

DG Research

Directorate A Unit 5

IN.TRACK

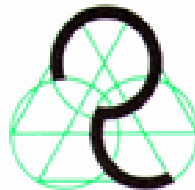
INsular Regions Knowledge TRACKEr

Activity 2. Evaluation / Analysis

Deliverable 2.1.3: Regional Evaluation Report

Partner 3:

CONSORZIO CATANIA RICERCHE



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INTRODUCTION

The present document intends to develop a broad picture of the state-of-art of the Sicily in terms of knowledge-based economic and technological development. In order to assess the development of the knowledge based economy in the region, the document has been structured in 4 sections:

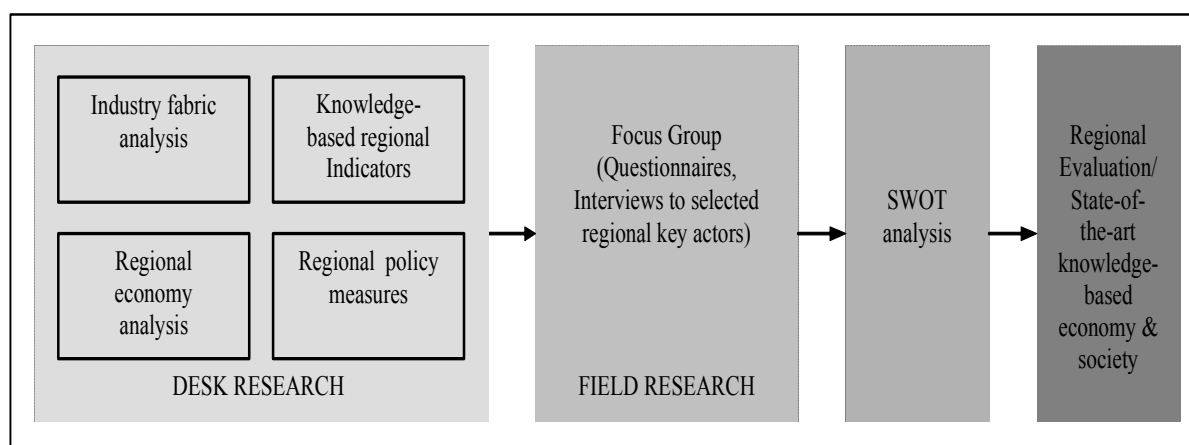
Desk Research

Field Research

SWOT analysis

Final Remarks (Conclusions)

The structure of the document reflects the audit methodology followed, which is shown in the figure below:



The Desk Research section consists of :

Regional Economy Analysis

Industry Fabric Analysis

Regional Policy Measures

Knowledge-based regional indicators

The aim of each sub-section is to gather quantitative data and indicators on the different aspects of the regional context. The regional economy and the industry fabric analyses present a series of statistical indicators. The analysis of the regional policy measures attempts to identify the regional policy objectives and goals in terms of knowledge/innovation policies as well as the directives/regulations/programmes aimed at meeting such objectives, together with the impact analysis performed on those programmes. The indicators presented in the last section have been selected on the basis of their importance to assess the degree of development of the knowledge based economy in the region. The indicators chosen have been agreed among the IN.TRACK project partners and embrace the following fields: ICT, intellectual capital, education, labour force, R&D and innovation within regional firms.

The Field Research starts with the creation of a “focus group” made up of key regional actors in order to gather valuable qualitative information on the status of the regional knowledge-based economy and its future perspectives for development. The main scope of the interviews has been to find out and assess the existing regional innovation strategies dealing with the knowledge-enhancing process and understand the process better. A questionnaire template made up of both “open”- and “multiple”- choice questions has been designed to this purpose.

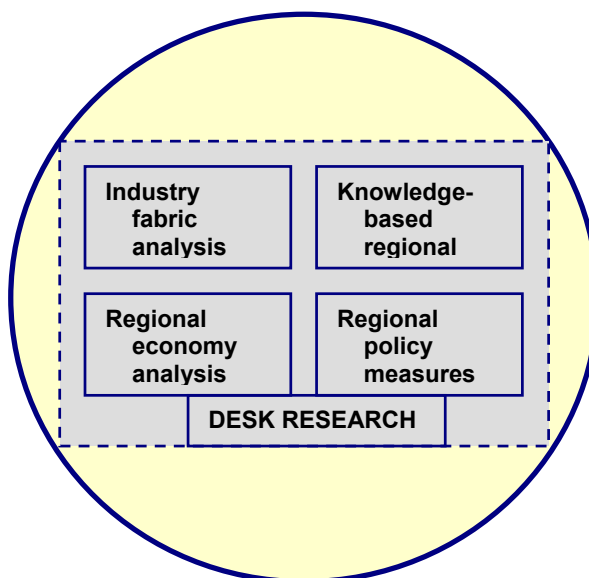
The section on SWOT analysis aims at developing an useful tool- the SWOT matrix- designed to evaluate the regional context in which the development of the knowledge-based economy is shaped and planned. The SWOT matrix allows to scan the internal and external environment, identifying the region’s Strengths, Weaknesses, Opportunities and Threats.

Finally, the last section presents the final remarks and conclusions.

Some data have not been mentioned due to difficulties in finding specific data for Sicily; in fact many Italian statistics refer not to Sicily but to the South part of the country (6 regions). As a consequence, it is hard to extrapolate specific information for a single region.

DESK RESEARCH

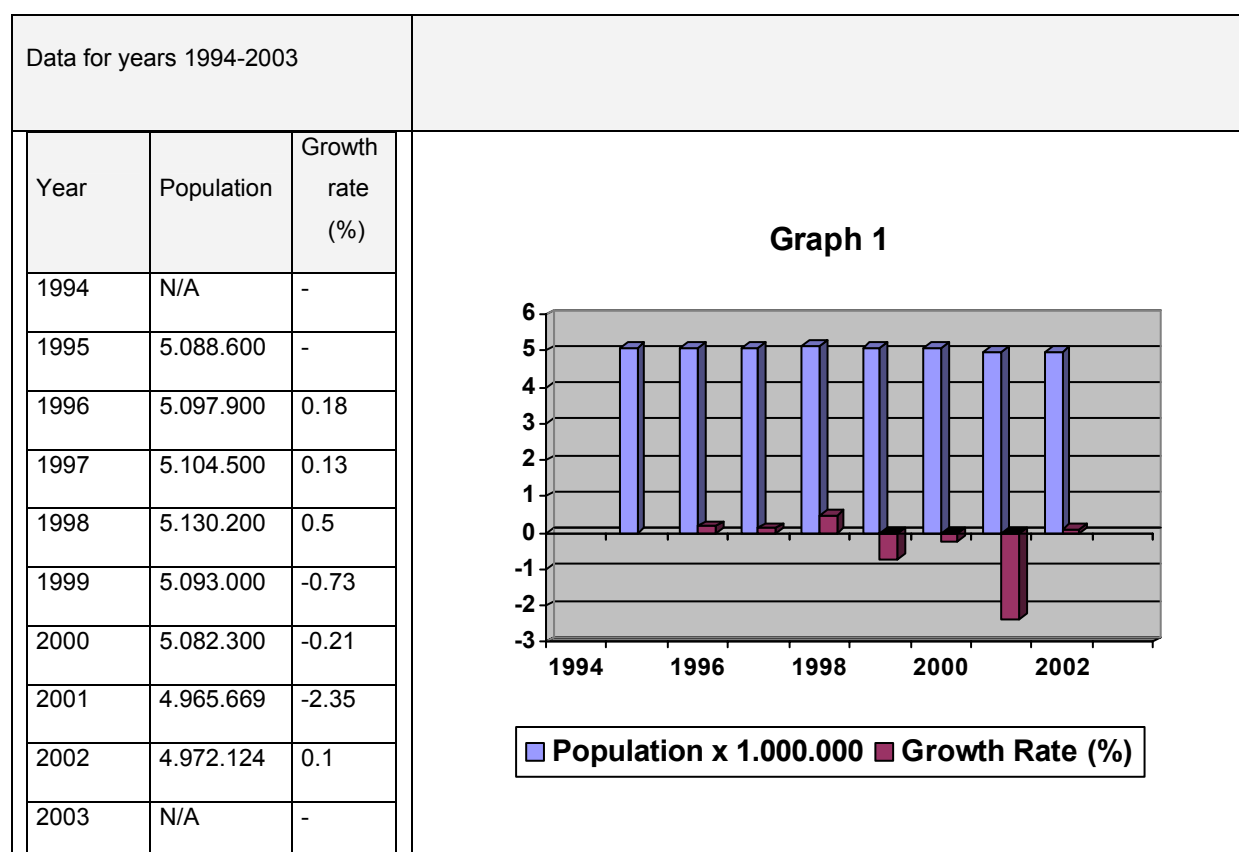
As mentioned in the introduction, the desk research has been focused on the collection of information and statistical data and indicators from various regional and national sources. The desk research has been focused on 4 areas, as shown in the figure below:



II.1 REGIONAL ECONOMY ANALYSIS

In this section, an analysis is given of the evolution over the last ten years in most cases, of a number of social and macro-economic variables which quantify and describe the regional economy of the Sicily and its evolution.

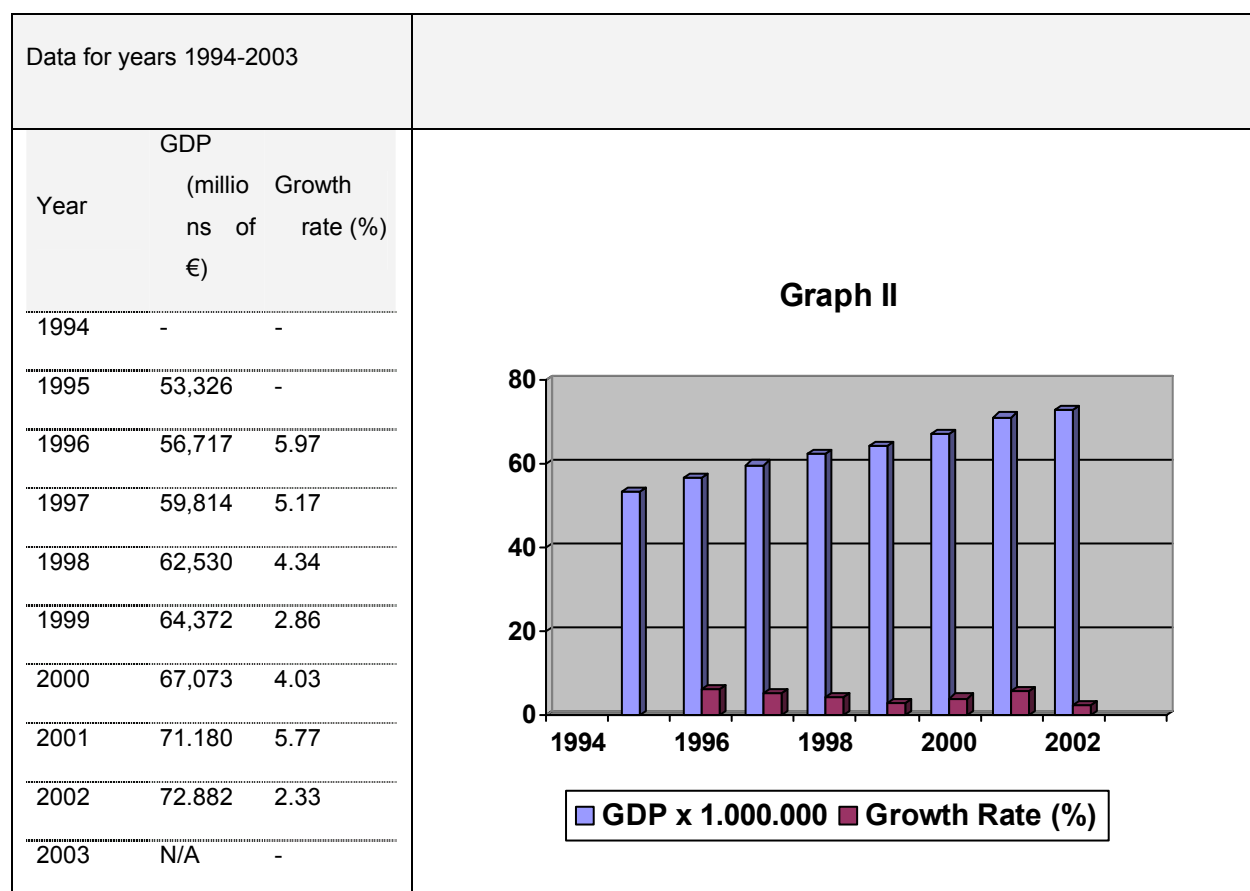
Population



Source: ISTAT – Census.

The regional population constitutes 8,7% of Italy. In the last years the Sicilian population has decreased.

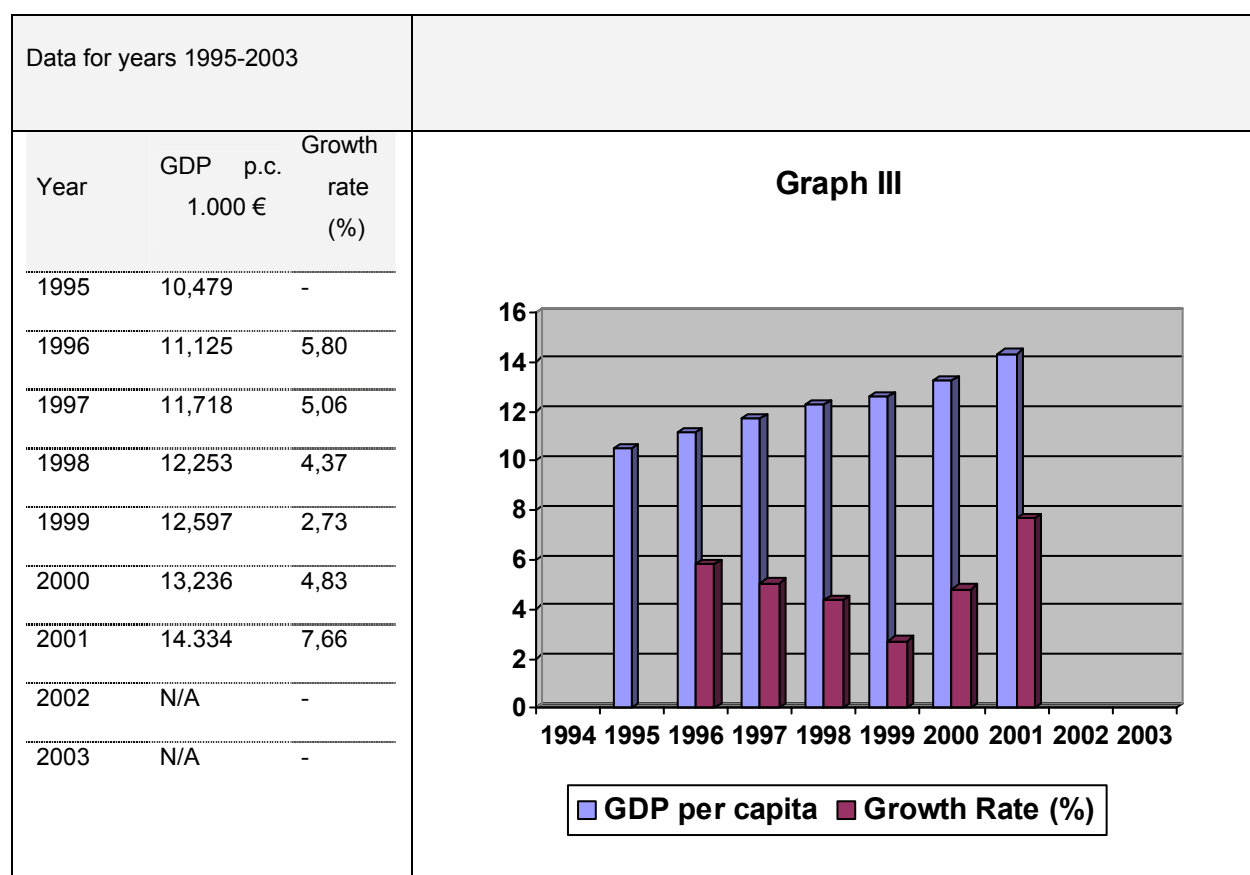
Regional GDP



Source: ISTAT – Economy – National and territorial statements.

