Higher Education in Regional and City Development

The Autonomous Region of Andalusia, Spain



OECD

Higher Education in Regional and City Development

Andalusia, Spain 2010



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Please cite this publication as:
OECD (2010), *Higher Education in Regional and City Development: Andalusia, Spain 2010*, OECD Publishing.
http://dx.doi.org/10.1787/9789264088993-en

ISBN 978-92-64-008899-3 (PDF)

Series:Higher Education in Regional and City Development
ISSN 2218-3140 (online)

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FOREWORD

Universities and other tertiary education institutions can play a key role in human capital development and innovation systems in their cities and regions. Reviews of Higher Education in Regional and City Development are the OECD's tool to mobilise higher education for economic, social and cultural development of cities and regions. They analyse how the higher education system impacts local and regional development and help improve this impact. They examine higher education institutions' contribution to human capital and skills development; technology transfer and business innovation; social, cultural and environmental development; and regional capacity building. The review process facilitates partnership building in regions by drawing together higher education institutions and public and private agencies to identify strategic goals and work together towards them. To know more about the OECD review process, visit the Higher Education and Regions' website at *www.oecd.org/edu/imhe/regionaldevelopment*.

These reviews are part of a wider multi-annum work of higher education in cities and regions co-ordinated by the OECD Programme on Institutional Management of Higher Education (IMHE). In 2004-07, the OECD/IMHE conducted an extensive study with 14 regional reviews across 12 countries. This resulted in the OECD flagship publication *Higher Education and Regions: Globally Competitive, Locally Engaged* (OECD, 2007) with recommendation to benefit both higher education institutions and national and regional governments. In 2008, the OECD/IMHE launched a second series of OECD reviews of Higher Education in Regional and City Development to address the demand by national and regional governments for more responsive and active higher education institutions. As a result, 14 regions in 11 countries underwent the OECD review process in 2008-10. The reviews were carried out by the OECD/IMHE in collaboration with international organisations and associations and other OECD programmes and directorates. This work also supports the OECD Innovation Strategy and OECD Green Growth Strategy.

Spanish regions have been active participants in the OECD reviews. This OECD review of the Autonomous Region of Andalusia is part of the

second round of the OECD reviews of Higher Education in Regional and City Development. It coincided with the review of Catalonia and followed the reviews of the Canary Islands and the Region of Valencia that took place during the first round in 2005-07. The review report of Catalonia, *Higher Education in Regional and City Development: Catalonia, Spain* (OECD, 2010) has a strong focus on university governance. The recommendations regarding the governance of Spanish universities in the Catalonian report are also relevant for Andalusian universities and readers interested in them should refer to this report.

ACKNOWLEDGEMENTS

Numerous national and regional stakeholders and representatives of higher education institutions provided valuable insights during the review visit and in the form of comments. The OECD would like to thank in particular the Regional Government, the regional co-ordinator – Eulalia W. Petit de Gabriel – and her working team – Mª Ángeles Ruiz Ruiz, Inmaculada Periáñez Forte (later seconded to the OECD/IMHE), Julie Laurent and Ángel Sánchez Díaz – as well as the active local counterparts for this review: Antonio Ávila Cano, Francisco A. Triguero Ruiz, Susana Guitar Jiménez, Mª Victoria Román González, Antonio Sánchez Pozo, Manuel Recio Menéndez, Mª Pilar Jiménez Trueba, Teresa Varón García, Antonio Benítez Herrera, Berta Muñoz Luque, Felipe Petriz Calvo, Mª Teresa Bermúdez Villaescusa, Rocio Medina Garcia, Antonio José Redondo García, Maria del Carmen Romera Montero, Julio Revilla Saavedra, Rafael Rodríguez Clemente, Joaquín Moya-Angeler Cabrera, Elías Atienza Alonso, Lourdes Cruz Ochotorrena, Ainhoa Otamendi Herrera, Joaquín Jesús Galán Pérez, Luis García Montero, Francisco Perujo Serrano, Juan Pérez Mercader, António Nieto Ribera and António Diz-Lois Ruiz.

Special thanks go to the leadership and staff of the following institutions: the University of Almeria, the University of Cadiz, the University of Cordoba, the University of Granada, the University of Huelva (UHU), the University of Jaen, the University of Malaga, the International University of Andalusia (UNIA), the University Pablo de Olavide and the University of Seville. The OECD would especially like to thank Luis Fernández Revuelta Pérez, José María Rodríguez-Izquierdo Gil, Laura Howard, Juan José Ruiz Sánchez, Mª José León Guerrero, Pilar Marín Mateos, Jorge Delgado García, Carlos A. Benavides Velasco, Cristina Quintana García, Julio Terrados Cepeda, Pilar Paneque Salgado, Cinta Canterla González, Alicia Troncoso Lora and Julia de la Fuente Feria.

This publication draws on interviews carried out during a week-long review visit in 24-31 January 2010, on the findings of the Self-evaluation Report of the Autonomous Region of Andalusia and using additional information provided to the review team. The OECD review team had a full

and intensive programme and were received openly by a wide range of stakeholders. The team had the benefit of an extensive Self-evaluation Report and were also able to rely on a range of other reports, including the OECD Reviews of Tertiary Education, Spain (2009) and tested its conclusions and recommendations within the higher education sector in the Autonomous Region of Andalusia.

This publication was co-ordinated by Jaana Puukka (OECD/IMHE), with support from Inmaculada Periáñez Forte, a Spanish national seconded from the Regional Government of Andalusia to the OECD/IMHE. The Review team members – Patrick Dubarle (former OECD Secretariat), Philip Wade (former OECD Secretariat), José-Ginés Mora (national expert) and Ernesto Flores (ITSON, Mexico) – contributed to this report. In addition, Francisco Marmolejo (Consortium for North American Higher Education Collaboration - CONAHEC) participated in the review visit. (Further details about the Review Team can be found in Annex 1 of this report). Rachel Linden supervised the publication process and Fionnuala Canning provided invaluable assistance in the editing phase.

