fact, in order to solve the lack of infrastructures, in the framework of the *Plan de Desarrollo Regional 2000-2006* many investments have been foreseen in the FEDER, in order to finance wide-band networks in populations of less than 30,000 inhabitants, where profitability of private investments in telecommunications are below the average as, for example, the programme for the creation of telecentres in Asturias or Andalucía, and programmes to establish wide-band

telecommunication networks in small municipalities, with the same level of quality. Also the *Nerpio* project has been developed in Castilla-La Mancha.

The amount and quality of telephone services existing in every region, the establishment of access points in houses and firms, telephones, mobile phones and hardware are some of the basic requirements for the development of the Information Society. As regards PCs of inhabitants and firms of Objective-1 regions, the data provided in table 1 show the disadvantaged situation of these regions as availability is concerned, both at house (with a penetration ratio of almost ten percentual points lower than that of the more developed regions) and in firms, being specially important in this last case. Thus, according to the information analysed to carry out the *Marco Comunitario de Apoyo 2000-2006*, the percentage of firms having PCs in communities within Objective-1 regions is well below the national average, being worth mentioning the case of the Region of Extremadura, with a low number of firms with PCs (39% of the national average). A similar deficit is observed also in telephone lines and mobile phones in houses in the analysed territory.

### **3.2. ACTORS**

The data about the number of actors in the Network of Objective-1 regions, despite the different levels of infrastructure, show that there is only a slight backwardness as compared with the national average and in relation to the remaining developed regions. Thus, in Objective-1 regions, about 10 per cent of citizens have access to the Internet, as compared with the 12 per cent at a national level. Likewise, the percentage of firms having Web pages in such regions is 29%, as compared with 32% at a national level and 36% in the remaining developed Spanish regions. It is worth mentioning the case of Galicia, with rates above the more developed autonomous regions. As for the level of use of the Net for commercial reasons by economic agents in Objective-1 regions, results are disheartening. The percentage of firms using electronic commerce in Objective-1 regions, 9%, is well below the national average (11 per cent), specially Castilla-León (2 per cent) and Castilla-La Mancha (5 per cent). On the contrary, there are other regions with higher rates, such as Murcia (14 per cent) and Asturias (12 per cent).

In this situation, in most regions, apart from Asturias and Castilla-La Mancha, many strategic plans have been implemented to promote Information Society in their respective populations. Such plans, which are summarised in Table 2, have two main frameworks at a national level: the *Plan de Desarrollo Regional 2000-2006*, addressed

to regions with development levels much lower than those of the European average and a lack of the factors required to improve their internal and external competitiveness, the INFO XXI initiative, which main objective is guaranteeing the appropriate development of the Information Society in its social and economic framework. Both plans have their origin in a community initiative: e-Europe. All the initiatives implemented in Spain try to adapt Information Society of underprivileged regions, to provide all citizens a similar access to ICTs. Such plans are accompanied in some autonomous regions by ‘observatories of the Information Society’, devoted to the study, analysis and co-ordination of the actions involving the Information Society.

**TABLE 2**  
**STRATEGIC PLANS AND OBSERVATORIES FOR INFORMATION SOCIETY IN OBJECTIVE-1 REGIONS**

<b>AUTONOMOUS REGION.</b>	<b>STRATEGIC PLAN</b>	<b>INFORMATION SOCIETY OBSERVATORY</b>
Andalucía	<i>Plan Director de Innovación y Desarrollo Tecnológico, 2001-2003</i>	-
Asturias	-	-
Canarias	<i>Plan para el Desarrollo de la SI en Canarias, PDSIC</i>	<i>Sistema de Indicadores de la Sociedad de la Información en Canarias, SISIC</i>
Castilla-La Mancha	In process	Fundación Ínsula Barataria
Castilla-León	<i>Plan Director de Infraestructuras y Servicios de Telecomunicaciones, PDIS (1999-2002)</i>	<i>Centro para el Desarrollo de las Telecomunicaciones</i>
Comunidad Valenciana	<i>Plan Estratégico de Modernización de la Administración Valenciana, PEMAV</i>	<i>Centro Valenciano para la Sociedad de la Información, CEVALSI</i>
Extremadura	<i>Plan Director Estratégico de la SI en Extremadura, INFODEX</i>	<i>Fundación para el Desarrollo de la Ciencia y la Tecnología, FUNDECYT</i>
Galicia	<i>Plan Galicia 2001</i>	<i>Centro Telemático Aplicado al Desarrollo Comarcal, CETADDEC</i>
Murcia	<i>Plan ESSIMUR</i>	<i>Fundación INTEGRA</i>

**Source:** Web page of the different autonomous organizations and Retevisión (2001). Our own results.

### **3.3. KNOWLEDGE**

There is a generalised consensus when assuring that the level of education and training in new technologies, both of consumers and entrepreneurs, is a key element to avoid ‘infomarginality’ or ‘infoexclusion’ of a certain region (García-Legaz, 2001; Coppel, 2000; Sánchez et al, 2001; UNCTAD, 1999; Rodríguez y Bernal, 1999; Comisión Europea, 1996). Research in every region will play an essential role since the higher it is, the higher its capacity to generate new knowledge and adopt foreign knowledge will be (Sánchez y otros, 2001). On the other hand, it is specially important the indicator related with innovation in this field, due to the quick development of technology, computer science and telecommunications, which can become outdated. It is therefore necessary to substitute them for new ones.