From 1996 to 2001, the regional GDP has shown an average increase of 2.1% which reflected the national growth. The island's wealth is based on agriculture, tourism and industry.

Regional GDP per capita



Source: ISTAT – Economy – National and territorial statements

The regional GDP per capita has registered an important trend of growth during the second half of the 1990s; it means that Sicilian economy has reached a better level of wealth; only in the last years the international economic crisis has involved the region.

Share of agriculture in regional GDP

Data for years 1999-2003		
Year	(%)	Growth rate (%)
1999	5,1 %	
2000	N/A	
2001	5 %	
2002	N/A	
2003	N/A	

Source: ISTAT and Prometeia. 1999; Sicilian Report 2002 – Regional Statistics Office (source: ISTAT).

The share of the primary sector in the regional GDP is about 5%. During the last years it has maintained the same level because of local government's support for agriculture through the community funds (FEOGA). However, the sector is involved in a process of growing products' specialization.

Share of industry in regional GDP

Data for years 1999-2002		
Year	(%)	Growth rate (%)
1999	16,5 %	
2000	N/A	
2001	16,6 %	
2002	N/A	

Source: ISTAT and Prometeia. 1999; Sicilian Report 2002 – Regional Statistics Office

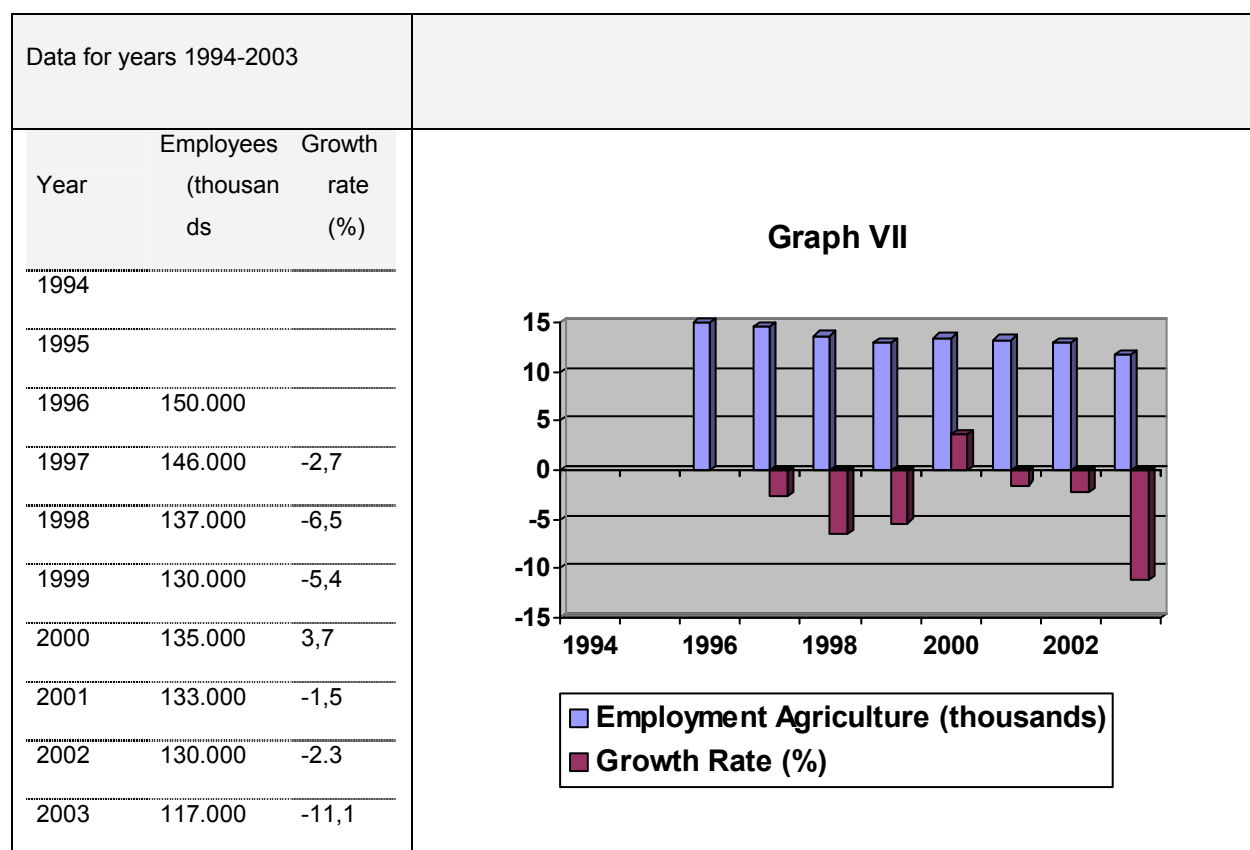
The share of industry in regional GDP has been of 16,6%. During the last years it has maintained the same rate. Industry is basically oriented toward the internal market. There are some sector, like energy, petrol-chemistry, automotive and microelectronics, which is mainly oriented to export.

Share of services in regional GDP

Data for years 1999-2002		
Year	(%)	Growth rate (%)
1999	68,2 %	
2000	N/A	
2001	70,5 %	
2002	N/A	

Source: ISTAT and Prometeia. 1999; Sicilian Report 2002 – Regional Statistics Office

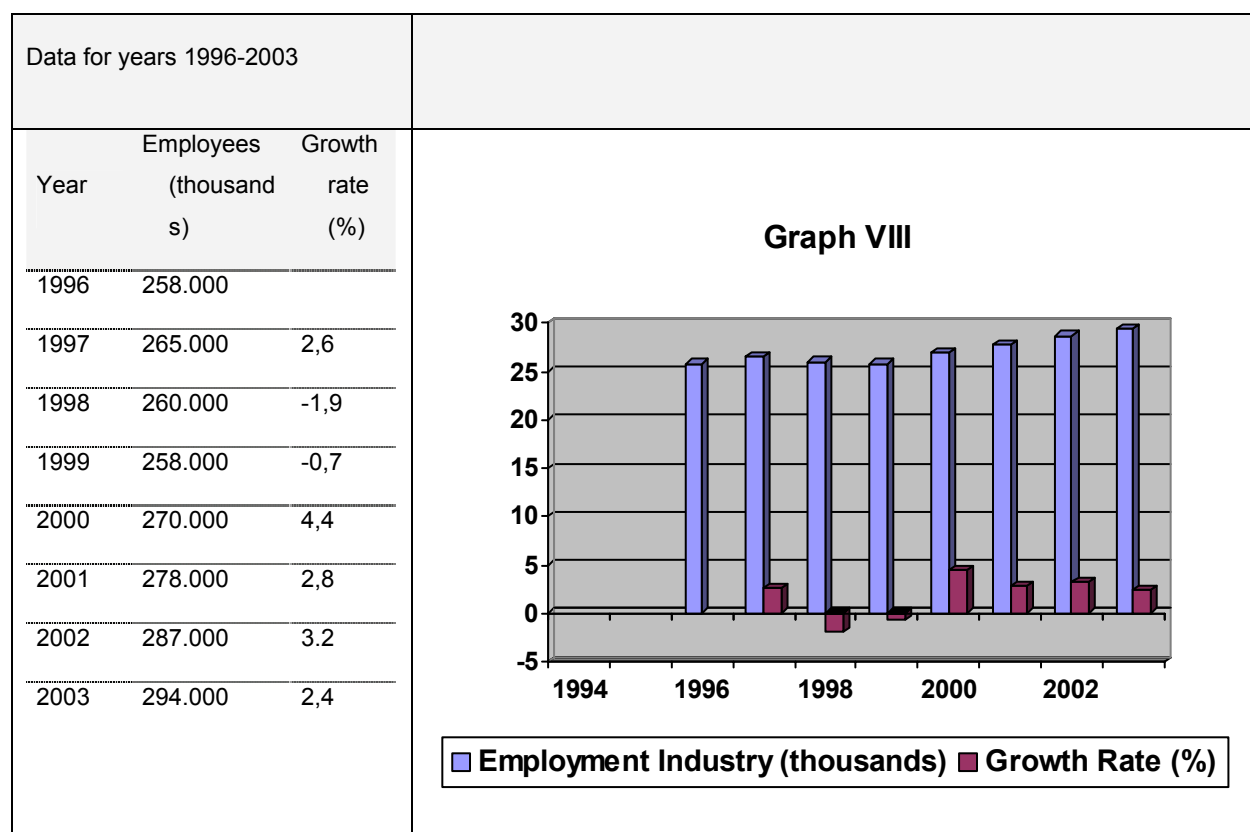
Services is the most important sector in the economy of the region. During the last years the share of services has increased; it is about 70,5% of the regional GDP. Public Administration, Trade and Tourism are the principal component of the services' sector.

Employment in agriculture

Source: Sicilia Report 2002 – Regional Statistics Office (Source: ISTAT)

The number of employees in agriculture has continuously decreased. It registered the highest rate of decrease in 2002. This data is due to the utilization of new equipments, which have increased the productivity, and to the low appeal of the agriculture sector to the young people.

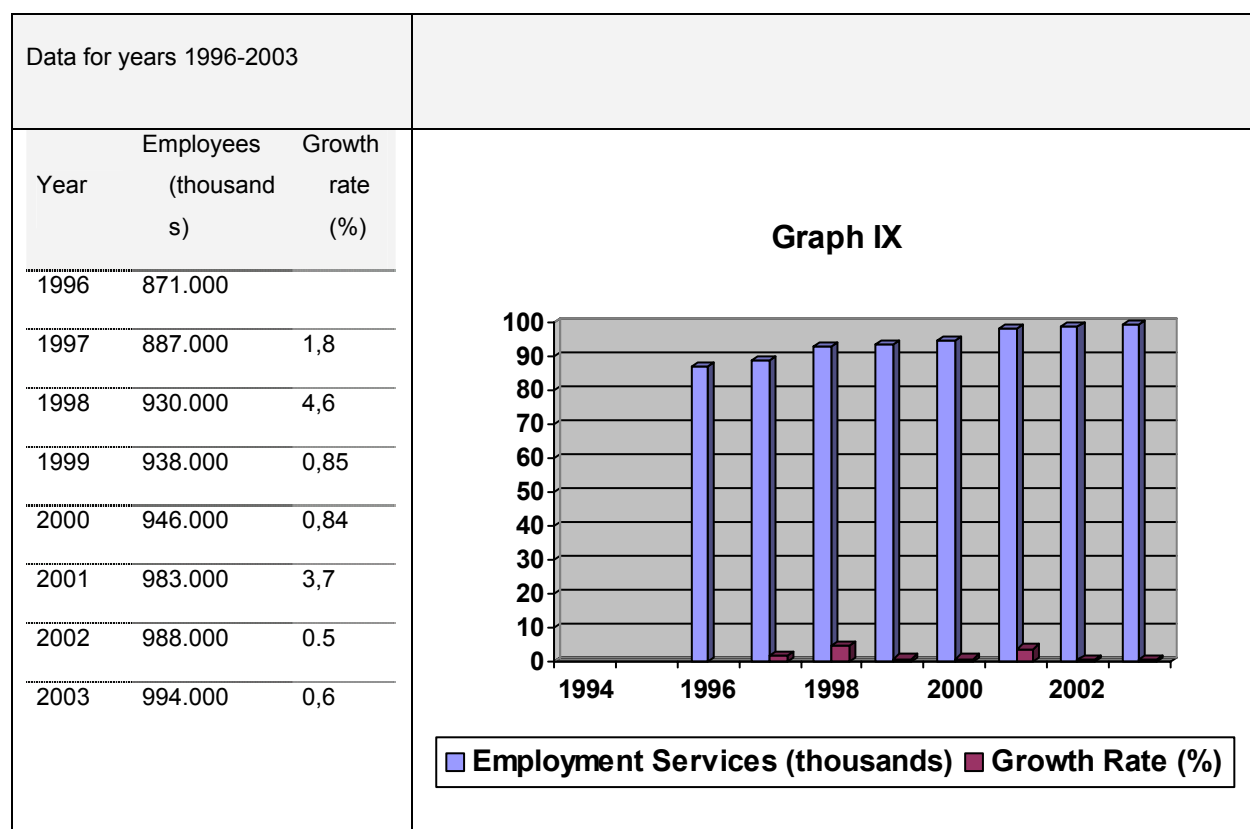
Employment in industry



Source: Sicilia Report 2002 – Regional Statistics Office (ISTAT).

The data of industrial employment shows a continuous growth, which is mainly due to the policy of regional and national governments supporting the industrial development based on employment growth (e.g. Law 488).