Table of Contents

Acronyms **13**

Assessment and recommendations **17**

Chapter 1: Andalusia and its tertiary education institutions **43**

1.1 Economic and historical overview 44
1.2 Geography and connectivity 45
1.3 Administrative organisation 46
1.4 Regional economy 50
1.5 Education in Spain and Andalusia 60
1.6 University education in Andalusia 67
1.7 Regional development perspectives 71
References 80

Chapter 2: Human capital development **83**

Introduction 84
2.1 Key features of tertiary education 84
2.2 Widening participation 88
2.3 Migrants, international students and talent attraction 91
2.4 Reaching out to working-age adults 102
2.5 Relevance of education 111
2.6 The reform of teaching and learning 119
2.7 Entrepreneurialism in the Andalusian universities 123
2.8 Steering and co-ordinating the system 130
Conclusions and recommendations 137
References 143

Chapter 3: Regional innovation **145**

Introduction 146
3.1 Regional achievements and university research 147
3.2 Higher education and the regional innovation system (RIS) 152
3.3 Research infrastructure 158
3.4 University-industry relationship 167

3.5 Strategic challenges and innovation policies....174
Conclusions and recommendations....185
References....193

***Chapter 4: Rural development*....197**

4.1 Rural features in Spain and Andalusia....198
4.2 Community development in rural areas....199
4.3 Improved connectivity....202
4.4 Rural assets in Andalusia....204
Conclusions and recommendations....211
References....214

***Chapter 5: Social, cultural and environmental development*....215**

5.1 Tourism and culture....217
5.2 Cultural and creative industries....230
5.3 Community development....236
5.4 Health and welfare....244
5.5 Environmental sustainability and green growth....248
Conclusions and recommendations....256

***Annex 5.A.1.*....263**

***Annex 5.A.2.*....265**

References....267

***Annex I: OECD review team*....270**

***Annex II: Programme of the review visit*....273**

Tables

Table 1.1. The governance structure of Andalusia 47
Table 1.2. Size structure of firms in Andalusia, 2008 53
Table 1.3. Firm density by region, 1999-2008 54
Table 1.4. Firm distribution by sector in Andalusia, 2001-08 55
Table 1.5. Evolution of registered students all kinds in Andalusia (1997/09) 60
Table 1.6. Enrolment and staffing of universities in Andalusia, 2007-08 68
Table 2.2. Education participation/non-participation rates, % of 16-24 yrs (2008) 86
Table 2.3. Immigrants by country of origin and by destination province in Andalusia in 2008 92
Table 2.4. Foreign and Erasmus students in Spain 94
Table 2.5. Students registered by nationality and university (undergraduate) in Andalusia 2008-09 95
Table 2.6. Students registered by nationality and university (postgraduate) in Andalusia 2008-09 95
Table 2.7. Student enrolment and completed studies in vocational training in Andalusia 2007-08 103
Table 2.8. Enrolment in non-official postgraduate studies in Andalusia, 2008 107
Table 2.9. Relation between "innovative competences" of graduates and predominant modes of teaching and learning in Spanish universities 122
Table 3.1. Trends in higher education R&D spending and BERD (regional share) 147
Table 3.2. Selected universities in the Scimago classification 148
Table 3.3. Participation of research teams in collaborative activities 168
Table 3.4. Andalusia's competitiveness framework and universities' role 184
Table 5.1.Goods, property and estates registered as cultural interest goods 228
Table 5.2. Regions with the highest average annual growth in CCI employment 2001-06. 232
Table 5.3. Top 15 regions by number of employees and share of European employment in four sectors of CCI 233
Table 5.A.1.1. Regions with the highest average annual growth in CCI employment, 2001-06. 263
Table 5.A.1.2. Europe's Top 25 regions for creative and cultural industries employment clusters 264
Table 5.A.2.1. Application in renewable energy technologies in OECD regions, 2004-06 265

Figures

Figure 1.1. GDP per capita in Spain and Andalusia 49
Figure 1.2. Real GDP growth in Spain and Andalusia 51
Figure 1.3. Unemployment rates in Spain and Andalusia, 1994-2008 56
Figure 1.4. Evolution of the number of university students 1998-2008 63
Figure 1.5. Universities in Andalusia 67
Figure 2.1. Population that has attained at least tertiary education (2008) 85
Figure 2.2. Modes of teaching and learning most used by universities 120
Figure 2.3. Required competences in jobs and acquired competences in the universities 121
Figure 2.4. Benefits of studies - opinion of Andalusian graduates 121
Figure 2.5. Regional ministries involved in human capital development in Andalusia 135
Figure 2.6. Spanish Higher Education System 136
Figure 3.1. Regional system of innovation in Andalusia 153
Figure 3.2. HERD as a percentage of GDP in selected countries, 2008 176
Figure 3.3. Percentage of HERD financed by industry in selected countries, 1995 and 2007 176

Boxes

Box 1.1. Regional assets in Andalusia 57
Box. 1.2. Governing bodies in Spanish public universities 65
Box 1.3. Innovation and Development Agency of Andalusia (IDEA) 73
Box 2.1. Victoria University's Access and Success programme 90
Box 2.2. University of Almeria's "Join us in your university" programme 93
Box 2.3. University of Granada and focus on internationalisation 96
Box 2.4. Talentia Grant Programme 98
Box 2.5. The Catalan Institution for Research and Advanced Studies (ICREA) 100
Box 2.6. City of Malmö 101
Box 2.7. Validation Centre in Malmö 105
Box 2.8. National Qualifications Agency of Ireland 106
Box 2.9. New modes of learning in Andalusian universities 108

Box 2.10. Integrated and dual study programmes 109
Box 2.11. Integrating unemployed foreign workers back into the workforce.....110
Box 2.12. Regional Government's employment-oriented programmes.....112
Box 2.13. Local Employment Observatory (OLE).....114
Box 2.14. Problem-based learning at Aalborg University.....117
Box 2.15. The Co-op Education at the University of Waterloo, Canada 118
Box 2.16. University of Rovira i Virgili: university-industry–region collaboration 119
Box 2.17. Andalusian university entrepreneurial initiatives 124
Box 2.18. BIEM - building critical mass in entrepreneurship education 127
Box 2.19. SME succession planning in Finland.....128
Box 2.20. The Technology Ventures programme at the University of Illinois at Chicago.....129
Box 3.1. The University of Seville Centre for Research, Technology and Innovation (CITIUS) 149
Box 3.2. The NURI programme in Korea 151
Box 3.3. Business involvement in the Andalusian regional innovation system.....154
Box 3.4. Knowledge Voucher Programme in the Netherlands 159
Box 3.5. OTRIs in Andalusia and factors limiting OTRI performance.....161
Box 3.6. Technological Corporation of Andalusia (CTA) 163
Box 3.7. Öresund region: universities and high-tech clusters 165
Box 3.8. UK Knowledge Transfer Partnerships.....169
Box 3.9. University of Almeria Project Exchange 170
Box 3.10. Developing public space in universities 171
Box 3.11. Small business development in North Carolina.....173
Box 3.12. Hull Logistics Institute.....174
Box 3.13. The Spanish government INGENIO 2010 Programme 178
Box 4.1. LEADER: bottom-up local development in the European Union 200
Box 4.2. Guadalinfo Programme improving connectivity 202
Box 4.3. Almeria Stone Technology Centre.....205
Box 4.4. University of California, Davis and the wine industry 206
Box 4.5. University of Jaen and the olive oil industry 208
Box 4.6. University of Huelva: The Institute of Local Development (IDL) 209
Box 4.7. Agri-food Campus of International Excellence: 210
Box 5.1. Partnership to develop tourism in Seville 218
Box 5.2. Cornell University School of Hotel Administration 220
Box 5.3. Supporting workforce training and development in tourism 222
Box 5.4. Programmes to support innovation in tourism.....223
Box 5.5. Universities and cultural and creative industries in England.....226
Box 5.6. Glasgow: culture as a catalyst of economic growth and image change....227
Box 5.7. The Three Cultures Foundation (La Fundación Tres Culturas).....229