Taking all this into consideration, in Table 1 we can observe that the indicator ‘Expenditure in innovation in telecommunication services’ per capita suggests that Objective-1 regions were in 1998 well below the national average, with an approximate expenditure of 1,000 pesetas/inhabitant, only a third of the average expenditure at a national level. As regards R&D expenditure, the ratios “Expenditure R&D/PIB pm” and “Expenditure R&D per capita” place Objective-1 regions, with values of 0.6 and 7.7 per cent respectively, well below the national average (0.9 and 14.9 per cent respectively). However, an important funding effort has been made in the last years. Thus, according to the INE (2000), the expenditure in R&D in relation to the gross added value in Objective-1 regions has doubled in the period 1987-1997, going from 0.31 to 0.69 per cent, reducing the differences of the remaining Spanish regions. We also observed differences in the actors of these expenditures. Therefore, in Objective-1 regions we observed a low participation of private firms in the funding effort in R&D (33.3 per cent), being public universities responsible for 50.1 percent. This situation is different to that of the remaining Spanish regions, where the private sector is responsible for funding, as shown in table 3.

The presence of ICT specialists in these territories, which is essential to allow a growth and development of Information Society, is lower than the relative significance of these territories (as population is concerned). There is only one exception, the Autonomous region of Andalusia (Rodríguez y Bernal, 2001). On the other hand, as suggested by the OCDE (2000), knowledge in the field of new technologies, specifically in computer science, is comparable to the capacity to read and write in the early 20<sup>th</sup> century. Therefore, it must be accessible to all citizens. On the contrary, a lack of knowledge can lead to social problems and to promote the ‘digital gap’ between different regions. Being aware of this fact, as shown in table 4, Objective-1 regions have carried out initiatives to promote a ‘digital literacy campaign’, not only for those sectors of population with average or high educational levels, but also for institutes, outskirts, children, the elderly, etc.

**TABLE 3**  
**EXPENDITURE IN R&D ACCORDING TO REGIONS AND ENTITIES, 1999 (PERCENTAGES)**

AUTONOMOUS REGION	TOTAL EXPENDITURE	CIVIL SERVICE	UNIVERSITIES	FIRMS
Andalucía	100	20,1	50,7	29,3
Asturias	100	17,0	40,9	42,0
Canarias	100	25,0	59,8	15,3
Cantabria	100	22,7	36,1	41,2
Castilla-La Mancha	100	11,5	36,9	51,6
Castilla-León	100	9,4	50,3	40,2
C. Valenciana	100	10,0	55,0	35,0
Extremadura	100	17,8	61,8	20,4
Galicia	100	18,9	50,7	30,4
Murcia	100	23,4	34,7	41,8
<b>Objective-1 regions</b>	<b>100</b>	<b>16,5</b>	<b>50,1</b>	<b>33,3</b>
Remaining regions	100	17,1	20,8	62,1
Spanish total	100	16,9	30,1	53,0

**Source:** Our own results, taking into consideration the information offered by the INE (2000), *Fundación COTEC para la Innovación Tecnológica* (2001, p. 244).