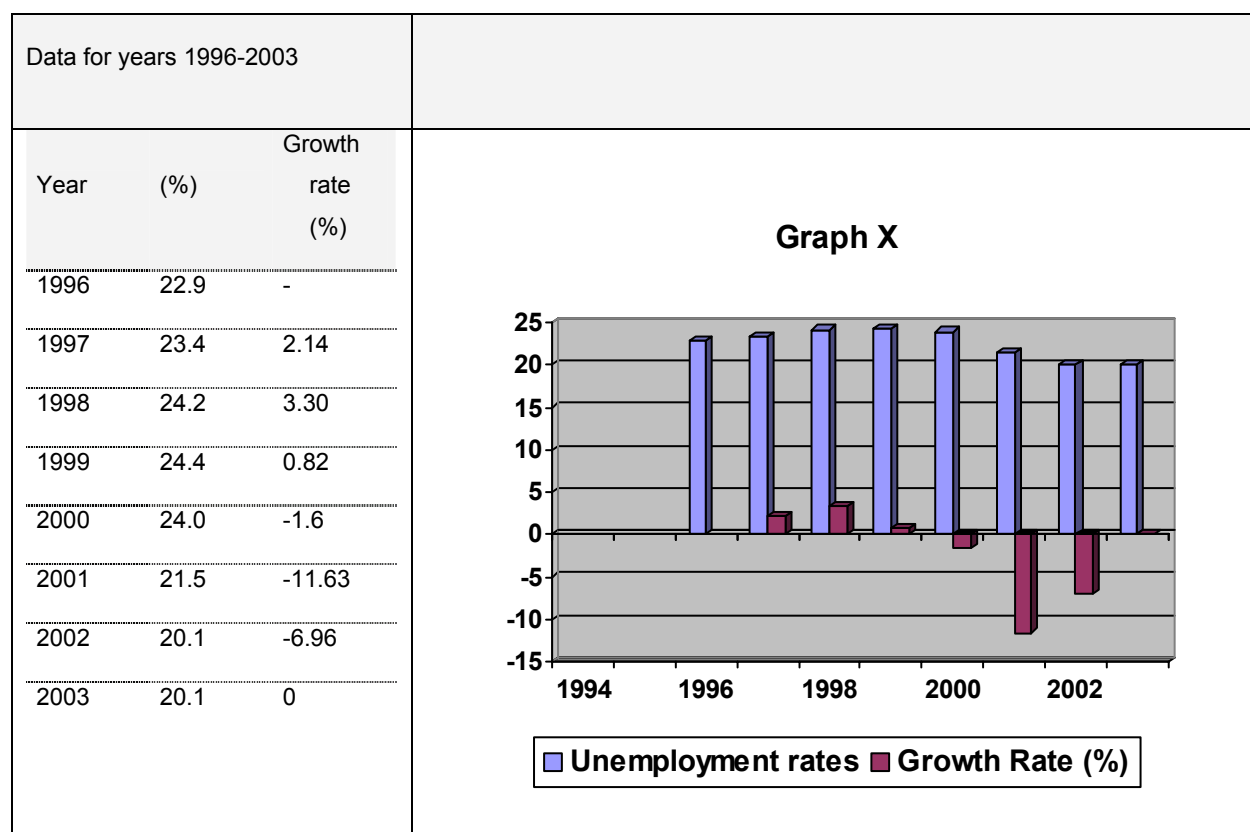
Employment in services



Source: Sicilia Report 2002 – Regional Statistics Office (source: ISTAT)

The employment in the service sector absorbs the majority of total number of employees in the region, with a dynamic increase over the last years. The number of employees in the service sector continues to represent the main contribution to the Sicilian work force (55,5%).

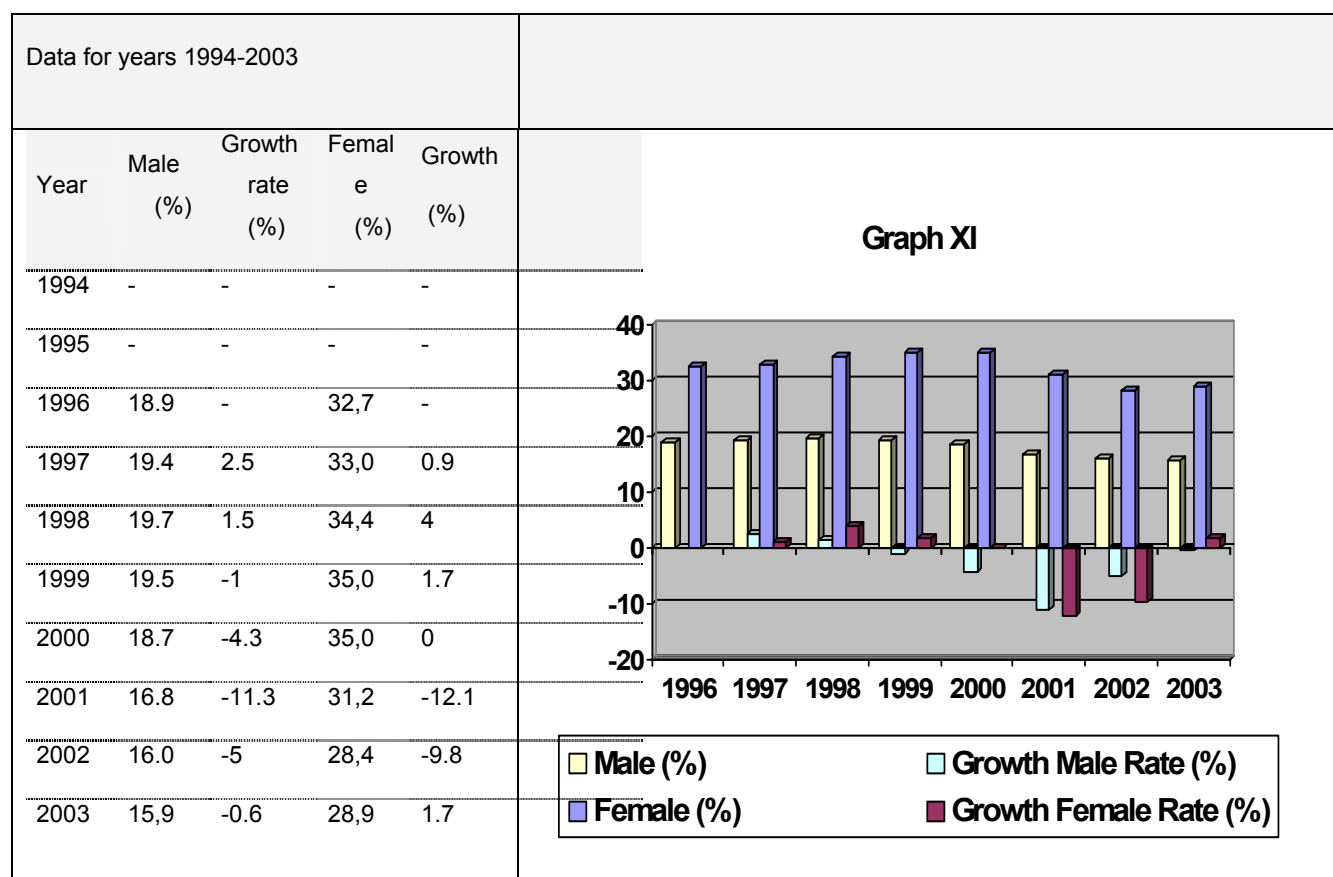
Unemployment rates: total



Source: Regional Statistic Report – Sicily 2003. Regional Statistics Service (elaboration on ISTAT data).

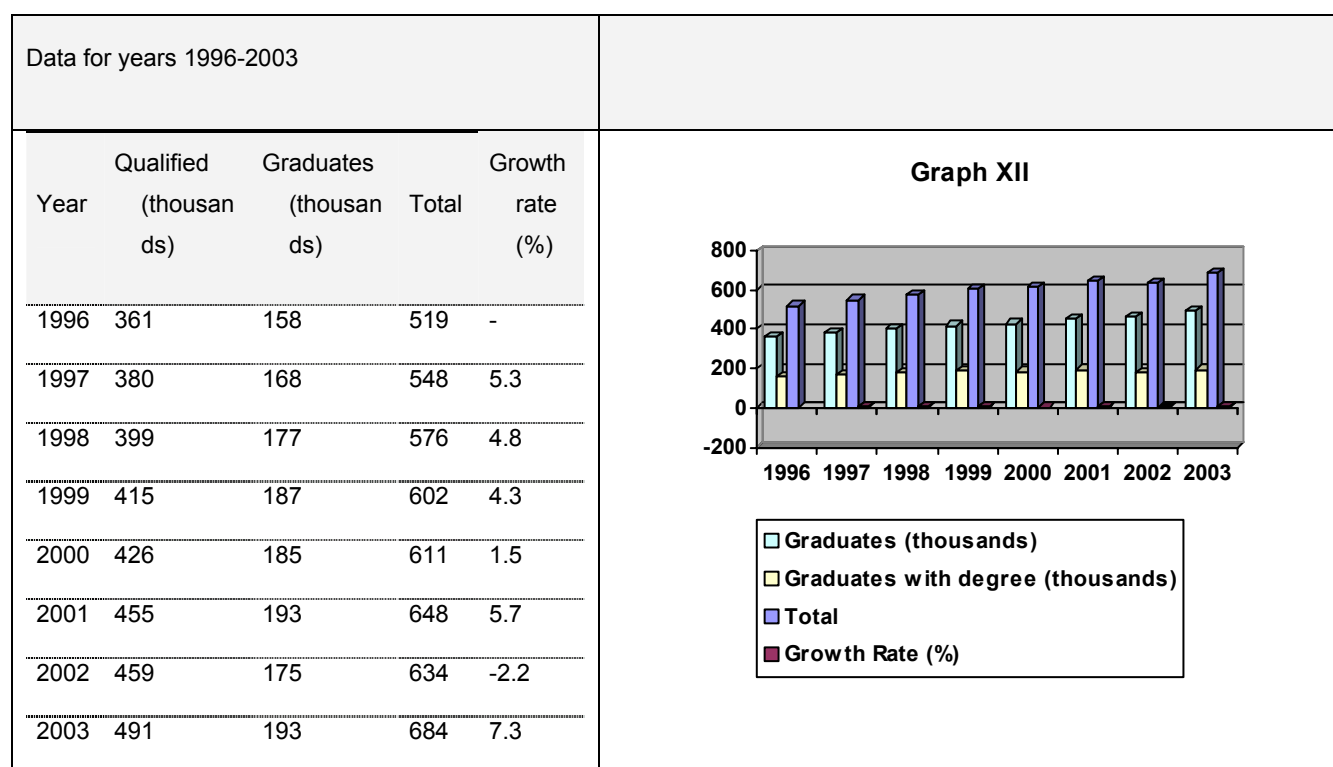
The unemployment rate has decreased constantly. The main reason is based on the new flexible laws regarding the labour legislation.

Unemployment rates: by gender



Source: ISTAT; Survey on work-forces and CNEL elaborations on ISTAT data.

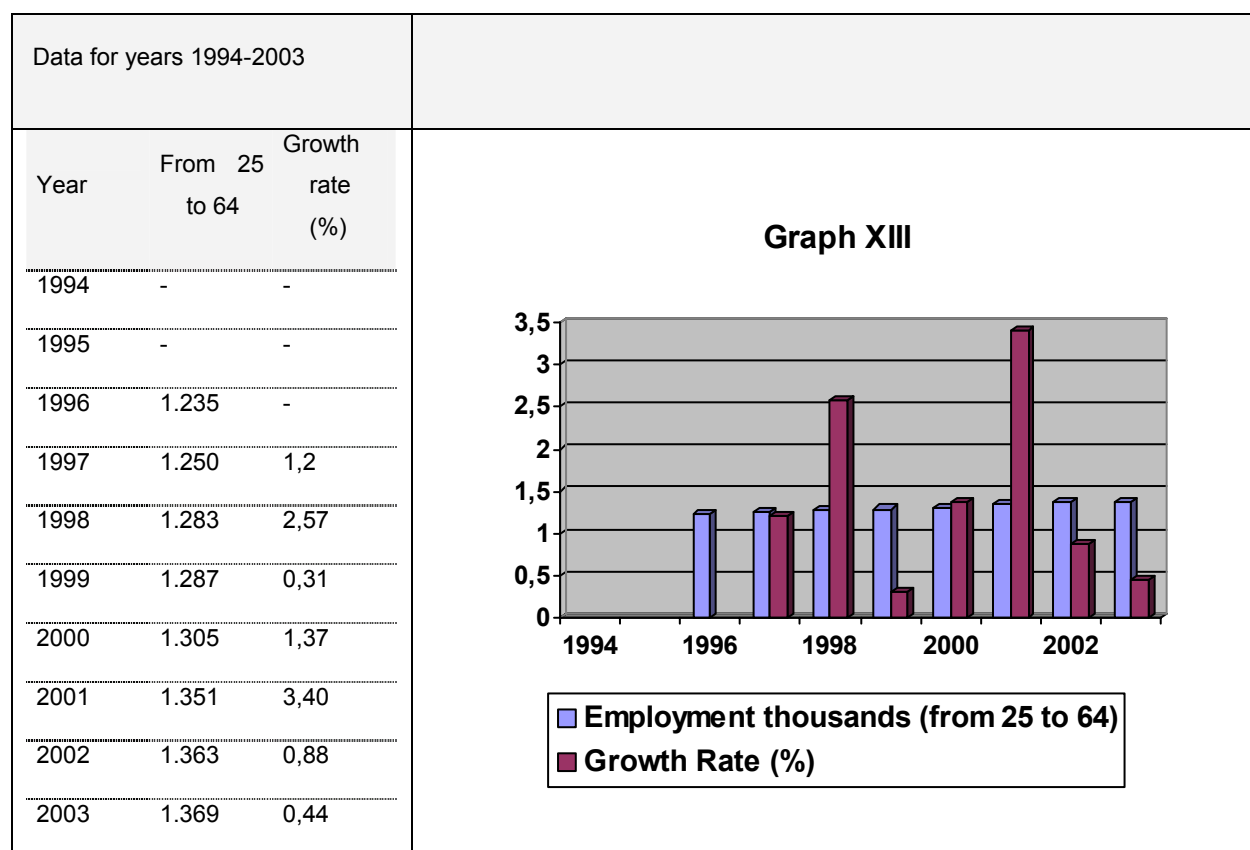
Since 2000 the unemployment rate has constantly decreased, especially for women, which have acquired a more important role in the job market. The national policy has supported women employment.

Employment: by level of education (thousands)

Source: ISTAT; Survey on work-forces and CNEL elaborations on ISTAT data.

Over the past years, Sicily has registered an increase in the number of skilled workers, both qualified and graduates.

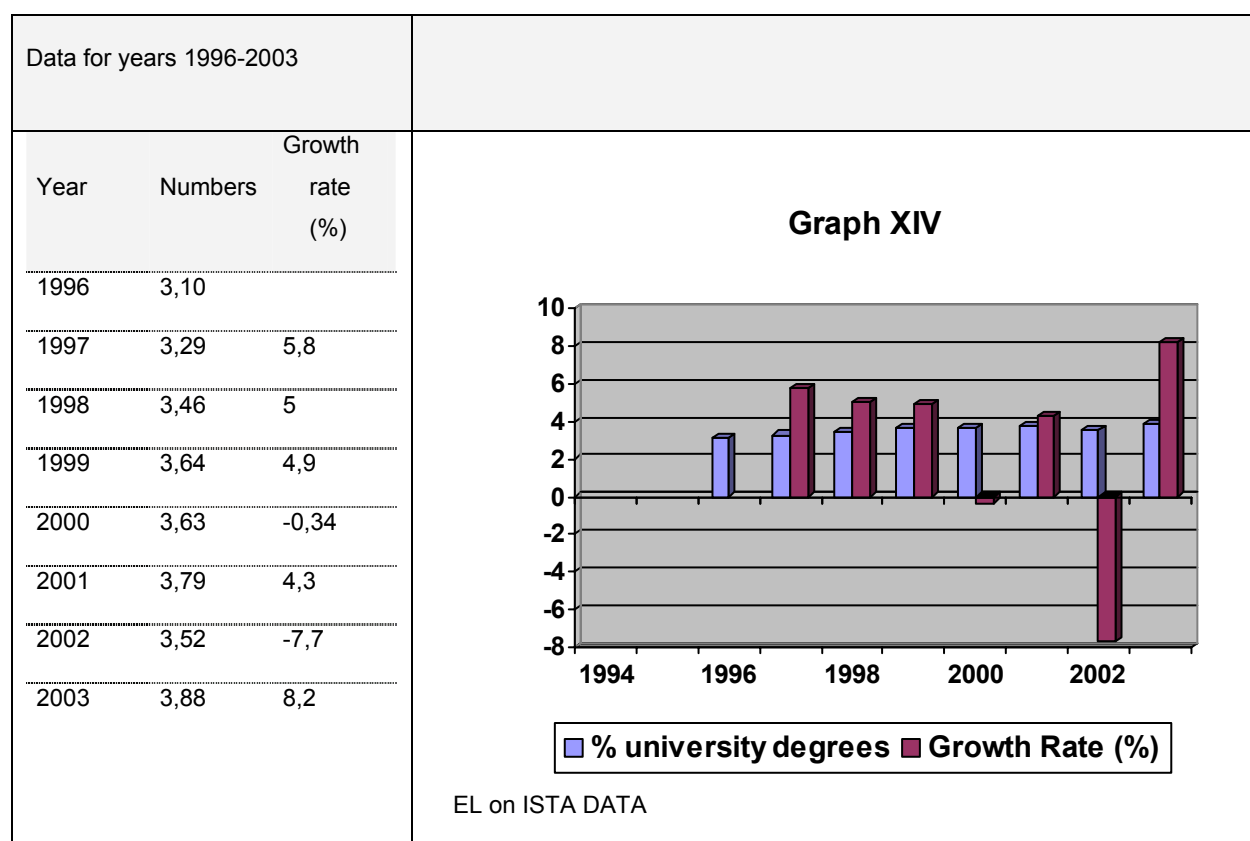
13. Employment in Sicily: by age (thousands)



Source: CNEL

Concerning the employees aged 25 -64, the employment has increased. Unemployment among the population of less than 25 years, is characterised by being basically young and female, by its precariousness (temporary contracts) and by lack of experience.