Box 5.8. Culture enhancing integration of migrant children in Arles 230
Box 5.9. Berlin and creative industries 235
Box 5.10. Support provided by CICODE in Granada 237
Box 5.11. UPO's Flora Tristan: community outreach in a distressed urban area ...239
Box 5.12 Combining sport and sustainability: University of Malaga 241
Box 5.13. Neighbourhood Management in Berlin 242
Box 5.14. Social Entrepreneurship Awards in England 243
Box 5.15. Independent life for disabled people: The University of Cadiz 246
Box 5.16. The Andalusian Public Health System Training.....247
Box 5.17. Andalusian universities and sustainability.....249
Box 5.18. Wind energy in Navarre.....252
Box 5.19 The world's first solar tower in Andalusia 253
Box 5.20. Design programmes for sustainable urban growth 254

Acronyms

AGAE	Andalusian Agency for Quality Assurance in Higher Education and Research
AICIA	Research and Industrial Co-operation in Andalusia Association
ANECA	Nacional Agency for Quality Assessment and Accreditation
ANEP	National Evaluation and Foresight Agency
AUPA	Andalusian Public Universities Association
BIEM	The Brandenburg Institute for Entrepreneurship and SMEs, Germany
BERD	Business R&D
BIQ	*Bildung im Quartier* Education and training in the neighbourhood (Part of the Neighbourhood Management Programme in Berlin)
BOE	Official National Gazette
BOJA	Official Gazette of the Regional Government of Andalusia
CAE	Andalusian Students Council
CAU	Andalusian Universities Council
CBUA	Andalusian Consortium of University Libraries
CCAA	Autonomous Communities
CCI	Cultural and Creative Industries
CDTI	Centre for the Development of Industrial Technology
CE	Spanish Constitution (1978)
CEASA	Experimental Health Centre
CEI	International Excellence Campus
CENIT	National Strategic Consortia for Technological Research
CESEAND	Southern Europe Innovation Relay Centre
CEUCOSA	Business Corporation of the University of Cordoba, public limited company
CICA	IT Centre of Andalusia
CICE	Regional Ministry of Innovation, Science and Enterprise
CICYT	Inter-Ministerial Commission on Science and Technology
CIEMAT	National Research Centre for Energy, Environment and Technology
CSIC	Spanish National Research Council
CSIC-K2B	Spanish National Research Council - Knowledge to Business
CITAndalucia	Innovation and Technology Transfer Centre of Andalusía
CNEAI	National Commission for the Evaluation of Research

COE	Spanish Olympic Committee
COTEC	Foundation for Technological Innovation
CITOLIVA	Olive and Olive Oil Technology Centre
CRUE	Spanish Universities Rectors Conference
CSIC	Spanish National Research Council
CTA	Technologic Corporation of Andalusia
CVA	Andalusian Virtual Campus
DNI	National Identity Card
EBT	Technology-based spin-off
EHEA	European Higher Education Area
ENQA	European Association for Quality Assurance in Higher Education
EPES	Professional Training for Employment
ESO	Compulsory Secondary Education
EU	European Union
EUR	Euro
EVA	Virtual Learning Space
FDI	Foreign Direct Investment
FPI	Research Personnel Training
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
GEOLIT	Scientific and Technology Park of Jaen
GRP	Gross Regional Product
GVA	Gross Value Added
HE	Higher education
HEI	Higher education institution
HERD	Higher Education R&D
IAT	Andalusian Institute of Technology
ICT	Information and communication technology
IDEA	Andalusian Innovation and Development Agency
IDL	Institute of Local Development
IEA	Andalusian Institute of Statistics
IFA	Institute for the Promotion of Andalusía
IFAPA	The Institute for Research and Training in Agriculture, the Fisheries, Food and Ecological Production
IMHE	OECD Programme on Institutional Management in Higher Education
INE	National Institute of Statistics
INVERCARIA	Venture Capital Investment Agency
IPI	Personalised Itineraries for Incorporation in the Labour Market
LACC	Andalusian Science and Knowledge Act
LACSU	University System Co-ordination Act (1992)

LAG	Local Action Group
LAU	Andalusian Universities Act (2003)
LEADER	European Commission Programme: Liaison Entre Actions de Développement de l'Économie Rurale', meaning 'Links between the rural economy and development actions'.
LOMLOU	Universities Act Amendment Act (2006)
LOU	Universities Act (2001)
LRU	Universities Reform Act (1983)
MEC	Ministry of Education and science
MIT	Massachusetts Institute of Technology
MVA	Medicon Valley Academy
NIE	Foreigners Identity Number
NURI	New University for Regional Innovation programme
OCW	Open Course Ware
OECD	Organisation for Economic Cooperation and Development
ONG	Non-governmental organisation
OTRI	*Oficinas de Transferencia de Resultados de Investigación* (University technology transfer offices)
PAI	Andalusian Research Plan
PAIDI	Research, Development and Innovation Plan of Andalusia (2007-2013)
PAS	Administration and services personnel
PBL	Problem-based learning
PDI	Research Personal Training
PIMA	Andalusian Innovation and Modernisation Plan 2005
PITA	Almeria Science and Technology Park
PISA	OECD Programme for International Student Assessment
PLADIT	Innovation and Technological Development Master Plan for Andalusia 2001-03
PP	Percentage point
PPC	Scientific Policy Plan (1984-86)
PRAEM	Training Programme
PTA	Andalusian Technology Park
RATRI	Andalusian Network for Transfer of Research Results
RDI	Research, development and innovation
RECTA	Andalusian Network of Scientific and Technical Divulgation Spaces
REFLEX	REFLEX survey (Flexible Professional in the Knowledge Society)
RETA	Andalusian Network of Technological Spaces
RDTI	Research, development, technology and innovation
SAC	Andalusian Knowledge System