**TABLE 4**  
**MAIN EDUCATIONAL ACTIONS IN SPANISH OBJECTIVE-1 REGIONS**

AUTONOMOUS REGION	INITIATIVE	CHARACTERISTICS
Andalucía	<i>Averroes</i>	Telematic communication network of educational institutions using the Internet as a means for training, communication and telemanagement ( <a href="http://www.averroes.cec.junta-andalucia.es">www.averroes.cec.junta-andalucia.es</a> )
Asturias	<i>Educastur</i>	Telematic network for the application of the Internet to the field of teaching. Includes several projects, such as REDINET, Mentor, Aldea Digital de Asturias, etc. ( <a href="http://www.educastur.princast.es">www.educastur.princast.es</a> )
Canarias	<i>Medusa</i>	Tries to incorporate ICTs in all the public educational institutions, including several fields in connection with the teaching activity (management, adult education, teachers training...) ( <a href="http://www.educa.rcanaria.es/MPIlego/Medusa.htm">www.educa.rcanaria.es/MPIlego/Medusa.htm</a> )
	<i>EducaRed</i>	Information network for the educational community offered by the <i>Consejería de Educación, Cultura y Deportes del Gobierno de Canarias</i> ( <a href="http://www.educa.rcanaria.es">www.educa.rcanaria.es</a> )
	<i>Biblioteca 2000</i>	Tries to computerise all public libraries to connect them to the <i>Red Canaria de Bibliotecas</i> ( <a href="http://www.culturacanaria.com/bibarchi/b2000/2000.htm">www.culturacanaria.com/bibarchi/b2000/2000.htm</a> )
	<i>Pincel</i>	Tries to computerise General Secondary Education institutions ( <a href="http://www.educa.rcanaria.es/pincelw/pincel98.stm">www.educa.rcanaria.es/pincelw/pincel98.stm</a> )
Cantabria	<i>Interaulas</i>	Helps students to familiarise themselves with new technologies and the Internet ( <a href="http://www.interaulas.org">www.interaulas.org</a> )
Castilla-La Mancha	<i>Hermes y Althia</i>	Devoted to the management, to adapt all the educational institutes to the ICTs and integrate ICTs into educational practice at schools and secondary education centres ( <a href="http://www.jccm.es/educacion/educar/num_6/nuevastechnologias.html">www.jccm.es/educacion/educar/num_6/nuevastechnologias.html</a> )
Castilla-León	<i>Escuelared</i>	Tries to provide rural schools the essential tools for the use of ICTs technologies ( <a href="http://adigital.pntic.mec.es/upe.de.Segovia">adigital.pntic.mec.es/upe.de.Segovia</a> )
	<i>Centros Rurales de Formación</i>	To spread the use of ICTs in areas far from urban centres ( <a href="http://www.cnice.mecd.es/Aldea_Digital/aldea.html">www.cnice.mecd.es/Aldea_Digital/aldea.html</a> )
C. Valenciana	<i>InfoCole</i>	To promote technological culture and the access of ICTs among children, providing the required infrastructure ( <a href="http://www.usuarios.iponet.es/casinada/22infoc2.htm">www.usuarios.iponet.es/casinada/22infoc2.htm</a> )
Extremadura	<i>Red Tecnológica Educativa (RTE)</i>	Tries to provide educational institutions with technological resources for the access to ICTs ( <a href="http://www.juntaex.es/consejerias/ect/dgsi/rte/rte.htm">www.juntaex.es/consejerias/ect/dgsi/rte/rte.htm</a> )
	<i>On Live</i>	To develop an interactive educational system ( <a href="http://www.fundecyt.es/actividades/proyectos/proyectos.htm">www.fundecyt.es/actividades/proyectos/proyectos.htm</a> )
Galicia	<i>Centro Multimedia de Galicia (CMG)</i>	To create multimedia areas in all the territories of Galicia, to promote training in ICTs ( <a href="http://www.xunta.es/conselle/cultura/cmog">www.xunta.es/conselle/cultura/cmog</a> )
	<i>SIEGA</i>	To introduce the use of new technologies in the educational framework. Includes three networks: Red Educativa Gallega (REDUGA), Xestión Administrativa de Educación (XADE) and Servicios Educativos Multimedia (SEM) ( <a href="http://www.educared.net/html/congreso-i/documentacio/txtccaa.htm">www.educared.net/html/congreso-i/documentacio/txtccaa.htm</a> )
Murcia	<i>EDUSI</i>	For the incorporation of ICTs in Secondary Education ( <a href="http://www.vdigitalm.com/edusi.htm">www.vdigitalm.com/edusi.htm</a> )
	<i>NETD@YS</i>	To promote the implementation of ICTs in educational centres ( <a href="http://www.centros5.pntic.mec.es/es.principe.de.asturias/pagcurso.htm">www.centros5.pntic.mec.es/es.principe.de.asturias/pagcurso.htm</a> )

**Source:** Our own results, from the data offered by Retevisión (2001).

#### **4. CONCLUSIONS**

Spanish Objective-1 regions find several problems when facing competitiveness between commercial activities in the Information Society. Thus, in a physical environment, there is a lack of telephone lines and equipment in houses to access to the Internet. As the organisation is concerned, these territories have a lower number of actors in the Net. As knowledge and innovation are concerned, its population does not have the same training levels.

The actions carried out in Objective-1 regions and in the rest of Spain and Europe in the field of economic policy are in an incipient stage, which makes it more difficult an appropriate assessment of its impact on the capacity to develop electronic commerce. However, it is almost clear that the framework of regional competitiveness for next years implies a need for a continued institutional support, given the leadership in the framework of research and development in the public sector of the territories analysed, to support the new economy and knowledge, by means of a process of permanent training, easy access and familiarisation –even for unemployed people- with ICTs, as suggested by the Second Report on Economic and Social Cohesion in the European Union (2001), if we want to avoid a ‘digital breakage’ in Europe.

In any case, technologies will not avoid or decrease regional differences, but can contribute to alter the model of inequalities (Venables, 2001). In this sense, the new forms of electronic relationship between business networks in a diverse and polycentric world not only alter the parameters to measure differences between territories, but also differences within a single territory. This paves the way for regional politicians to promote the three key elements required to improve the economic structure of less developed regions in the framework of the Information Society and trying to position every single territory in the new competitive atmosphere of present time, where virtual relations in the commercial environment have a growing interest.

Finally, since the adoption of these technologies is not homogeneous in every region, it is necessary to promote knowledge in every territorial environment, to avoid inequalities between regions limiting competitiveness in every one of them.



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