Percentage university degrees of the population



Source: CNEL

Except for the year 2002, the percentage of university degrees has increased. One of the reasons for this increase is the bigger chance for holders of a university degree to find a better job in the market.

Number of graduates (Catania, Palermo, Messina Universities)

Data for years 2000-2002		
Year	graduate	Growth rate (%)
2000	9.338	-
2001	11.252	17.01
2002	12.642	10.9

Source: www.regione.sicilia.it/bilancio/statistica

In the last years the number of Sicilian graduates has considerably increased.

Annual average inflation rates

Data for years	
1995-2003	
Year	Growth rate (%)
1995	3,9
2001	2,6
2002	2,4
2003	2,6

Source: Quadrante Economico siciliano N. 1 Banco di Sicilia

The annual average inflation rates have maintained a 2.5% rate, in line with the Italian trend,

Desk research conclusions

Sicily is the largest island in the Mediterranean, located in the south-west of Italy. Being a region whose development is below the European average, Sicily has still a fragile production base, an economic structure featuring low industrial employment compared to agriculture, services and construction, and an unemployment rate higher than the national average.

According to the analysis performed, the entrepreneurial structure is composed by micro-enterprises mostly active in traditional sectors. Clusters and SMEs networks are mostly underdeveloped. Applied research often lacks demand due to the limited number of SMEs sensitive to innovation issues; there is insufficient attitude from SMEs to invest in R&D and innovation. As a consequence, the export level of companies is too low because they are not very competitive at international level.

Sicily has the highest concentration (31%) of 'scientific research structures in southern Italy, but the networking system to build co-operation with industry needs to be improved.

Brain drain is a serious phenomenon affecting the region.

Sicily exports about 6% of its production, as opposed to the national average close to 20%. (also due to its large internal market). In the last decade, however, the export percentage of GDP has risen, essentially due to petroleum products.

Infrastructure development is below the national average. While the situation is comparable to the rest of the country in terms of ports, telecommunications and power stations, the infrastructure sector (airports, roads and motorways) is underdeveloped.

Although the island's remarkable natural environment and cultural heritage is well known all over the world, it is still under-exploited. Tourism has risen regularly since the 80s, but this trend is due to national visitors on the whole.

Sicily is marked by strong peculiarities compared to the rest of the national territory which mainly refer to its peripheral geographic position and history. The wide geographical area has a common weak economic structure mainly based on its internal market.

Its weak points (dependence on import growth of a tertiary sector dominated by public sector, contraction of manufacturing industry, insufficient infrastructure) as well as its strong points (presence of the major national private companies (FIAT, STM, ERG, ENI,) diffused presence of SMEs, although not arranged in a "integrated" local system, high level of cultural, artistic and natural heritage) represent the main traits of local economy.

On the basis of the 14° Census 2001, Sicily has got a population of 4.972.124 inhabitants and it is the 4th among the most populated regions in Italy.

In the last years, Sicilian economy has grown with higher levels compared to Italy; the GDP has increased more than the whole Southern Italy. The Sicilian contribution to the Italian GDP is 5,8%. During the 1990s, values related to consumptions and investments have fluctuated, moving from a heavy stagnation to an increase of their growth rates, as it is shown in the Regional GDP table. Population is about 8,7% of the Italian amount but the area produces 6,1% of the total GDP and the 3,5% of the industry value added. The low contribution of Sicily to the Italian economy is also shown by the data relating to industry and innovativeness, despite the continuous efforts to create economic development in the region.

II.2 INDUSTRY FABRIC ANALYSIS

As far as the industrial fabric is concerned, industry has maintained a relatively weak weight compared to the public and service sectors within the Sicilian economy.

The service sector is the most important in the economy of the region, accounting for 68% of total GDP (see graph 6).

The industrial sector contributes for 16,5% ; given to the presence of several large companies in the fields of energy industries and refineries (see graph 5).

However, Sicilian industry has shown an overall dynamic tendency towards innovation in the last few years, especially within the so called "Etna Valley" district based on microelectronics and ICT technologies, which is located in the whole area surrounding Catania. The Sicilian economic system is characterised by the presence of a few large companies and a larger number of SMEs (73%, in Italy SMEs represent 63% among the total number of companies). From an historical perspective, the main industrial sectors in Sicily are Agrofood, Energy (Petrol and Petrochemical), Constructions and Tourism.

Added-value industrial domains are mainly represented by Mechanics, Microelectronics, Telecommunications and some "embryonic" industrial districts like those belonging to natural stones and ceramics, viticulture and wine production, plastic materials and textile.

According to data collected and updated in 2002, the total number of companies in Sicily is 310.597; the majority still belong to those sectors as Agriculture and Trade which have always had a strong weight in the Sicilian economy. Nevertheless, Constructions and Industry have maintained a significant role over the last years. In the last decade Sicily has changed part of its economic assessment especially with regard to some specific areas. As a matter of fact, over the last few years Catania has been characterised by a process whereby its traditional production activities, such as constructions and trade, have been gradually substituted by highly advanced activities. The presence of an increasingly high number of innovative companies in the whole area surrounding Catania has justified the adoption of "Etna Valley" as a new expression indicating the area where those new companies have settled. The sectors involved refer to ICT, Electronics and Microelectronics as well as Biotechnology and Telecommunications.

Main industrial sectors in the region

Table 1: Number of firms - industry sector (2002)

	2001	2002
Agro food	10.018	10.347
Wood-Furniture	7.014	6.900
Mineral non metallic:, ceramics, stones-	3.347	3.453
mechanics	5.227	5.341
Electro mechanic; equipment	2950	3000
Total	36.836	37.406

Table 2: Firms and sector turnover (range from - to) in percentage - Year 2000

Sicilian Region - Year 2000	< 5 mil. €		5-50 mil. €		50-250 mil. €		> 250 mil. €	
	Firms (%)	Turnover (%)	Firms (%)	Turnover (%)	Firms (%)	Turnover (%)	Firms (%)	Turnover (%)
TOTALE	95,2	32,7	4,5	32,4	0,2	11,4	0,0	23,5
Agriculture Fish	97,3	59,7	2,7	40,3	0,0	0,0	0,0	0,0
Industrial manufacturing (agrofood, wood, paper, chemistry products, plastic materials, electro-mechanic, metal-mechanic, electronic)	91,9	16,2	7,8	21,4	0,2	3,2	0,1	59,2
Construction	98,2	60,5	1,7	30,5	0,1	9,0	0,0	0,0
Trade	92,0	37,3	7,7	44,2	0,4	18,4	0,0	0,0
Hotel and restaurant	97,5	66,0	2,5	34,0	0,0	0,0	0,0	0,0
Transport and communication networks	92,0	22,2	6,9	28,1	1,0	33,9	0,1	15,8
Research, informatics and others	98,6	60,7	1,4	32,8	0,0	6,4	0,0	0,0
Other services	97,8	59,3	2,2	40,7	0,0	0,0	0,0	0,0

Source: Unioncamere - Osservatorio sui bilanci delle società di capitale, 2002

Table 3: Firms and employees by sector: Year 2002

Sectors	Firms	Employees
Agriculture , Fish	110.901	131.629
Industrial manufacturing (agro food, wood, paper, chemistry products, plastic materials, electro mechanic , mechanic, electronic)	29.422	108.922
Construction	29.456	92.631
Trade	90.779	180.375
Hotel and restaurant	9.104	29.477
Transport and communication networks	8.986	36.726
Finance organizations (banks)	3.700	21.231
Research, informatics and others	25.979	97.690
Others	2.270	4.062
TOTAL	310.597	702.743

Source : Unioncamere

Table 4: Size and numbers of firms

Size	number
Micro-firms (1-2 employees)	264.891
SMEs (3-250)	45.637
Large enterprises (> 250)	69

Geographical distribution / concentration within the region

Industrial transformation: - oil transformation and refinement (Gela and Siracusa);

production of means of transport (FIAT industry in Termini Imerese);

chemicals, plastics materials and rubber products (Catania and Messina).

Traditional Industry: especially broadcasted in coast – areas and, in particular,

alimentary sector in Trapani and Agrigento (viticulture production);

textile sector in the centre of Sicily (Caltanissetta, Enna and Valguarnera) and in Val Demone area;

paper and publishing sector in Catania and Messina;

making of non-metalliferous minerals in Custonaci Valderice and S. Stefano of Camastra (ceramics).

High-tech Industry: Catania's area, where the presence of multinational industries leaders in the sector of microelectronics and telecommunications shows the potentiality of becoming a technological pole of international importance.

Table 5: Description of poles/ districts and the centres of regional technological excellence

Poles/ districts	M2	N. of companies
Etna Valley – Microelectronics and telecommunication sector (Catania)		6.881
Petrochemical District – Priolo Melilli Augusta (Chemistry and Energy)		2.061
FIAT- Termini Imerese ; Centro Ricerche FIAT – (Area Industriale Catania) (Automotive)		662
Sciacca-Bagheria (Fish)		1.106
Ragusa (Agrofood)		1.621
6. Marsala (Wine)		1.801
7. Messina (Nautical and Tourism)		
Centres of regional technological excellence		
Name of the Centre	Areas of Excellence	
National Council of Research – Catania and Palermo Area	Microelectronics; Plastic materials; Energy; Agro food ; ICT Information technology	
Departments of Catania Palermo and Messina University	Physics; Chemistry Biology; Medicine; Engineering; Information Technology ; Mathematics	
National Institute for Nuclear Physics (INFN) (Catania)	Nuclear Physics	
Centro per la Ricerca Elettronica in Sicilia (CRES)	ICT and microelectronics	
Consorzio di ricerca filiera lattiero casearia	Dairy farming	
Consorzio Catania Ricerche	Materials - Surphace Analysis	
Sicilian Science Park	Biotechnology- Materials; Agro food; Cultural Heritage: Tourism; ICT; Training	
CEOM	Marine technology	
Scuola Superiore di Eccellenza – Università di Catania	Education	

II.3 REGIONAL POLICY MEASURES

This section describes the regional policy objectives and goals in terms of knowledge and innovation policies.

a) NATIONAL RESEARCH AND INNOVATION POLICY

Recently, Italy has significantly rationalized its research and innovation policies devoting increased efforts to enhance the spread of innovation among SMEs. The strategic directions dealing with Science and Technology are set by the National Programme for Research (PNR) developed by MIUR (Ministry for Research). The PNR overall objective is to enforce the relationship between research and the market and to enhance Excellence of Italian research.

The governmental support to R&D is granted by three main funds which are operating in a complementary perspective: 1) the FIT – National Fund for Technological innovation, 2) the FAR – National Fund for Applied Research, 3) the FIRB - National Fund for Basic research

Main supporting actions to PNR objectives are:

Basic research project (“curiosity-driven”)

Strategic programmes for applied research (public-private partnership responding to a market opportunity)

Realization of great infrastructures for research

Promotion of academic spin-offs

Promotion of business plans competition and incubation schemes

Research projects according to identified priority sectors (environment, transport etc).

The implementation of R&D policies for “objective 1 areas” (Sicily and Southern Italy) are ruled by the National Operating Plan for Research 2000-2006.

PON objective is to reinforce R&D absorption capacity of the socio-economic tissues of Southern Italy, so that these Regions can compete and succeed globally. To reach this goal, the PON devotes more resources to research and innovation and supports schemes favouring the opening of the research system to economic players (SMES), also in view of attracting more external investors. The PON operates through four main streams of action:

Human resources valorisation;

Promotion of investment in research and innovation within the industrial tissue;

Networking and clustering processes both for enterprises and for research and intermediaries;

Stronger links between research and the market.

b) REGIONAL RESEARCH AND INNOVATION POLICY

The Sicilian Government is characterised by political autonomy since it is one of the few Italian Regions with a Special Statute. It has exclusive powers in industrial policy that have contributed to the creation of specific bodies devoted to industrial promotion and development, with a special focus on innovation, training and market openings.

Research and innovation have been recognised as priority areas of intervention both at regional level and by the institutional agreement with the National Government. Consistent resources have been assigned to those priority areas by the POR (Sicilian Operating Programme 2000-2006) and PON Ob.1 2000-2006 strategic plan has been undertaken to optimise the utilization of these resources for innovation enhancement in the whole Sicily.

The regional plan for innovation of Sicily (SRI Sicilia -2003)

The strategy, formally endorsed by the Regional Government in 2003 after a continuous consultation and consensus building process, set the guidelines to increase Sicilian innovation capacity and absorption of research and innovation. The SRI has been developed in response to socio-economic issues (weak interface distance between research and market, prevalence of micro-enterprises, but also high knowledge potential, emerging high tech clusters) and the needs of innovation expressed by SMEs.

The strategy puts forward the concept of innovation as a process to develop and convert ideas, knowledge and competences into market products and services.

SRI SICILIA is built around the following key issues:

- Enterprises as target groups (existing and start up companies);
- Bridging research and market;
- Public-private collaboration;
- Networking and clustering.

The strategy overpasses traditional innovation policies promoting industrial research, financial incentives for R&D, state-aids, to pursue schemes for cooperative projects between research institutes, universities and SMEs, cluster-based policies, schemes for knowledge-based start up creation (from scouting to IPR, seed capital and incubation).

The aim is to reinforce the regional innovation system by introducing a policy mix capable to sustain innovation at 360° (SMEs have different potential and innovation needs).

The main strategic program of the Sicilian Region is represented by Piano Operativo Regionale (POR) for the years 2000-2006, which uses the community structural funds assigned with Agenda 2000. It was approved by the EU in July 2000 and should provide a contribution of 9.415 million Euro.