SAE	Andalusian Labour Service
SER	Self-evaluation Report
SBIR	Small Business Innovation Research Program, United States
SGUIT	General Secretary of Universities, Research and Technology
SME	Small and medium-sized enterprise
SWOT	Strengths, weaknesses, opportunities and threats
TOEFL	Test of English as a Foreign Language
UAL	University of Almeria
UCA	University of Cadiz
UCO	University of Cordoba
UGR	University of Granada
UHU	University of Huelva
UJA	University of Jaen
UMA	University of Malaga
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIA	International University of Andalusia
UNICA	Shared Research Unit on Olive Oil
UPO	University Pablo de Olavide
US	University of Seville
USD	United State Dollar
VET	Vocational education and training

Assessment and recommendations

Andalusia: moving from low-skills towards a knowledge-based region

Andalusia is the most populous region in Spain with over 8 million inhabitants, representing 18% of the population in the country. Historically a crossroads of three cultures – Christians, Muslims and Jewish – it has enjoyed remarkable growth and improvement in living conditions. Since the accession of Spain to the European Union in 1986, Andalusia has also successfully transformed itself from a traditional region of emigration into a host region for new immigrants. Despite the progress made, the region lags behind the Spanish and EU averages in key socio-economic indicators, currently standing at 80% of the EU average GDP per capita.

The current economic and financial crisis has affected Andalusia harder than most other Spanish regions due to its economic structure that is over-dependent on construction and tourism and is lagging behind in industrial diversification. From April 2008 to October 2009 the regional GNP contracted by 4.5% and the unemployment rate reached 26.3% after destroying 28 700 jobs. The negative development has continued so that in the second quarter of 2010 the unemployment rate stood at 27.7%, eight percentage points above the national average. The deterioration of the labour market situation has revealed the vulnerability of the regional labour market which is characterised by low skills.

In the two last decades educational attainment levels have improved in Andalusia: for working age adults in employment the years of education have increased by 3.9 years compared to 3.6 years nationally. Despite the improvements, disparities remain between Andalusia and Spain as a whole.

The Regional Government of Andalusia has had a strong leadership role in steering the region towards a knowledge-based economy through massive investments in innovation, human capital development and improved connectivity. The economic crisis and the fact that beyond 2013 Andalusia

will no longer be eligible for receiving European structural funds as a convergence region will significantly reduce external funding for the region. This situation constitutes a real challenge for the region and its authorities but also an opportunity to build on the regional assets. In this context, the key challenges for Andalusia and its universities and other tertiary education institutions are the following:

- How to improve the overall educational attainment levels and improve the flexibility of the population to face rapid changes in the labour market? How to improve the relevance and quality of education?
- How to create jobs, promote new business formation and attract knowledge-based businesses (industry and services)?
- How to leverage the current economic base? How to strengthen and diversify the existing industries and improve the absorptive capacity of the SME-based economy?
- How to address the socio-economic gaps, needs of the diverse population and a growing number of ageing citizens?

A region that wants to be globally competitive needs to have a highly skilled workforce and knowledge-based economy that can absorb this workforce. In order to slash unemployment Andalusia needs to improve its overall educational attainment levels, improve the relevance of university education, widen access to tertiary education and improve the flexibility of the workforce by re-skilling and up-skilling. It also needs to diversify and upgrade its existing industry.

To address these challenges, Andalusia needs a comprehensive approach to human capital development including a human capital development strategy with vision, goals, milestones, co-ordination measures and robust evidence base. Employability, creating jobs and providing access to employment opportunities should be seen as the primary goals of innovation and human capital development. A more enabling environment needs to be created for new business formation and upgrading the current low skilled economy. A systematic approach should be adopted to entrepreneurship in education and a wider innovation concept should be adopted in order to move away from the science-push model. The good practice examples in the region in widening access to higher education and industry-university collaboration should be disseminated, extended and scaled up. University funding system should be revisited to allow for stronger incentives for greater alignment with regional needs and inter-institutional collaboration.

Finally, Andalusia's geographical location, multi-cultural heritage with the co-existence of three cultures, connections with North Africa and the presence of migrants from this area constitute strong assets that the region could capitalise on in developing cultural tourism, attracting foreign direct investment, integrating migrant population and encouraging ethnic entrepreneurship.

Human capital development in Andalusia

Tertiary education in Spain and Andalusia has experienced strong growth and development over the past two decades. The regional distribution of universities ensures that geographical barriers to access university education have been largely removed. But long-term joint efforts are needed to overcome the challenges in the secondary education system which is characterised by high drop-out rates and poor learning outcomes. At the same time, widening participation and social inclusion should feature more prominently on the education policy agenda.

The Spanish tertiary education system has experienced significant growth and transformation over the last 20-25 years. In Andalusia since 1990, five new public universities have been established. The geographical expansion of the university system, now encompassing ten public universities, has improved access to higher education, by bringing university education to each of the eight provinces. The overwhelming majority of students come from Andalusia, with most students attending their local university: in 2009-10, only 7.2% of the first year students are from other regions in Spain, 0.68% from EU countries and 2.5% from the rest of the world. Universities in the smaller provinces remain strongly aligned with the local needs.

Challenges in tertiary education and economic development in Spain and Andalusia are partly linked to the problems in the secondary education system which features high drop-out rates and poor learning outcomes. A significant proportion of the young age group remains outside education and training: nearly one in three Spaniards between the ages of 18 and 24 have not completed secondary education and are not enrolled in education or

training, representing more than double the EU average (EU-27). Those in school perform poorly in international testing (PISA). Fewer than one in 20 of Spain's 15-year-olds reach the top levels of science proficiency. Only 1.5% of 15-year-olds in Spain belong to the top performers for reading, the lowest percentage in the OECD countries apart from Mexico. Among ten Spanish regions, Andalusia holds the lowest scores in PISA in science, reading and mathematics.

The primary responsibility for overcoming quality and equity gaps in secondary education lies with school authorities at the national and regional levels who will need to address the challenges in a comprehensive way and mobilise appropriate levels of financial resources to support education. Universities should, however, actively reach out to local schools to raise aspirations and academic performance of students and to improve the quality of teaching. In Andalusia, there was limited evidence of long-term institution-wide or system-wide collaboration between schools and universities.

While equity policies have improved in Spain, students' financial, academic and social support system is in need of strengthening. Participation in tertiary education is still related to socio-economic background. Widening participation and social inclusion should therefore feature more highly on the education and policy agenda in Spain and in Andalusia.

The Andalusian University System features long duration of studies, high dropout rates and poor graduate employment outcomes. There is a need to improve the alignment of education provision with labour market needs, improve university-industry linkages and track student progress and graduate employment outcomes.

The Andalusian University System demonstrates a low level of efficiency in graduate production. In 2006, the total number of university students was 223 501 whereas the total number of graduates was 29 776, only 13% of the total number of students. Due to the lack of adequate student support, there is limited mobility by Andalusian students and a significant number of students work while studying. As a consequence, there is also a high level of educational failure: the drop-out rate is estimated at 30% of students in Spanish and Andalusian universities. Students are also taking longer than necessary to complete their degrees. The long duration of studies results in high costs to the society, late entry to the labour market and a low level of efficiency of the university system. It is in the public

interest that the authorities take steps to ensure that the current educational reform will change this tendency.

A major challenge facing Andalusia is the high level of unemployment, reaching 28% in the second quarter of 2010 and exceeding the national average by eight percentage points. While unemployment hits harder those without a tertiary education degree, the labour market outcomes of the university graduates are poor and have deteriorated under the current economic crisis. High youth unemployment (40%) and poor graduate employment outcomes are challenges that the regional government and the university system need to address.

There is a lack of robust data about student progress, graduate performance, employment outcomes and graduate destinations. The ARGOS programme does not provide an adequate vision of graduate employment. Moreover the universities themselves need to establish an appropriate method of tracking graduates as a way of informing curriculum development and better understanding how education meets the needs of society and the economy.

There is considerable variation among the Andalusian universities in addressing the skill needs of the region. Traditionally, the design of study programmes has been supply-driven, based on the academic capacity within the universities. A rigorous analysis of the labour market demand has not yet been carried out. As a result, there is a degree of duplication of programmes which are not well-aligned with the regional socio-economic needs. To move away from traditional modes of teaching and learning and to better align educational programmes with regional needs, the universities should take full advantage of the ongoing pedagogical reform and engage academic staff, students and employers to support this reform.

Universities have established various forms of work-based learning opportunities and entrepreneurship training for students, but in general only a small proportion of students in a limited number of fields benefit from them. Creating stronger ties between students and regional employers through internships and co-operative programmes should be made a priority. To change the economic fabric of Andalusia, to enhance the relevance of education and to improve students' employment outcomes it is necessary to develop new types of programmes and active learning modes that integrate employability, industry linkages and entrepreneurship in all study programmes.

The high and rising levels of unemployment necessitate effective for lifelong learning provision. Currently, there is an abundance of providers in continuing education, with limited co-ordination resulting in overlapping provision and difficulties in monitoring the quality of the courses. There is

limited data available to understand the needs of the adult population or the efficacy of higher education in meeting them. The regional government has sponsored new modes of learning by supporting innovative initiatives, such as the Digital University and Andalusian Virtual Campus, that facilitate distance and lifelong learning. These mechanisms should be mobilised to reach out to the unemployed population. Other approaches that have demonstrated effectiveness with adults, such as work-based programmes targeted at adults and dual study programmes that combine work and study, could also be considered.

Andalusia is one of the leading Spanish regions in university spin-offs but the new businesses are often not growth-oriented or successful in the real job market, generating only few jobs and small turnover.

Andalusia is one of the leading Spanish regions in university spin-offs and much of the entrepreneurship support is channelled through incubation centres. There are a large number of activities, initiatives and projects developed by universities and the regional government to support graduate entrepreneurship. However, while the universities have a good track record in spinning out companies, in general these are not growth-oriented or successful in the real job market, but continue to be supported by public funding. The number of jobs created and the turnover remain low.

Entrepreneurial activities and entrepreneurship education are in an early phase of development and mainly technologically oriented. This is reflected in the limited breadth and refinement of entrepreneurship education activities in the universities and the small proportion of students benefiting from them. Collaborative mechanisms between the universities to boost innovation, business incubation and development remain limited. Andalusia would benefit from concerted efforts to support entrepreneurship activities and share good practices among universities, business and government to pool resources and gain critical mass. Furthermore, university programmes in business development and incubation should be extended and tied more closely to regional efforts, such as those being undertaken by regional development agencies.

Andalusia is among the most attractive regions for international students in Spain. The regional government has recognised the need for capacity building for internationalisation. There is considerable potential in internationalisation through better integration of international students and nurturing talent within the existing migrant community.

The number of international students is on the increase and in the national comparison Andalusia is one of the most attractive regions in Spain. In 2010-11, there are 6 158 international students making up 2.6% of the Andalusian student population with the universities of Malaga and Granada leading the scene (4.8% and 3.2% of their total student enrolment respectively). A more effective joint marketing of the Andalusian University System could attract more talent to the region and enhance the visibility and impact of the Andalusian University System.

There is potential in internationalisation through stronger integration of international students in academic and student life, and a lack of initiatives to link international students with employers in Andalusia or to mobilise them as ambassadors for Andalusia. The University of Granada has taken steps to address these issues by connecting international students with local employers and participation in language learning efforts (for example Arabic) sponsored by the regional government. These efforts should be scaled up and adopted throughout the university system.

The Regional Government of Andalusia is aware of the need to build capacity in internationalisation and improve language competencies. It has introduced the Talentia Programme to train globally-minded talent for the region. This programme would benefit from closer connections with the employers and alignment with the regional development needs to guarantee return on public investment. The recently introduced talent attraction programme has had a slow start and would benefit from a focus on attracting people with a proven track record on industry-university linkages and growth-oriented business creation. There is also a need to nurture and draw on the skills and competencies of the current migrant population in the region. For example, the diverse migrant community includes a highly qualified segment of immigrant retirees whose competencies could be mobilised to contribute to teaching, research and entrepreneurship education as well as Andalusian export efforts, for example in collaboration with the Trade Promotion Agency in Andalusia (EXTENDA).

Immigration has contributed to a population growth in Andalusia and has been a key driver of economic growth in recent years. Actions need to be taken quickly to keep and reintegrate immigrants in the workforce and educational system.

Andalusia, like the rest of Spain, has a drop in birth rates that is partly compensated by immigration. The net contribution of immigration to population growth during the last ten years approaches 600 000 inhabitants. 23% of the foreign population come from Africa, 19% from South America and 15% for the EU-15.

Unemployment among the foreign-born labour force has increased in all OECD countries, the rate of Spain being 28.3% which is over 11 percentage points higher than the unemployment rate of the native-born labour force. Immigrant youths have suffered disproportionately during the crisis and the comparison with native-born youth, who suffered more than prime-age adults, is significant.

No robust data were available in Andalusia about education participation levels among the new immigrant community either at the system or institutional level. There is a need to strengthen the knowledge base about overall training needs and improve access to tertiary education among the immigrant community. Useful analysis in this area could be carried out with the contribution of all universities to help develop region-wide programmes to raise aspirations among immigrant children and to provide re-skilling and up-skilling opportunities. The University of Almeria has taken steps to address the needs of the immigrant population by designing a small scale programme "Join us in your university" *(Programme ÚNETE a tu universidad*) which raises aspirations among secondary school students with migrant backgrounds and operates in close collaboration with the local schools.