Table 6: POR SICILY BUDGET

	Investments by sectors		
	Public Financing	Private	Total
Natural resources	1.973.033.203	394.606.124	2.367.639.327
Cultural resources	955.636.869	143.346.228	1.098.983.096
Human resources	886.188.910	88.618.839	974.807.749
Local Systems	2.391.987.171	956.323.757	3.348.310.928
Cities	487.826.078	73.174.196	561.000.274
Services	867.809.758	173.562.055	1.041.371.813
Technical assistance	23.382.070	0	23.382.070
Total	7.585.864.058	1.829.631.198	9.415.495.256

Regional measures:

Within this programme, there are some regional measures supporting innovation and R&D:

Measure 3.14: Promotion of the research and innovation regional system

Measure 3.15: Network for the development of Scientific Research

Measure 4.05: Training of local development systems

Measure 5.05 Network aimed to improve cities offer

Measure 6.05 Network a service to ICT society

National Measures:

The Italian Ministry of Innovation, together with the Ministry of Industry and local Institutions (Sicilian region, municipalities, development agency) has started a policy in order to make use of ICT technologies. The main measures promoted are:

E-Government programme in Public Administration

Application of ICT technologies in SMEs

The Italian Ministry of Research (MIUR), within PON research measures, supports R&D projects based on cooperation between research centres and enterprises (e.g Law 297/99; PON Research).

The Italian Ministry of Industry (MAP), within PIA INNOVAZIONE measure, supports innovation projects involving large companies and SMEs.

Impact analysis of the above programmes

The impact of the above programmes is not very high due to the following reasons:

- 1) the structure of the regional economy is based on traditional activities such as Agrofood, Trade, Tourism, and low technological industries in general;
- 2) there are not many large companies;
- 3) SMEs do not have to develop and/or implement innovation.

The programmes represent an opportunity, a starting point for future development in the fields of research, innovation and knowledge economy.

The key point is the time gap between the start up of the programme and its financing. Although there are some measures fostering innovation and R&D (European, national and regional), the current implementation has not had sufficient impact on the economic and industrial system yet.

The local key actors which have been interviewed, assert that one of the main reason concerns with the great numbers of innovation and R&D programmes which have not been financed yet. For example, regional measure such as 3.14; 3.15; national measure such as Law 297/99 or PIA innovation.

The main reason could be linked to the general state of Italian public finance.

Considering that SMEs, which represent the largest number of regional firms, don't invest in research and innovation without public support, as the tables show, in this moment they are not able to implement innovation as the global economic and industrial competition requires. They also need skilled personnel.

Notwithstanding some general problems, university and research centres have more opportunities to obtain R&D finance which often are not addressed to industrial applications.

II.4 KNOWLEDGE-BASED ECONOMY

The indicators presented in the current section have been selected on the basis of their importance to assess the degree of development of the knowledge based economy in the region. The indicators embrace the following fields: ICT, intellectual capital, education, labour force, R&D and innovation within regional firms.

In some cases, data for Sicily are not available.

II.4.1 Information and Communication Technologies ICT

The knowledge economy in Sicily is not enough developed; all the interviewees consider the regional investments in ICT and R&D not sufficient; however there are some geographical areas where the productive systems are more sensitive to the knowledge economy in terms of high-technology investments, high-technology industries and highly-skilled labour, which are mainly close to large cities (Palermo, Catania, Messina).

Sicily can be considered as a complex area, due to the co-presence of an excellent and strong public research system and a fragile industrial structure. Besides, "scientific research" prevails on "innovation" as leading concept while research and market are not easily connected since neither public nor private offices are involved in the creation of such networks.

The local small/medium-sized companies' need the knowledge economy and innovation in order to try to overcome their competitive problems but, at the moment, the public investments are not sufficient.

The main regional institution, Regione Siciliana, has not planned significant measures to support the knowledge economy within POR Sicilia. The Regional Strategy on Innovation (SRI) and some others measures such as measure 6.05 on ICT development, measure 3.14 on innovation in SMEs and measure 3.15 on R&D network, have not been implemented yet.

Private investments are not sufficient, the average expenditure of an Italian SME (1-99 employees), which represents a large part of the Italian industrial structure, is 1.321 dollars (in Spain is 2.207 and in Europe 4.501)¹.

The Italian government-Ministry of Innovation and Industry- has planned some specific measures for companies and public institutions respectively in the fields of ICT and E-Government.

Promoting the high – tech district "Sicily Micro and Nano Systems"

Some Italian policy makers have planned in Sicily a creation of an excellent research and innovation technology district in the field of Micro and NanoSystems.

The partners are the Italian Ministry of University and Research (MIUR), the Sicily Region, the Universities of Catania, Messina and Palermo, the Municipalities of Catania, Messina and Palermo, and STMicroelectronics.

It has been considered that the activity area has good expertise and potentialities in R&D, a necessary condition to successfully create a technological district.

¹ Source IDC-Microsoft
Deliverable 2.1.11 Regional Evaluation Report

The sectors covered by the programme are:

- Optoelectronics;
- Bioelectronics, biosensorics and bioinformatics;
- Molecular and organic fotonics;
- Power electronics on composed materials;
- Nanostructured devices and materials;
- Silicon Microsystems for integration;
- Applications on ICT sector.
- Robotics and Automation

The district's objectives are:

- 1) to create a pole of excellence attracting and educating young skilled employees and researchers with multi-disciplinary competences;
- 2) to activate cooperative projects addressed to industrial research at international level;
- 3) to promote the opportunities offered by new technologies in order to improve the competitiveness of existing company and encourage start up companies.

ICT market

Considering the high number of SMEs and the Sicilian Population (about 5 millions in habitants), the potential ICT market is very promising and attractive.

The Italian ICT market is estimated on 2,2 billion of Euro. Sicily represents 2,7% of the total market and during the period 2000-2002 the region experienced an increase of 3.3 % per year (compared to Italy with an increase of 2,8%).

In 2002 the ICT expenditure on GDP was 0,9 %; Italy 2% ; USA 3,8 %.

In Sicily the ICT expenditure for employee is about 386 Euro.

Table 7: Companies operating in ICT sector

	2000	2001	2003
Numbers	3587	3986	4201
Percentage of growth		11%	6%

In two years, the ICT companies have increased by 17%; but the companies size is not very high in order to compete at national and international level.

SMAU, the main Italian Fair on ITC in Milan, organises in Catania the Euromediterranean ICT and consumer electronics event. This year (next 18-21 November 2004) the items will be: business; consumer, e-government. Last year companies exhibitors were 210, 37% coming from Sicily (half from Catania) and there were 36.000 visitors.

II.4.1 INFORMATION AND COMMUNICATION TECHNOLOGIES ICT

General indicators

Table 8 : ICT Expenditure (thousands of €)

2000	2001	2002	% regional GDP
500,9	550,7	543,3	2.7

Sicily has a market share of 2,7% of the Italian total ICT market controlled by Lombardia region (22,7%) and Lazio (19%), while the percentage of population is of 6,9%, against the 16,2% and 9,7% of, respectively, Lombardia and Lazio.

In the period 2000-2002 the average of ICT Sicilian growth was about 3,3%.

The rate firms/inhabitants is of 1/21, while in the North and Centre of Italy it is of 1/14.

The Regional Innovation Scoreboard, carried out by the Italian Ministry of Industry (MAP) and IPI, using data from ISTAT and Eurostat, presents the following 11 indicators:

INNOVATION IN SICILY 2000 – (Italy= 100)**Table 9: Sicily Innovation Scoreboard**

1	New Science and engineering graduates (%o of 20-29 Year age class)	105,1
2	Population with tertiary education (% of 25-64 Years age class)	83,8
3	Participation in lifelong learning (% of 25-64 Years age class)	47,5
4	Employment in medium-high tech manufacturing (% of total workforce)	40,2
5	Employment in high-tech services ((% of total workforce)	82
6	Employment in R&D (x 1.000 in habitants)	44,2
7	Public R&D expenditure (% of GDP)	109,50
8	Business R&D expenditure (% of GDP)	19,82
9	Patent application UEB (million in habitants)	24,2
10	High Tech Patent application UEB(million inhabitants)	111,0
11	Internet access	56,6

Sicily covers position number 16. ITALY = 100; Sicily= 65,8; Lombardia = 161,6 ; Lazio 135,3 .

The percentage of growth is very good from 1995 to 2001, which means that R&D and Innovation investments have increased, especially in the indicators: a) Population with tertiary education (position n. 3 in Italy), b) Business R&D expenditure, (position n. 1), c) New Science and engineering graduates, d) High tech patents.

This good positions are linked to Etna Valley district and the good level of Universities.

Considering the European Regional Score board, Sicily hold the position 124° ; Madeira 123; Canarias 113 .

Table 10: Numbers of firms operating in ICT sector

	2000	2001	2002
number	3.587	3976	4.201
% growth Sicily		10,8	5,7
% growth Italy		8,8	4,9

Source: Assinform

Table 11: Demand fragmentation ICT sector

Firms	Micro-firms	SMEs	Large Enterprises
Employment	1-9	10-199	> 200
Italy	95%	4%	1%
South	96%	3,6%	0,4%
Sicily	98%	1,7%	0,3%

Innovation Scoreboard - Osservatorio Filas

Table 12: Penetration of mobile telephones (% of family) ITALY

1995	1998	1999	2000
6,9	40,4	60,7	70,4

Internet users (%): in 1999, in Sicily there were 218 providers (3021 in Italy), equal to 4,3 on each 100.000 inhabitants (Italian average: 5,3%).

Families with computers are 15,2 % (2000).

The households with computers is of 29 units on each 1000 inhabitants (National average: 27,7).

Table 13: Internet access (%)

2002	2004
12,60 %	18,60 %

Innovation Scoreboard Lazio- Osservatorio Filas

Table 14: Home internet access (%)

2002
22,13 %

Innovation Scoreboard Lazio- Osservatorio Filas

The internet connection rate of firms is of 5,1% (national rate: 6,7%)

Sicily is in the fifth place among the Italian regions for the increment of information technologies' firms between 1997 and 1999 (+25,8% according to Unioncamera sources).

ICT and Education

Percentage of schools with computers	%
Percentage of students per computer in primary level	%
Percentage of students per computer in secondary level	%
Percentage of students per computer university	%
Percentage of schools with connection to the internet	%

N/A DATA

Even if official data is not available the percentage of schools and students with computer is very high because in the last years the Italian government has supported the use of computers in the school.

ICT in the workplace- Electronic Commerce

Regarding the type of transactions in the workplace, these are mainly oral and paper based rather than on-line transactions, since companies prefer this type of business relationship.

II.4.2 INTELLECTUAL CAPITAL**Table 15: Number of patents applications in Sicily**

Provinces and Regions	1996	1997	1998	1999	2000	2001	2002
Sicilia	102	112	87	83	89	110	108
Trapani	6	7	3	2	5	8	2
Palermo	23	24	18	16	17	24	23
Messina	27	25	15	10	7	19	10
Agrigento	5	7	3	1	3	1	2
Caltanissetta	6	4	7	9	15	23	30
Enna	0	1	0	0	0	0	0
Catania (208)	27	30	24	30	35	32	30
Ragusa	4	8	10	8	4	3	11
Siracusa	4	6	7	7	3	0	0

Nord-Ovest	4.362	4.562	4.514	3.344	4.101	4.282	4.000
Nord-Est	2.420	2.626	2.599	2.632	2.240	2.845	2.908
Centro	1.682	1.611	1.598	1.582	1.385	1.571	1.492
Sud-Isole	424	474	407	225	231	437	437
ITALIA	8.888	9.273	9.118	7.783	7.957	9.135	8.837

Source: Ministero delle Attività Produttive

In the fields of computer hardware, semiconductor devices and electronic components, for the years 1995-1999, Catania Area accounted for 11,2 % of Italian inventors on total inventors of the sector. (Source: University of Pavia, elaboration on European Patent Office).

Table 16: selected indicators for major Italian high tech sectors

Sectors	Region	Local Labour System	Inventors per LLS and % of total inventors of the sector years 1995-99	Production units per LLS and % on total production units of the sector census 1996	Employees per LLS and % on total employees of the sector. Census 1996
Computer, hardware, semiconductor devices and electronic components	Lombardia (Milano)	186 (28,4%)	228 (35,4 %)	260 (13,4%)	12,966 (25,9%)
	Sicily (Catania)	39 (11,2 %)	50 (7,8%)	13 (0,7 %)	1,969 (3,9 %)
Total	All	655	644	1,943	49,984

Source: ISTAT; University of Pavia (The Italian System); European Patent Office

II.4.3 EDUCATION

The education system in the region is very well developed and very competitive. It is located mainly at academic level. There are 3 Universities (Palermo, Catania, Messina) and a lot of higher education institutions (e.g. Scuola Superiore dell'Università di Catania, CERISDI). The main strengths identified in the interviewees are the human capital of universities, and national research centres.

Total number of higher education institutions (public/private)	510
Population with tertiary education (% of 25-64 age class)	9,47
Percentage of graduated population with Ph.d degree	
Prevailing specialisations (and distribution of students among the fields, if available)	
Existence of distant learning facilities: at universities and Research Centres like CNR mainly	
Participation in life-long learning (% of 25-64 age class)	

II.4.4 LABOUR FORCE

The employees in R&D mainly belong to public R&D institutions; the employment level of R&D personnel within private companies is low.

Unfortunately, there is a large number of graduates who cannot find job in Sicily so they are forced to go outside. It means that it is difficult to find a good job, linked to degree.

In the last years only the graduates in the fields of engineering, chemistry, physics, mathematics, electronics and informatics have found a good job.

The employment in high-tech manufacturing is low and it is concentrated in the Etna Valley area where high tech companies such as STM, Nokia and numbers of SMEs in the fields of electronics, materials, ICT are settled.

In the class of computer hardware and electronic components Catania is the only centre in southern Italy appearing among the main concentrations in any high-tech class in Italy. Through the activity of its large companies more of than 1.000 researchers have been employed.

Table 17: Employment in R&D per 1000 in habitants

	1995	1996	1997	1998	1999	2000
Sicily	1,1	1,2	1,3	1,3	1,2	1,3
Italy	2,5	2,5	2,5	2,7	2,5	2,6

Innovation Scoreboard Lazio- Osservatorio Filas

Table 18: Employment in R&D

	1997	1998	1999	2000	2001
University	4.739	No data	4.474	4515	5.676
Firm	904	1042	979	939	996
Other	871	825	786	906	929
Total	6514	1867	6239	6360	7.601

Table 19: Employment in medium/high manufacturing (% of total work force)

2002
2,30

Innovation Scoreboard Lazio- Osservatorio Filas

Table 20 Employment in high-tech manufacturing (thousands)

2002
1.950

Data available only for 2002

Table 21: Employment in high-tech services (% of total work force)

	2002
(%)	2,30
(thousands)	2.300

Innovation Scoreboard Lazio- Osservatorio Filas

II.4.5 RESEARCH AND DEVELOPMENT

The percentage of regional R&D expenditure is 0,64% of the regional GDP, while in Italy is 1,02% . The distribution of the total R&D expenditure among the different institutional sectors shows the highest value in Universities expenditure (64,1%), while only the 11% on the total regional expenditure is represented by public administration.

R&D expenditure is highly concentrated in large firms, which are normally part of large industrial groups. The southern Italy confirms its delay compared to other regions, both in terms of industrial and R&D activity, with the exception of the area of Catania.

This area, called Etna Valley, is mainly characterised by the presence of national and international companies which mostly operate in the electronic sector as well as in telematics and telecommunications sectors. Thanks to the innovative impulse given by the main industrial colossus, ST Microelectronic, together with the vital action of local SMEs. During the 90's ST Microelectronics has started to co-operate with important local institutions, such as the Universities of Catania Palermo and Messina; it has been involved in many research projects, especially in the fields of microelectronics and Nan technologies.