Integrating immigrants into education and labour market systems is an important challenge in Andalusia. International experience in integrating both highly skilled as well as those with low skills into education and the labour market can be found for example in Malmö, Sweden. Examples of successful reintegration of foreign employees into the work force come from Japan, where active outreach and targeted training services have been used.

The Regional Government of Andalusia has created a regional university system which is characterised by collaboration and co-

ordination. The university funding model provides a powerful steering mechanism that could be used to encourage stronger alignment of educational programmes with regional needs. Andalusia would also benefit from a more comprehensive human capital development system stretching from secondary education to tertiary education and lifelong learning.

Reducing the complexity of the university decision making system in Spain is advisable in order to improve efficiency and transparency in education. Strengthening universities' institutional autonomy is important but not a sufficient precondition to ensure greater engagement of universities with the labour market and regional development if the right incentives and accountability schemes are not in place to support such activity. Mechanisms need to be put in place to monitor the return on investment and the results achieved.

The Regional Government of Andalusia has created a regional university system which is characterised by collaboration and co-ordination that manifest themselves in many areas, for example a common university curriculum for 75% of undergraduate education, regional quality assurance for higher education and research, and a funding model that has introduced a mix of performance-based allocation elements linked to both policy objectives and to institutional performance as a lever to increase efficiency and improve accountability.

There is currently limited diversity of mission within universities in Andalusia, leading to some overlap and duplication of efforts. A large proportion of common curricula may constrain stronger differentiation of universities in their course offerings and the alignment of study programmes with local needs, reducing the responsiveness of the university system. The regional government should ensure that the strong element of co-ordination does not stifle institutional initiatives aiming for specific niches or for a better alignment with local needs.

The university funding model in Andalusia, in which 30% of the funding is based on results, provides a strong tool for the regional government to steer the university system and to improve its accountability. In order to mobilise universities for regional development, the regional government could consider encouraging greater alignment of programmes with regional needs as well as institutional innovation and specialisation. It could also consider whether stronger incentives are needed to mobilise universities for regional engagement and collaboration between institutions.

This element could be integrated into the funding system through the launch of a competitive funding model for programmes that are needed in the region and its labour market. Competitive funds could fulfil many objectives, including the improvement of quality, relevance and efficiency of the universities.

The tertiary education sector in Andalusia is principally a university system; there are limited pathways and interaction with vocational higher education and secondary education. A well-developed mechanism for accreditation and recognition of prior learning could provide a more flexible system by which learners could take up different learning opportunities at different stages of their lives. Examples in this domain come from Ireland and Sweden.

Andalusia would benefit from a comprehensive human capital development system stretching from secondary education to tertiary education and lifelong learning. The Regional Government of Andalusia could build stronger relationships among the different components of the education sector – universities, vocational higher education institutions and secondary education, so that they operate as an integrated developer of human capital potential.

There is a need for a stronger regional policy for human capital development. This requires *i*) robust data on the status of the region's human capital, *ii*) a policy audit to identify barriers to meeting needs, *iii*) regional/national policy to foster tertiary education institutions with multiple, complementary missions aligned with regional needs, and *iv*) revision of student selection, finance policy (institutional, regional and national student support), and governance/regulation. Specific data needs include: *i*) educational attainment benchmarked to country-level achievement and OECD average and the best performing OECD countries, *ii*) migration by educational level and age, *iii*) regional higher education participation rates (*e.g.* youth, adults, socio-economic status), *iv*) robust information on which institutions serve the region's population, *v*) labour market needs, *vi*) degrees awarded by regional tertiary education institutions and vii) functioning pathways between and among tertiary education institutions as well as other levels of education.

The following measures would promote human capital development in Andalusia:

- A wider portfolio of robust data related to the regional context and the situation of individual higher education institutions – universities and vocational higher education institutions – should be

developed in Andalusia to support evidence-based decision making at the regional and institutional levels. The most effective region-wide graduate labour market systems are based on the collection of comprehensive labour market intelligence, on-line publication of the data in a single place to improve students' ability to make rational choices about their studies and to help graduates and employers come together and increase students' chances of finding employment. Finally, the data should be used strategically to identify regional priorities and to respond to the data in terms of course offerings and the provision of employer/cluster-specified skills by educational institutions.

- The regional government should develop the existing funding model of the Andalusian University System to improve the accountability, specialisation and efficiency of the universities. The funding system could provide greater incentives for regional engagement of universities by introducing competitive funds and for example through the following measures: *i)* formulae for block grant funding could include higher weights for enrolment of students from special populations (students from lower socio-economic and/or migrant backgrounds) or for enrolments in academic programmes related to regional labour market needs, *ii)* eligibility for special or "categorical" funding could be contingent on evidence of regional engagement and focus, *iii)* requirements that institutions collaborate in order to obtain funding and *iv)* special funding could be established to provide matching of funding obtained by universities from contracts with regional employers for education and training services. The Regional Government of Andalusia could establish a special regional investment fund (funded from public and private resources) to support building university capacity for regional engagement and provide incentive funds to institutions and individual faculty members for regional initiatives. These could emphasise increasing tertiary education access for the region's target populations, engaging faculty members and students in teaching/learning and applied research projects related to regional priorities. To ensure return on public investment and stronger accountability, higher education institutions and regional government should improve their mechanisms for following-up and monitoring the success of their programmes.

- The regional government, tertiary education institutions, other educational institutions and key stakeholders of the economy and society should work together to establish a Regional Human Capital Development System embracing the education pathway from

secondary (or even primary) to higher education and lifelong learning in order to define region-wide goals, policies and priorities. Pathways between universities and vocational higher educational institutions and different levels of education should be strengthened. Measures should be put in place to accommodate and encourage mobility within and between educational institutions at different levels to enable students to move from one institution to another by co-ordinating and formulating formal agreements and a mechanism for recognition and accreditation of prior learning and experience.

- The regional government should strengthen its efforts to develop general competencies among the population to help adjustments to rapid changes in the labour market and to facilitate lifelong learning. Systematic joint efforts should be made by the authorities, educational institutions and key stakeholders to raise the levels of education attainment and re-skilling and up-skilling activities. Technical and vocational education should be strengthened for the benefit of the regional industry. The regional government and tertiary education institutions should prioritise lifelong learning and responding to regional demand. These steps should create clear and transparent pathways to advanced education for adults, including the ability to attend multiple institutions, obtain short-term education and training that can later be applied to degrees, and re-skilling and up-skilling courses and programmes designed around the particular needs and interests of adults who often combine work and study. Due to the high unemployment rates, it is important to develop a tailored curriculum for lifelong learning, to reinforce VET flexibility and improve ICT and entrepreneurship skills. Special emphasis should be given to the co-ordination between the programmes provided by vocational higher education institutions and those provided by the universities.

- The regional government, tertiary education institutions, schools and the business sector should develop long-term efforts to increase the access and success of the first generation students including those from socio-economic and/or migrant background. These efforts should build upon successful models of effective academic, social and financial support services for students, and moving away from teacher-centred learning models by taking advantage of the ongoing Bologna reform.

- The issue of affordability should be taken up in the national agenda in order not to price higher education attainment beyond the reach of students from low socio-economic backgrounds. The national

government should develop the forms of cost sharing in higher education through means-tested scholarships, income contingent loans or other funding packages to complement the existing loan and grant schemes. Both universities and the regional government should consider financial assistance to low income students.

- The regional government and universities should work together to increase their efforts to provide a stronger corporate brand for the Andalusian University System through joint marketing with the regional government. Stronger efforts should be made in internationalising the region, through enhanced language learning schemes, more focused talent attraction and development programmes, integration of international students in the academic and social life of their universities and cities by training them to become "ambassadors for Andalusia". Inactive highly-skilled human capital of the immigrant retirees could be mobilised for the benefit of university research and teaching for example in languages, entrepreneurship and for the internationalisation efforts of the region.
- Universities and the regional government should work together to strengthen the labour market relevance of university education and alignment with the regional needs in a systematic way. Universities need to focus on the employability and entrepreneurial skills of graduates, providing them with the skills and competencies needed in the globalised knowledge economy through new modes of learning, including work- and problem-based learning methods and programmes that build an entrepreneurial and innovative mindset.

Innovation in Andalusia

The regional government is committed to making innovation a pillar of Andalusia's economic development and placing universities in the heart of the regional innovation system. It has developed a full portfolio of policies, instruments and agencies to boost research, development, innovation and entrepreneurship. Faced with the economic crisis, the government needs to ensure that resources are not spread too thinly by focusing public funding around the most promising sectors, enhancing the existing assets of the regional economy and

rationalising the number of intermediary organisations, agencies and programmes. Care should also be taken that the strong public presence in the regional innovation system does not undercut its own goals of developing entrepreneurship.

The Regional Government of Andalusia is committed to making innovation a pillar of Andalusia's economic development and placing universities at the heart of the regional innovation system. It has excelled in areas of planning, co-ordination, analysis, goal setting, prioritisation and consensus building. It has a coherent plan with well-articulated long-term goals and has achieved good vertical and horizontal co-ordination of the national and regional plans to stimulate innovation and the knowledge economy through the Inter-Ministerial Commission on Science and Technology (CICYT).

The Regional Government of Andalusia has pioneered new agencies and organisational arrangements and created a dense network of innovation support institutions and intermediary organisations. It has increased mobility and connectivity in the region. It has also made important investments to engage the university system with regional development, which now plays a key role in the knowledge and innovation support system through policy design and is the main beneficiary of the public R&D funds.

The necessity to absorb large flows of funding, the fragmentation of the national and regional innovation system and the organisational disconnect within the regional government have resulted in many small scale, partly overlapping programmes, agencies and initiatives. The regional innovation system is dominated by the public sector while the contribution of business and industry is limited. As in the rest of Spain, the share of higher education research financed by the private sector has slightly declined compared to the mid-1990s. There are also imbalances between public and private spending in R&D and applied innovation. A large number of clusters have been identified with the aim to create technology centres in each, which indicates that decreasing funding may be spread too thinly instead of focusing on the most promising fields.

The regional government has facilitated the establishment of interface bodies to improve the knowledge flows between universities and industry and to boost demand for research and innovation in industry and small and medium-sized enterprises (SMEs). The large infrastructure of intermediary organisations shows a low co-ordination capacity and has resulted in relatively low outputs. There is a need to rationalise – reorganise and reduce – the number of intermediary organisations, agencies and programmes

through mergers and improved networking capacities. In order to gain the critical mass, regional and national governments should increase their support for networks and collaboration. This could facilitate the specialisation of universities and increase their capacity to commercialise research results nationally and internationally.

Strong government presence and publicly-driven innovation may undercut goals of developing entrepreneurship. The risk is that the ability to attract public funding for an idea becomes the measure of success, rather than the success in the market as a product people want to purchase and the amount of commercial return generated. Universities and the many public agencies supporting RDI in Andalusia tend to measure their success in terms of acquisition of external funding. A publicly-driven innovation system can also lead to the funding of initiatives and innovations which are not commercially viable without subsidies.

In order to mitigate or eliminate the potential disadvantages of publicly-driven innovations systems, the regional government could consider constructing efficiency/performance indicators for public agencies including universities involved in innovation. These indicators could include the time to process project applications, the cost to the provider (in time and resources) of applying to various public programmes and the administrative costs of the programmes. The indicators should be measured and benchmarked against a set of comparators that include good private sector actors as well as top public sector agencies. Finally, when the regional government creates programmes and instruments to substitute for the absent private sector, these should seek the highest levels of efficiency.

The Andalusian University System has made considerable progress in improving knowledge generation and R&D capabilities. However, the increase in academic publication is no guarantee that R&D is translated into innovation, and again into new products and processes that are tested in the market and eventually generate new jobs. Through long-term industry collaboration universities could move beyond their traditional role of knowledge producers and embrace a more robust concept of innovation.

The Andalusian University System has made considerable progress in improving knowledge generation and R&D capabilities. R&D assets are concentrated in the research-intensive universities. The number of research

groups in universities has more than doubled over the last two decades (1 746 in 2007 compared to 800 in 1989) leading to an increasing number of academic publications.

The number of patents and spin-offs from Andalusian universities remains low and the spin-offs do not appear to be able operate independently in market conditions. Since 2006, the number of technology-based companies created by universities has ceased to grow and the number of patents granted to universities remains at a modest level. The legal basis for intellectual property protection is not yet fully developed in Spain. Furthermore, lack of funding for early stage firm formation and insufficient venture capital remain problems.

The university technology transfer offices (OTRIs according to the Spanish acronym) lack the economies of scale or scope to optimally commercialise faculty innovations. Broadening the understanding of knowledge transfer, knowledge utilisation and exploitation would be useful. By focusing on how university R&D can support jobs, industry productivity and innovation in the region, the university technology transfer offices could move to a system that is based on ongoing partnerships with industry, government and other partners.