All these companies have been characterised by the presence of highly specialised personnel at low cost thus enabling them to add value to their products and services. Today this area is mainly characterised by the presence of national and international companies.

Another important aspect is that ST Microelectronics has strongly modified its relationships with the other Etna district's companies moving from a strictly vertical production to the decentralisation of some significant processing phases. Moreover, the research activity has been enhanced over the last few years with the co-operation of local researchers and scientists, as well as with National Research Council (CNR).

The industrial activity of ST Microelectronics (STM) has been related to an advanced research carried out in collaboration with researchers of the Departments of Physics, Chemistry, Electronic and Telecommunication, Mathematics and Informatics of the University of Catania. The development of the research activity permits STM to maintain a rich pocketbook of new products, thanks to which the company can get lower negative effects on financial balance during international crisis and it can assume an active position in the world-wide market of microelectronics.

Although STM has contributed to the settlement of 23 international companies in the Etna district (such as Magneti Marelli, Applied Materials, Nokia, etc.), another relevant aspect concerns the birth of new firms which have been created both by STM ex-employers and by young entrepreneurs (national law n.44/1986), such as Antech (telecommunication and satellite), Wire Net (telecommunication) and Proteo (water management software system).

Local government policies have encouraged the settlement of national and international companies even by the establishment of important services, such the local counter "InvestiaCatania" whose main function is to provide companies with all the necessary assistance for the creation of new businesses within 90 days. Thanks to its support, some of the most important multinational companies have decided to develop businesses in the area.

An important indicator is represented by the high number of patent applications (208) in Catania during the period 1996-2002 (please see the table) .

In particular, the computer sector has had a boom: during the 90's the international crisis operated a selection between software houses and those providing generic services disappeared. Today, the specialist software

companies can offer high quality services thanks to the employment of new-graduates in Mathematics and Informatics.

Within the Information Technology sector, major companies, such as Computer Science Corporation, IBM (with the first Mobile Technology Centre in Italy), Magneti Marelli (which is specialised in developing software for checking engines of motor car industry) have settled in Catania.

Among the local companies belonging to the so called "new-net economy" which embraces emerging high-tech fields, the Sicilian companies Cities on Line, which was founded in 1995, Proteo and SeaSoft, specialised in producing fiscal software sold to a commercial specialist group (Buffetti), can be considered as the most representative cases of vital businesses. Another field which has strongly developed in the last year is Biotechnology. Together with the numerous companies operating in this field, Etna Biotech was created last year in order to exploit some of the local natural resources, such as tomatoes and red oranges, for their use in medicine.

Within this general framework, the traditional distinction between production and research activities becomes weaker. Production and service activities merge into a single "mixture" which is not independent from the social context where they have spread. As a matter of fact, cognitive and learning processes are unique and strictly related to the nature of the relationships networks which characterise the urban area. From this point of view, the establishment of networks and clusters, and the interaction and knowledge flows within them have been given increasing priority. Local institutions, such as Universities, CNR laboratories, Consorzio Catania Ricerche and the Innovation Relay Centre, together with local and international enterprises, are the major components of the "urban milieu". With the help of all those intangible elements that constitute local culture, the urban milieu plays the key role of "incubator" towards SMEs innovation.

Recently a protocol on the promotion of an high tech district in Sicily on Micro and Nanosystem has been signed among local stakeholders (Regione Siciliana, municipalities, universities- Catania, Palermo and Messina) , Italian Ministry of Research and ST Microelectronics). For the period 2004-2008 a budget of 40 millions of Euro has been planned, mostly in the fields of : bioelectronics, optoelectronics, fotonic, electronic, Microsystems and ICT applications.

Region: Sicily

A regional study on Innovation Scoreboard, including all the Italian regions has been carried out by the Lazio region. The following data regards Sicily.

Table 22: Innovation score board Sicily

1	Public R&D expenditure (% of GDP)	0,64
2	Business R&D expenditure (% of GDP)	0,13
3	EPO High Tech Patent application(million in habitants)	4,90
4	EPO Patent application	13,21
5	Venture capital investments in high technology businesses	0,03
6	Home internet access	20,13
7	Internet access	11,60

8	ICT Expenditure (% GDP)	2,72
9	GDP procapite	12.377

(Source Osservatorio Filas) 2002

Expenditure

Table 23: Total expenditure on R&D, thousands of Euro

	2000	%	2001	%
University	364.302	9,4	405.440	9,2
Firms	140.635	2,3	134.493	2,0
Other	63.096	2,7	62.247	2,5
Total	568.033		602.180	

Source: ISTAT

The R&D expenditure in Sicily represents 4,4% of Italy

Table 24: Total expenditure of FIRMS on R&D

	1998	1999	2000	2001
(thousands of €)	102.018	83.478	140.635	134.493
(%)	1,8	1,5	2,3	2,0

Table 25: Public expenditure on R&D (% Regional GDP)

1997	1998	1999	2000	2001	2002
0.49	0.64	0.56	0.64	0.66	0.8

Table 26: Business Enterprise sector expenditure on R&D (% Regional GDP)

1997	1998	1999	2000	2001	2002
0.05	0.16	0.13	0.21	0.19	0.3

Regional expenditure in knowledge/innovation policy

Unfortunately, no data on regional expenditure in knowledge/innovation policy is available for Sicily.

Research institutions

The main research institutions operating in the region are shown in the table below:

Research institutions
<p>Name: UNIVERSITY OF PALERMO</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: University of Palermo is divided in 69 Departments, 12 Faculties, 12 Interdepartmental Centres.</p>
<p>Name: UNIVERSITY OF CATANIA</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: University of Catania is divided in 49 Departments, 12 Faculties e three Research Centres.</p>

<p>Name: UNIVERSITY OF MESSINA</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile University of Messina is divided in 63 Departments, 11 Faculties.</p>
<p>Name: CONSORZIO PER L'UNIVERSITA' KORE DI ENNA</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: University of Enna offers 20 courses of masters degree.</p>
<p>Name: C.N.R. Institute for Microelectronics and Microsystems (Catania)</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile:</p> <p>Disciplinary area: Basic Sciences</p> <p>Research fields: Innovative materials and processes for the development of new technologies and methods of diagnostics and characterization for the design and realization of: Micro- and opto-electronic devices on silicon and Si- components Sensors and Microsystems Photo - and thermo-photovoltaic systems.</p>
<p>Name: C.N.R. - Institute for advanced energy technologies "Nicola Giordano" (Messina)</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile:</p> <p>Disciplinary area :Technological, Engineering and Information Sciences</p> <p>Research fields: Systems for the direct production of electrical energy; systems for combustible production from traditional and renewable sources of energy; systems for transformation, build-up and transportation of energy.</p>
<p>Name: C.N.R. Institute of biomedicine and molecular immunology (Palermo)</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: Disciplinary area: Life Sciences</p> <p>Research fields: Molecular, cellular and morphological studies on the first stages of the embryonic development and of the mechanisms involved in differentiation and in the degenerative processes of eukariotic cells. Molecular studies on the proteins involved in immunological disorders, particularly in allergic reactions. Synthesis and characterization of bioactive molecules. Physiopathology and clinics of the cardio-respiratory system and the control of the respiratory function during wakefulness, sleeping, and controlled physical activity with particular reference to intensive therapy and semi-intensive therapy devoted to respiratory insufficiency. Biology and clinic of</p>

<p>brunch pulmonary pathology from obstructive causes, interstitial infiltration and neoplasias. Tissue compatibility in organ transplants and analysis of experimental transplant models; bio effects of magnetic fields on the immune system. Epidemiology, physiopathology and clinic of renal insufficiency and arterial hypertension.</p>
<p>Name: C.N.R. Institute of bio molecular chemistry – Department of Catania</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile:</p> <p>Disciplinary area :Life Sciences</p> <p>Research fields: Isolation, chemical synthesis, molecular characterization, structure-activity relation, and molecular design of biologically active molecules; Innovative chemical methods in synthesis, biosynthesis, purification, and characterization of biologically active molecules; Chemistry, biochemistry, and microbiology in application development of biomasses and compounds significant in biotechnology and ecology</p>
<p>Name: C.N.R. Institute of neurological sciences Department of Catania</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: Disciplinary area: Life Sciences</p> <p>Research fields: Clinical psychopathology and therapy of nervous systems diseases with particular attention to hereditary neurological diseases; Clinical, neurophysiological, and neuropathological diagnosis of nervous system diseases; Diagnostics by images and nuclear medicine applied to the diagnosis and the study of the nervous system diseases; Genetics, biochemistry, immunology, and pharmacology applied to the diagnosis and the study of the nervous system diseases. Development of biotechnologies to study the diseases of the nervous system.</p>
<p>Name: C.N.R. Institute of archaeological heritage - monuments and sites (Catania)</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: Disciplinary area: Social and Human Sciences</p> <p>Research fields: Methodologies for the analysis of settlements, territory, and transformation of the environment and landscape in the ancient and middle ages. Multidisciplinary studies on archaeology, from a Mediterranean perspective, with particular reference to Southern Italy and Sicily. Methodologies for knowledge, diagnosis and intervention in the conservation, restoration and presentation of the archaeological heritage (sites and monuments)of the Mediterranean Countries.</p>
<p>Name: Institute of chemistry and technology of polymers - Department of Catania</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p>

<p>Brief profile: Disciplinary area: Basic Sciences</p> <p>Research fields: Correlation among molecular characteristics, morphology and structure, and physical-mechanical properties of polymeric systems. Determination and control of molecular, physical and structural factors devoted to design and realize innovative polymeric systems. Chemical technologies, and innovative and eco - sustainable working processes to develop special polymers.</p>
<p>Name: C.N.R. Institute of bio structure and bio imaging - Department of Catania</p> <p>c/o Dip. di Scienze Chimiche dell'Università Viale A. Doria, 6 - 95125 Catania CT Sicilia</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile:</p> <p>Research fields: Biochemical technologies and bio structures; Biochemical technologies oriented at diagnostics by images; Technologies of diagnostics by images and radiotherapy; Diagnostics by images and radiotherapy</p>
<p>Name: C.N.R. Institute of plant genetics - department of Palermo</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Research fields: Processes limiting growth, development, and productivity; Interaction of plant with the physical and biological environment; Analysis of plant genome; Product quality; New agricultural products for food, pharmaceutical, and chemical industries.</p>
<p>Name: C.N.R. Institute for Mediterranean agriculture and forest systems - Department of Catania</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Research fields: Study and analysis of the physical, chemical, and biological processes determining the functioning and the dynamics of the agrarian and forestry ecosystems. Development of technical solutions for the improvement of the production processes, of the total quality of products, and to raise the functionality of woods basing upon the knowledge of the previous item. Development of methods and tools to transfer the studied solutions to the territory, due to the spatial variability of factors determining the aptitude to use. Development and application of advanced research methods as numeric simulation models, decision support systems and remote sensing.</p>
<p>Name: C.N.R. Institute for coastal marine environment - Department of Messina</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Research fields: Biological resources and sustainability, with particular attention to fishing and aquaculture resources. Biodiversity of marine ecosystems and biogeochemical cycles, devoted to the study of: ecosystems of coastal strip and resources; mechanisms determining biodiversity; marine system tolerance of perturbation. Marine geology and morpho-bathymetry based upon the study of the morphology of the sea floor, the acoustic</p>

<p>characteristics of the floor, and the stratigraphic and tectonic aspect of the seafloor. Pre-operation and ecological oceanography of sensorial systems aiming at a continuous forecast of the future conditions of the sea.</p>
<p>Name: C.N.R. Institute for chemical and physical processes - Department of Messina</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Research fields: Matter and radiation: structure, dynamics, transformations, reactivity, interactions even in extreme conditions; Computational, analytical, spectroscopic methodologies and their innovative applications; Modelization of materials and complex systems.</p>
<p>Name: C.N.R. Institute for high performance computing and networking - department of Palermo</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Research fields: High performance computing systems. Parallel computing. Environments, protocols, and advanced technologies for computer networks and internet. Intelligent and complex functionality computer systems.</p>
<p>Name: C.N.R. Cosmic physics and space astrophysics institute - Department of Palermo</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Research fields: Definition, realization and scientific utilization of instruments for space missions with particular reference to Gamma, X, UV, IR and mill metric astronomy, and to the study of cosmic background, observation technology, planet logy and cosmic rays; Optical astronomy, theoretical astrophysics, astrophysical and information technologies.</p>
<p>Name: C.N.R. Institute for educational technology - Department of Palermo</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Research fields: Teaching/learning processes and systems dedicated to their realization. Innovative solutions for educational and training problems based upon a systemic approach to design, management, and assessment of learning environments. Information and communication technologies as important elements in determining new educational needs and as resources for teaching/learning.</p>
<p>Name: C.N.R. Institute of intelligent systems for automation - Department of Palermo</p> <p>c/o Dip. Ingegneria Elettrica - Università Viale delle Scienze.</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Research fields of the Institute are: robotics aimed at achieving intelligent machines able to perceive and act autonomously in poorly and uncertain real environments. Automation to increase performance, productivity, and security of complex systems. Signal and image processing in integrated hardware and software systems for the acquisition and treatment of multispectral, multitemporal and multiplatform information. Systems based on soft-</p>

<p>computing techniques for measurement and support to decisions in complex applications.</p>
<p>Name: C.N.R. Institute of nanostructured materials - Department of Palermo c/o area della Ricerca di Palermo Via U. La Malfa, 153 - 90146 Palermo PA Sicilia Public or Private research organization: PUBLIC Nationally or regionally funded organisation: Nationally funded Research fields of the Institute are: Development of nanostructured materials applicable to electronics, catalysis, sensoristics and microsystems; Development of innovative methodologies of synthesis and epitaxial growth; Chemical-physical characterization of materials; Study and modification of surfaces and interfaces.</p>
<p>Name: C.N.R. Institute of biophysics - Department of Palermo c/o Area della Ricerca di Palermo Via Ugo La Malfa, 153 - 90146 Palermo Pa Sicilia Public or Private research organization: PUBLIC Nationally or regionally funded organisation: Nationally funded Research fields: Structure, dynamics and organisation of bio molecules - Structure and function of membrane transport proteins - Photo induced processes in bio molecules and cells - Structure and function of the photosynthetic apparatus - Modelling of organization and dynamics of complex systems - Microscopy, micro spectroscopy and instrumentation development - Transformation and accumulation of trace elements in the environment.</p>
<p>Name: C.N.R. Institute of radio astronomy - Department of Noto (Siracusa) Public or Private research organization: PUBLIC Nationally or regionally funded organisation: Nationally funded Research fields: Radio astronomy both under the astrophysical (connected with complementary researches in other electromagnetic spectrum bands) and instrumental point of view (realization and management of massive radio telescopes); Space geodesy and technology for astronomic in radio bands, millimetre, infrared and optical instrumentation.</p>
<p>Name: C.N.R. Institute for coastal marine environment - Department of Messina; department of Mazara del Vallo Public or Private research organization: PUBLIC Nationally or regionally funded organisation: Nationally funded Research fields: Biological resources and sustainability, with particular attention to fishing and aquaculture resources. Biodiversity of marine ecosystems and biogeochemical cycles, devoted to the study of: ecosystems of coastal strip and resources; mechanisms determining biodiversity; marine system tolerance of perturbation. Marine geology and morpho-bathymetry based upon the study of the morphology of the sea floor, the acoustic characteristics of the floor, and the stratigraphic and tectonic aspect of the seafloor. Pre-operation and ecological oceanography of sensorial systems aiming at a continuous forecast of the future conditions of the sea.</p>
<p>Name: Istituto Nazionale di Fisica Nucleare Laboratori Nazionali del Sud (Catania) Public or Private research organization: PUBLIC</p>

<p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: The INFN - the National Institute of Nuclear Physics - is an organization dedicated to the study of the fundamental constituents of matter, and conducts theoretical and experimental research in the fields of subnuclear, nuclear, and astroparticle physics. Fundamental research in these areas requires the use of cutting-edge technologies and instrumentation, which the INFN develops both in its own laboratories and in collaboration with the world of industry. Research activity at the INFN is carried out at two complementary types of facilities: the Divisions and the National Laboratories..Each of the 19 Divisions is located at a university physics department. The Divisions thus provide a direct connection between the Institute and the academic world. The four Laboratories— in Catania, Frascati, Legnaro, and at Gran Sasso—are home to major facilities which are available to the national and international scientific community.</p>
<p>Name: CRES - Centro per la Ricerca Elettronica in Sicilia - Monreale (Palermo - Italy)</p> <p>Public or Private research organization: PRIVATE</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: CRES is an Applied Research Centre, set up in 1974 by the University of Palermo, the Chamber of Commerce, Industry, Handicraft and Farming of Palermo and by the Municipality of Monreale, in order to promote and to make a wider, real co-operation, between Scientific and University institutions and Enterprises. In the Southern Italy, CRES is a point of reference as regards Electronics, Informatics and Telematics; it participates to a great number of projects, both at a national and at an international level. CRES works also in the field of software planning, communication networks, optical electronics and in the transfer of Informatics and Telematics solutions to the small and medium Sicilian Enterprises.</p>
<p>Name: CEOM ScpA Palermo (Italy)</p> <p>Public or Private research organization: PRIVATE</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: CEOM is a consortia joint company with its headquarters in Palermo; it was set up in May 1988 by AGIP and ESPI (Economic Corporation of the Regional Government) as part of an extensive programme of collaboration, with the aim of establishing, in Sicily, a Centre for the Development of Marine Science and Technology.</p> <p>SNAMPROGETTI and TECNOMARE, two ENI's Engineering Companies, subsequently, joined the holding. As ENI's hydrocarbon exploration and production activity is operated by AGIP Division, at present more than 90% of CEOM shares hold to ENI S.p.A corporation. The main objective of the company is to co-ordinate and carry out activities in the field of research, acquiring scientific knowledge and developing new operating techniques in order to explore and utilise, for industrial, economic and scientific purposes, the sea-environment.</p>
<p>Name: I.R.C.C.S. Istituto di ricovero e Cura a Carattere Scientifico – Associazione OASI Maria S.S. – TROINA (EN)</p> <p>Public or Private research organization: Private</p> <p>Nationally or regionally organisation: Nationally and regionally funded</p> <p>Brief profile: The Troina's "OASIS" is a no-profit institution which, during the years, has developed scientific</p>

<p>competence of high level in socio-sanitary field..</p> <p>I.I.R.C.C.S. privileges three main research areas:</p> <p>mental retardation prevention; diagnosis and qualification of mental retardation and of rare disease related with it; prevention, diagnosis and possible therapeutically approaches of cerebral senile involution.</p>
<p>Name: Istituto Nazionale di Geofisica e Vulcanologia Catania, Palermo</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: The legislative decree n. 381 of 29 September 1999 founded the new Istituto Nazionale di Geofisica e Vulcanologia, which become one of the largest European research institutions. The INGV main research fields are in geophysics, seismology and volcanology. The Institute comprises eight main Departments located in five main centres.</p>
<p>Name: SCIENCE AND TECHNOLOGY PARK OF SICILY (Palermo, Catania)</p> <p>Public or Private research organization: PRIVATE</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: The Science and Technology Park of Sicily (STPS) is a joint-stock consortium company born from the association of research centres and of companies operating in different sectors of the Sicilian economy since 1991. Thanks to the teamwork with the University of Palermo, Catania and Messina and to a deep knowledge of local territory, the STPS is able to create elements of competitive advantages, fundamental for the realisation of new products, new processes, new organizational systems, new activities and new enterprises. In particular, the STPS of Sicily wants to identify itself as a useful instrument for small and medium enterprises (SMEs), in order to facilitate their growth and to increase their visibility and competitiveness in international markets. The operative model that has been thought for the STPS consents to optimise the use of different sources of applied knowledge and technologies. The presence in the consortium of various companies with different Know-how and core-business supplies STPS with a large "catchments area" from which it gathers qualified competences, for the development of projects in various sectors.</p> <p>Main Areas of Interest: agro-food productions; advanced biology and its applications; conservation; valorisation and use of cultural and environmental resources; Information and Communication Technologies (ICT)</p>
<p>Name: Consorzio Ricerca Filiera Lattiero-Casearia (Ragusa)</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: regionally funded</p> <p>Brief profile: The Research Consortium Row Dairy – Creamery is an agency with personalities of public right. It acts on a regional level and its main office is in Ragusa. Its main activity is finalized to study the traditional Sicilian Dairy – Creamery productions, following a row's approach. It is addressed to SMEs. The final target is to raise the old creamery productions, obtained by traditional processes, to real "works of art", numbered to the Italian Cultural Goods.</p>

<p>Name: CONPHOEBUS (Gruppo ENEL) Catania</p> <p>Public or Private research organization: Private</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile: Conphoebus is specialised in services and systems accustomed to the renewable sources sector and rational usage of energy and to the related research and development activities. It is operative since 1978 with more than 60 projects of the EU in thermic and photovoltaic solar, in Aeolic and biomasses, and also in the bio climatic planning and in energetic-environmental services. The society's main office extends on an area of 100.000 m2, entirely equipped for the experimentation of new technologies and of innovative solutions in the renewable sources sector, with investments further than 20 billions in the Special Projects of MURST. Conphoebus also offers education services in the sector of new energetic-environmental technologies.</p>
<p>Name: CSEI CATANIA Centro Studi di Economia Applicata all'Ingegneria di Catania</p> <p>Public or Private research organization: PRIVATE</p> <p>Nationally or regionally funded organisation: REGIONALLY funded</p> <p>Brief profile:</p> <p>The CSEI of Catania is a no-profit agency. It was constituted in 1975, inside the extraordinary intervention for the development of South areas, under initiative of the FORMEZ, of the Fund for South, of University of Catania, of the SVIMEZ and Mediterranean Polytechnic Foundation. The aim of the centre is to contributing to support the socio-economical development of the South of Italy in waters' management, in pollution systems of water environment, of systems of environment protection from pollution and in natural resources management. In pursuing these purposes the CSEI Catania carries out activities of applied research, educational activities and assistance's technical-organisational activities, aimed to the development of active and innovative skills of public and private organisations which acts in the South in natural resources area.</p>
<p>Name: Istituto Sperimentale per l'Agricoltura ACIREALE (Catania)</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: REGIONALLY funded</p> <p>Brief profile: The Research institute for citrus cultivation was founded in the 23th of November 1967 (D.P.R. 1318 about the «Riordinamento della Sperimentazione agraria»). The institute « studies and seeks for the structure and the improvement of different citrus fruits and also considering their cultivation technique, following the demand of development of citrus production in the home and international markets » (art. 18 del D.P.R. 1318/67).</p>
<p>Name: Stazione Sperimentale di Granicoltura (Caltagirone- Catania)</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile:</p> <p>The experimental Station for Cereal Crops in Sicily has the main aim to deal with the problems of agronomic techniques in a dry hot climate, to improve agrarian (particularly the cereals' one) production.</p> <p>These institutional aims are reached through the experimentation and the basic and applied research, dealing with</p>

<p>all thematic connected to interdisciplinary of all treated subjects.</p> <p>Moreover, the Institute promotes every activity involved in improving agrarian production.</p> <p>The Institute provides its maintenance from the Sicily Region and from consorted bodies.</p> <p>It also gets maintenance from specific Italian and foreign research programmes, as well as from royalties on agrarian types varieties constituted by the Institute itself.</p> <p>The Institute is well known, in Italy as well as abroad, for the results attained in cereals' cultivation field.</p>
<p>Name: MATIS - Centre of Materials and Technologies for the Information and communication -</p> <p>Science Department of Physics and Astronomy, University of Catania</p> <p>Public or Private research organization: PUBLIC</p> <p>Nationally or regionally funded organisation: Nationally funded</p> <p>Brief profile:</p> <p>MATIS is an interdisciplinary Centre of Research and Development of the National Institute for the Physics of Matter (INFN) dedicated to the materials and processing issues related to the information and communication technologies.</p> <p>It is located within the Department of Physics and Astronomy of the University of Catania and MATIS benefits also by a long and fruitful collaboration with the Catania section of CNR-IMM. Emphasis of the Centre is applied research in high-tech materials in connection with industries and Centres located within the so-called "Etna Valley", such as ST-Microelectronics and Applied Materials</p>

The table below shows the main areas covered by research:

Microelectronics
Pharmaceutics
Chemistry and Physics
Telecommunications informatics
Biotechnology
Energy

Number of researchers in public organizations	6.605 (12,7% of Italy)
Number of researchers in private research organizations	996 (1,5% of Italy)
Mean age of researchers	

Participation of regional scientists in national/international scientific Commissions	
Yes X often	
Number of awards and distinctions granted to regional researchers	
Number of co-operation agreements with external research institutions	
Participation in specific programmes (Community, national, regional) aimed at favouring R&D and the innovative capacity of the region	
Number of scientific, technical and/or innovation related centres/associations in the region (List with a brief profile)	

Source: AIRI: year 2001

The research activity of universities in Sicily is highly developed in terms of international cooperation and innovative programmes.

Specific data is not available but the budget of universities in 2001 has been 405,440 millions of Euro which represents about 9% of Italy.

II.4.6 INNOVATION WITHIN REGIONAL FIRMS

	N°	%
Number of Innovative firms ² in the region:	422	
Percentage or number of regional firms involved in innovation co-operation ³	200	
Percentage or number of regional firms involved in innovation co-operation over total firms	100	
Percentage or number of firms participating to Innovation EU Funded related Programmes(E-Ten, IST)	25	
Percentage or number of companies in the region investing in IT related projects		
Percentage or number of companies in the region investing in IT related projects		
Percentage or number of businesses considering IT in their strategies		
Percentage or number businesses considering IT in their strategies		
Percentage or number of high-tech firms ⁴ in the region financed by venture capital		

N/A DATA

² all manufacturing/services firms that introduced new products or processes either 1) in-house or 2) in combination with other firms.

³ all manufacturing/services firms that had any co-operation agreements on innovation activities with other enterprises or institutions in the three years before the survey.

⁴ High-tech includes the following sectors: computer related fields, electronics, biotechnology, medical/health, industrial automation, financial services.

Within the activity of the Innovation Relay Centre of Sicily, MEDIA (co-ordinated by Consorzio Catania Ricerche), the number of innovative firms is 422 which represents a 20% of the total clients base for Media's activities.

The number of companies involved in European projects is not very high due to their small dimension.

The number of companies investing in IT projects is not available but it is known that, in the years 2000-2002, the ICT expenses have an increasing trend, as shown by the investment carried out by SMAU Italia within Euromediterranea Fair held in Catania.

FIELD RESEARCH

The field research aimed at the creation of a "focus group" made up of key regional actors in order to gather valuable qualitative information on the status of the regional knowledge-based economy and its future perspectives for development. The main scope of the interviews was to find out and assess the existing regional innovation strategies dealing with the knowledge-enhancing process and understand the process better.

To this scope an ad-hoc questionnaire has been designed. The template has been used as a guide to perform the interviews. Some questions have been formulated as "open questions" whereas others as "multiple choice". Each partner has performed the interviews in its own language, translating the questionnaire accordingly. The English version of the template of the questionnaire is provided in Annex 1.

The list of key actors interviewed in Sicily is presented here below:

Dr. A. Bricola- ST Microelectronics – Strategic planning manager

Dr S. Cassar – Managing Director Investiacatania

Prof. E. Rimini – Managing Director I.M.M. (Istituto per la Microelettronica e Microsistemi) – National Council of Research - CNR

Prof. A. Puliafito – ICT representative Rector University of Messina

Prof. A. Catara – President Siclina Science park

Ing. M.Sinatra – ERG MED – Responsible of Innovative process – automation department

Dr. G. Scuderi – Vicepresident Api Sicilia (association of SMEs)

Prof. A. Risitano- Managing Director Dept. Industrial Engineering – University of Catania– Research Pole automotive Fiat Research Centre

Prof. R. Lanzafame – Vice-Dean Faculty of Engineering – University of Catania- delegate relationship with Assindustrie Catania (belong Confindustria association of Small, Medium and Large companies)

Prof. S. Riva Sanseverino- President CRES- Centro Ricerca per la Elettronica in Sicilia – Full Professor Engineering – University of Palermo

Ing. D. Noè – Assessorato Industria – Regione Siciliana

Dr. G. Grasso – Fraunhofer ITWN (Catania Site)

Ing. T. Portuesi – Assessorato Bilancio e Finanze – Regione Siciliana

On. Claudio Fava – European Parliament

Ing. P. Zuccarini – Director Gela e Ragusa site Polimeri Europa S.p.A

The 15 regional stakeholders identified have similar visions in terms of regional knowledge-based economy and its future perspective for development.

Considering the Sicilian innovation and research system, the key-actors identified cover the following sectors:

--Regional Government: the main regional Institution of innovation policy, Regione Siciliana, has been represented by the Minister of Industry Scientific and Technological; and the Minister of Economy and Finance

--Industry:, represented by a representative of SMEs' association Api Sicilia (belonging to the National confederation of SMEs - Confapi); a representative of microelectronics multinational STMicroelectronics and a representative of ERGMED a company working in the petrochemical sector.

-- R&D Institutions: concerning R&D organisations interviews involved a representative of the three regional universities (Palermo, Catania e Messina), the National Council for Research (I.M.M.), the Catania Site of Fraunhofer- (Germany), and the research centre of electronic in Sicily (CRES)

--Development Agency: Investiacatania has been chosen in representation of local development; it plays an important role in the metropolitan area of Catania in terms of local development and of investment attraction, and it has also been commissioned by the Sicilian Region – Presidency – Planning Regional Department, to realize the Regional Strategy for Innovation.

The Park of Sicily (PSTS) has been chosen to represent the innovation policy of the Regional Government (Ministry of Industry). It is a private structure of innovation and research, but the Sicilian Region has a share of 88%, and the Industry Councillorship coordinates its activity.

-- Furthermore, a Sicilian representative of new EU Parliament has also been interviewed.

During the interviews, the insufficient level of the knowledge economy and research and innovation system in Sicily has been highlighted, as it is certified by statistical data. All the interviewees agreed that in some areas of Sicily there are important and competitive structures of education and research, such as the three universities. There are also important international research centres (CNR, INFN, INFN, CRES) and other interesting high tech industrial areas, especially in Catania.

Most of the interviewees also agreed that the industrial system is fragmented: On the one hand there is the world of research, mainly public and academic, and on the other hand, the enormous majority of enterprises, besides of small dimensions. SMEs do not have the size and the capitalization which are necessary to adopt research and innovation routes.

In the middle there is the main institution for industrial politics, the "Sicilian Region", which does not succeed in building a connective network of the research and innovation system.

Recently, the Sicilian Region has adopted a regional innovation strategy (SRI) and a Strategic Plan for ICT but there are not empiric experiences to give a sort of evaluation.

The main aspects of SRI are:

- 1) improvement and development of the innovative SMEs potentiality
- 2) development of regional research offer
- 3) more cooperation between research and industry
- 4) technology transfer and risk capital to support start up companies

The ICT Strategic Plan is devoted to improve 1) TLC infrastructure ICT services for citizens and SME; 2) e-government related to public Administration; 3) e-commerce for people and SME; e-society related to Information Society, to training and education, to research and to innovative and technology transfer; e-health, related to sanitary system.

Since now, these policy documents are not full implemented so it is not possible to evaluate their impact.

Some of the interviewees think that the regional policy makers pay few attention to ICT fields; only recently there are signals of an inversion of this trend.

The most evident results coming from the "focus group" is that the knowledge-based economy plays an important role just in some geographical areas, such as:

- 1) Etna Valley, the metropolitan area of Catania linked to the three Universities, where the cooperation between academy, CNR, Municipality of Catania and STMicroelectronics, has allowed the fertilization of a protodistrict in Electronics and ICT sectors
- 2) Palermo, in the fields of Aerospace and ICT, where the large companies Aerospace Galileo Avionica (a Finmeccanica company), the Italian avionic leaders, Italtel and Engineering – Ingegneria Informatica are located.
- 3) Siracusa in the fields of petrochemical and energy industry (ERGMED, ENI)
- 4) Nautics, Shipowners and tourism in Messina (Cantieri Navali Rodriguez, Gruppo Franza)

The remaining part of the region is characterized by a traditional productive structure (agrofood, tourism, mature manufacturing industry, such as metalmeccanics, chemical-plastics, ceramics, constructions), highly interconnected to the public. Though there are some industrial sectors such as the petrochemical (ERGMED, ENI), automotive (FIAT; Centro Ricerche FIAT) that are not relevant within the local system. Cooperation is mainly characterized by the graduates' education and in some applications of academic knowledge in sectors like engineering, automation and information applications; however they are activities orientated to the productivity and quality implementation.

Recently, a research pole of automotive focused on industrial production such as city cars and minibus has been created between the University of Catania – Dept. of industrial engineering and Centro Ricerca FIAT. The awareness of the existence in the territory of some important strength points is widespread:

- a) presence of three good Universities,
- b) medium-high level human sources, above all in technical-scientific areas;
- c) presence of competences in the area of microelectronics of an international level; important industries like Nokia, Magneti Marelli, Ducati, Applied Materials, Centro Ricerche Fiat have decided to locate in Sicily.

The evaluation of weak points can be summarised as follows:

- a) inefficient links between the structures/ organizations of the system,
- b) insufficiency of the investments and delays in the implementation phases,
- c) difficulty in the birth and development of high-tech enterprises;
- d) difficulty of local productive system to utilize the high level of human resources skilled.
- e) low levels of education in the public administration workers.

Many opportunities have been highlighted, such as:

- a) geographical position close to Mediterranean countries,
- b) availability of highly skilled labour, competitive costs of the productive sectors, also because of being a objective 1 region.

Some interviewees think that there are good conditions to promote new high level start up companies in the fields of ICT and electronics, energy and environment and automotive.

The main threats are considered to be:

- a) competition with other territorial area especially from the East of Europe, Far East
- b) excessive bureaucracy and inefficiency of public administration c) the slight attitude to collaboration in the system concept.

The main sectors retained of high technological outline are: microelectronics, information and telecommunication, but also engineering in general, biotechnologies applied to agricultural and food and pharmaceuticals.

Unanimously all interviewees agree in considering current investments, public and private, restricted; indeed public and private investment have decreased in Italy in the last years. SMEs do not invest for the lack of human and financial sources. Only a few enterprises (large and medium) have a level of investment above the average. (e.g STM, WL, SIFI, ERGMED, Galileo Avionica, Italtel. PSTS , Engineering).

Interviewees agree that electronics, telecommunications, information, biotechnologies, pharmaceuticals, automation, robotics, photonics, nanotechnologies are the most important areas of application also from a point of view of general added value.

There is a widespread awareness of the existence in the territory of structures of excellence in the field of ICT e R&D, but, during the interviews, it has been highlighted a strong claim of more coordination between all the structures and activities of promotion, development and application.

Moreover, the claim for a more effective support of the regional and national policy to support the sector in a sure and continual way is felt by the interviewees; at the moment the variety of policies are often not very integrated in a clear strategy.

Even if SRI has highlighted the strategy in:

--Strategic role of firms

--Structured and continual link between demand-offer of research, technology and innovation and market

--Collaboration between public and private subjects

--Adoption of a system's optics

There is a widespread feeling of the lack of a real policy towards innovation and research, motivated by delays of implementation of programmed measures.

The main obstacles identified during the interviews are:

--Low inclination towards knowledge economy;

--Small size of local companies and lack of resources at different levels: cash flows, specialised human resources; cultural background;

-- Lack of a "strategic vision" of local SMEs within a more dynamic global market.

The main organizations/structures considered as capable to generate knowledge are Universities, large companies and public and private research Centres (CNR, Catania Ricerche, CRES, Science Park ect..)

The main sectors where organizations/structures operate are Applied Sciences (Informatics, Chemical, Electronic Engineering, New Materials, Biology, Physics); agro food, microelectronics, telecommunications. Wireless, Pharmaceutics

Some interviewees (Ing. Noè – Assessorato Industria; Prof. Rimini- CNR – IMM) have talked about the high – tech district "Sicily Micro and Nano Systems" which has been planned by Ministry of Research in cooperation with Regione Siciliana, Sicilian Universities, ST Microelectronics.

SWOT ANALYSIS

The SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) is an useful instrument for evaluating the regional context in which the development of the knowledge-based economy is shaped and planned.

Scanning the internal and external environment is an important element of the strategic planning process. Environmental factors within the region can be classified as Strengths or Weaknesses, whereas external factors often can be classified as Opportunities or Threats. Such an analysis of the strategic environment is referred to as a SWOT analysis.

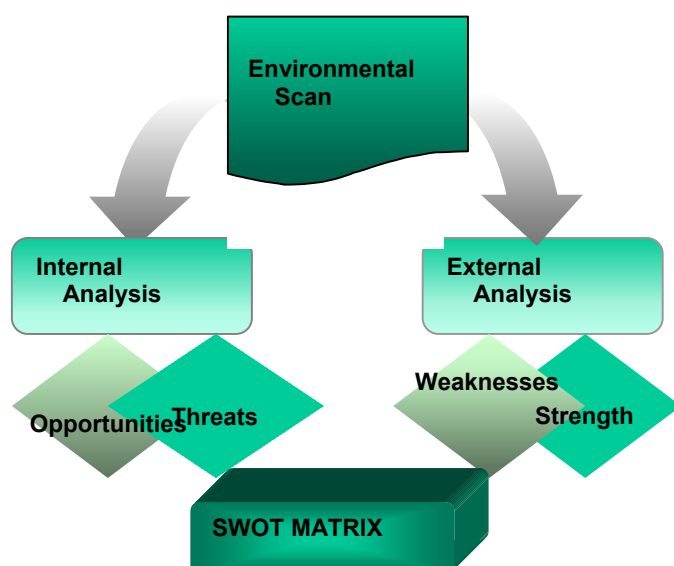
The SWOT analysis provides useful information to match the region's resources and capabilities to the environment in which it operates. As such, it is instrumental in strategy formulation and selection, helping to identify internal strengths, weaknesses and external opportunities and threats, both at present and in the future.

Strengths. A region's strengths are its resources and capabilities that can be used as a basis for developing or strengthening its competitive advantage in terms of knowledge-based development.

Weaknesses. The absence of certain strengths may be viewed as a weakness.

Opportunities. The external environmental analysis may reveal certain new opportunities for regional growth and development.

Threats. Changes in the external environment may also threaten the region.



The SWOT Matrix

A SWOT matrix (4-entry matrix) for the Sicily is presented below. The aim of the matrix is to identify the major factors affecting the development of the knowledge-based economy in the region, taking into consideration the results obtained in the sections on “Desk research” and “Field research”, with the ultimate objective of attaining an overall picture illustrating the key issues in the region (scenario zero).

The identified strengths are to be kept and reinforced and the external opportunities exploited. Likewise, the weaknesses should be improved and the threats eliminated, where possible, or mitigated.

	INTERNAL ANALYSIS	EXTERNAL ANALYSIS
+	STRENGTHS KEEP/REINFORCE	OPPORTUNITIES EXPLOIT
-	WEAKNESSES IMPROVE	THREATS ELIMINATE/ADAPT

SICILY	
SWOT ANALYSIS	
Internal Analysis	External Analysis
<p>Strengths</p> <p>Presence of a few dynamic companies (Electronics, ICT, Pharmaceuticals)</p> <p>Research*</p> <p>Success cases** (cooperation among research centres and companies)</p> <p>Highly qualified personnel</p> <p>Big internal market</p> <p>Natural resources</p>	<p>Opportunities</p> <p>Increasing awareness towards the set-up of technology-based companies</p> <p>Public financial aids (POR, PON) towards Research & industry cooperation</p> <p>Presence of natural and human resources attracting external industrial groups</p> <p>Strategic position within Mediterranean area</p>
<p>Weaknesses</p> <p>Small-sized companies operating in the most traditional industrial sectors***</p> <p>Export</p> <p>Public Research (Institutions, University) not answering companies' needs</p> <p>R&D investments</p> <p>Few connections between Research and Industry</p> <p>Uneasy access to credit and financial aids</p> <p>Few relations with non local research and industrial districts</p> <p>Few public/private services towards technology transfer</p>	<p>Threats</p> <p>Loss of regional competitiveness and consequent marginalization</p> <p>Ineffective regional policy towards innovation and technology matters</p> <p>Instability of funding supply</p> <p>Increasingly high brain drain</p>

* 3 Universities (Palermo, Catania and Messina); 17 Research Centres (CNR); other independent institutes (CRES CCR, CONPHOEBUS, Consorzio Agroalimentare di Ragusa)

** Reference to large multinational companies : ST Microelectronics and University of Catania are responsible for the creation of 200 companies, 22 multinational offices and 4 spin-off; Nortel Networks, in cooperation with the University of Palermo, set up a R&D Centre specialised in wireless networks.

*** Main weaknesses of Sicilian industrial system: predominance of traditional sectors; small-sized companies; lack of production-oriented services and communication networks.

CONCLUSIONS AND FINAL REMARKS

According to the SWOT Analysis, the most important “Strengths” singled out in Sicily are highly-qualified human resources, cultural and natural resources and Research, whereas “Weaknesses” refer to the lack of an innovation-oriented culture and a “pulverised” entrepreneurial system all over the territory.

It has been emphasized the excellent and strong public research system; a fragile industrial structure. Besides, “scientific research” prevails on “innovation” as leading concept; research and market are not connected since neither public or private offices are involved in the creation of such networks.

At the same time, new realities come up, especially in the eastern areas where external large industrial industries are settled.

From this scenario, the whole Strategy (Regional Strategy for Innovation) is addressed towards the enhancement of an effective innovation system which is able to exploit all Sicilian potentialities.

The above mentioned Strategy answers to local small/medium-sized companies’ needs of innovation and internationalism trying to overcome their structural lack of economic resources as well as their “individualism” as economic actors.

Suggestions for improvement for the future

- Implementation of a “systems approach” (definition of sectors; instruments and proposals focused on specific needs; exploitation of “group’s potential” by their involvement in innovation initiatives).

- Promotion of a regional system based on knowledge economy involving the main key actors, such as: University; Science Park, Business Innovation Centre, Association of SMEs, Regional Development Agency, Institutions.

- Improvement of connections among Regione Siciliana, Universities and SMEs in the fields of knowledge economy in order to plan industrial development better.

- Implementation of knowledge economy support measures already planned by regional and national institutions.

- Promotion of risk capital (venture capital, business angel, seed capita) in the knowledge economy fields.

ANNEX 1**IN.TRACK Project (INSular Regions Knowledge TRACKer)****QUESTIONNAIRE ON THE REGIONAL STATUS AND PERSPECTIVES OF THE DEVELOPMENT OF THE KNOWLEDGE-BASED ECONOMY****General Questions**

1. Contact details

Name.....Surname.....

Organisation name.....

Complete address.....postal code.....

City.....Country.....

e-mail.....

Telephone number.....

Fax number.....

2. Type of Organisation (private company, public institution etc)

Ministry Higher Education Public research org. Private enterprise

Other (please specify)

3. Your position in the organisation

Managing Director Responsible Staff member

Other (please specify)

Questions regarding the knowledge-based economy in the region

4. How would you define your region's innovation system?

Advanced/Highly developed

Developed

Insufficient

5. Could you please describe the main traits of the innovation and research systems in the region?

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.....

6. Has your region implemented any RIS/RITTS - Regional Innovation Strategy project/ Regional Innovation and Technology Transfer Strategy project?

Do you think that these projects have been effective in supporting the development of regional innovation policies?

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.....

7. Could you please describe the framework and the objectives of the Strategic Innovation Plan of your region?

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.....

8. What are, in your opinion the critical aspects for the development of a knowledge-based economy⁵ in your region? Please distinguish between strengths, weaknesses, opportunities and threats.

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.....

9. In which sectors are the technically high-skilled workers employed?

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.....

10. Is investment in ICT and in R&D in the region encouraged, discouraged, restricted?

Please, explain

.....
.....

⁵ The term "knowledge-based economy" results from a fuller recognition of the role of knowledge and technology in economic growth. Although the term "knowledge-based economy" has been widely used and no formal definition has been given yet, we refer to economies which are directly based on the production, distribution and use of knowledge and information. This is reflected in the trends towards growth in high-technology investments, high-technology industries, more highly-skilled labour and associated productivity gains.

11. How many industries in your region invest a significant proportion of their turnover in ICT or in Research & Development?

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.....

12. In which applications is the regional investment in ICT and in R&D mainly focused?

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.....

13. What are the technologically advanced sectors that contribute to generate value and knowledge in your region?

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.....

14. Which are the organizations/structures that are capable to autonomously generate knowledge in your region?

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.....

15. In which sectors do these organisations/structures operate?

.....
.....
.....

16. Is there in your region any consensus-based decisional or consulting committee regarding regional innovation and research matters?

Yes If yes, please explain.....

No

17. Would you be interested to participate as a regional stakeholder in the European Awareness Scenario Workshop⁶ on the development of the knowledge-based economy that will be shortly organised in your region?

Yes

No

⁶ During the interview, the interviewer should present a brief introduction of the EASW that will be organised in the region.

SOURCES

European Innovation Scoreboard

Statistics in Focus (Eurostat)

European Report on Science and Technology Indicators

EPO (European Patent Office) / USPTO

Regional sources/statistic

ISTAT

AIRI

Unioncamere

Regional reports on innovation policies implementation

Ministero delle attivita produttive

CNEL