International experience shows that while university technology transfer models may lead to saleable intellectual property and start-ups, they seldom produce enterprises that grow in the region and contribute to regional economic development. The creation of localised supply networks is therefore critical to the process through which innovation is transferred to enterprises enabling the creation of new innovation that transforms and upgrades existing industries. A well functioning regional knowledge transfer model is based on ongoing relationship between the university and industry to determine what innovations have the best opportunities for adoption and commercialisation, creating an industry-university learning environment. It supports the human capital development required to adopt and apply process and product innovations and works with SMEs as well as large corporations. It measures success in terms of the sustainability and transformation of regional industry and employment growth. University entrepreneurship programmes should therefore also support the existing industries and SMEs.

Andalusia suffers from a lack of dynamic clusters, a low level of applied R&D and innovation due to the predominance of small and medium-sized enterprises (SMEs) in traditional sectors. There is a narrow

orientation of knowledge providers and an over-emphasis on high-tech based development.

While the Regional Government of Andalusia and the universities currently have a strong focus on science and technology-led R&D and innovation, there is a need to improve incremental demand-driven innovation and research in non high-tech and traditional industries of relevance to the region, such as construction, tourism, transport, distribution and logistics, new materials and green technologies. Cluster development should be conceptualised across the industry-service divide, to connect, for example the agribusiness cluster with tourism.

Micro-firms – either self-employed or employing less than ten people – represent a larger part of the business fabric in Andalusia, accounting for over 95% of the enterprises. There is a low absorptive capacity and nascent innovation culture in and a lack of tradition of collaboration between small and medium-sized enterprises (SMEs). One consequence of this is a poor articulation of demand for services from the universities for the SME sector. There is a lack of information and data on innovation performance within the private sector and also within universities. A detailed investigation into the nature of innovation within firms, the barriers and problems and the experiences of collaboration with universities could help move forward.

Reaching out to small enterprises through training, knowledge transfer and by student internships is crucial for dissemination of innovation, whether in terms of management, processes, products or services. Universities should systematically target SMEs on a long-term basis, in addition to their focus on support for new business formation. Excellent framework conditions in place, such as an ICT network that reaches out to rural areas, following the implementation of the Guadalinfo project, and a dense network of specialised technology centres that cover the major areas of business activity in Andalusia, should be mobilised for SME development.

The following measures would promote regional innovation in Andalusia:

- In light of the reduction in funding, the regional government should take steps to rationalise – reorganise and reduce – the number of overlapping intermediary organisations, agencies and initiatives and focus on a few promising fields while continuing to develop, diversify and upgrade the existing industries and SMEs. The regional government should improve inter-ministerial collaboration in order to address the pressing needs for workforce development.

- The regional government should improve internationalisation of the region, its business sector and universities through attraction of talent and foreign direct investment. More attention should be given to the design of policies for attracting high skills and professional technical labour (students, researchers, IT specialists, research scientists etc.). Policy instruments include employee tax incentives, repatriation schemes and improving the attractiveness of academic careers. In Quebec, for example, the government is offering five-year income tax holidays to attract foreign academics in IT, engineering, health science and finance to take employment in the region's universities. In Finland, Nokia has invested in the cultural adaptation of foreign IT workers as a way to improve productivity. Given that these policies need to be customised, talent attraction initiatives may be better designed by regional bodies that have strong industrial connections and a good knowledge of the local labour market. To be more effective, these policies need also to be an integral part of the international co-operation strategy of the region. They can be coupled with initiatives to attract foreign investment, an area where Andalusia is still underperforming (FDI amounted on average to only 1.5% of the Spanish total for the first half of the decade) and where new incentives and policy support are needed.

- The regional government should reduce the bureaucratic burden on companies, new business formation and development, and stimulate entrepreneurship education. It is crucial to better diffuse a risk-taking culture in the academic world and have a detailed entrepreneurship teaching programme rather than impose a compulsory and vague package for each student. Universities should support entrepreneurship throughout the curriculum and build comprehensive support programmes encompassing entrepreneurship training, practical experience of creating new businesses for groups of students and incubation facilities together with seed funds for new graduate ventures. The recognition of the need to promote entrepreneurship training programmes by the regional government is important, but this commitment will only be able to deliver tangible results if at the same time the bureaucratic burden on companies is significantly reduced.

- The regional government should seek to encourage greater collaboration between universities through programmes, joint investments in R&D facilities and incentives. At the same time, stronger efforts should be made to encourage university specialisation and to promote international, national and regional

networking by mobilising virtual and digital systems already in place. Andalusian universities should also develop a practical engagement with business and a collaborative way of referring enquiries from businesses and industry with the help of virtual and face-to-face collaboration. All Andalusian universities have strategic plans. While the youngest universities recognise local and regional engagement as one of their missions, this is less clear for the older institutions; collaboration is in any case not a part of these strategies. More can be achieved by better established and designed university collaboration and enhancing and emulating the International Excellence Campus type collaboration. Reviewing the state of collaboration in the university sector would provide an opportunity for universities to rethink their priorities and to specialise. In that context, the example of Finland can be contemplated. In Finland, the Ministry of Education has requested higher education institutions to jointly devise regional strategies.

- The Andalusian University System should evaluate the universities' regional engagement. Some universities, mainly through their social councils, have commissioned studies of the socio-economic impact on their environment. There is no formal process for reviewing current regional engagement arrangements of the universities in Andalusia, but evaluation is limited to a few fragmented initiatives. There is a need for higher education institutions to collectively construct an overall monitoring and evaluation system that would cover the wide range of regional development issues with a special focus on innovation-relevant activities. This should be supported by a coherent and informative system of indicators for the measurement of the regional contribution of universities. The system should be able to collect information at the organisational level, the university level and the regional level. Furthermore, the regional government and the Andalusian universities should collaborate to improve evidence basis for regional and institutional decision making through collection, monitoring and analysis of robust data. Common university indicators should be defined, transparency of results should be guaranteed, monitoring and following up the success of programmes should be strengthened and the public dissemination of results improved.

- To improve productivity and innovation in traditional industry and services, and regional development, the regional government should align the ongoing programmes, such as Talentia, with the region's needs and establish special mobility programmes to link the students, graduates, post-graduates and academic staff with the local

business and industry in a more systematic way. Models for linking postgraduate students with local industry include the Knowledge Transfer Partnership Scheme in the United Kingdom that has improved the competitiveness of companies through the introduction of some form of innovation or new technology; around 75% of postgraduate associates are offered jobs in the companies.

- The universities should see job creation as the focus of innovation activities in Andalusia. Technology Transfer Offices (OTRIs) should assume a wider role in collaboration with industry. In order to ensure that they fully play their role in cementing the value chain, OTRIs will need to be strengthened with professional staff.
- Incentives for universities should be strengthened to increase their capacity to act as technology transfer "agents" to bring non-local knowledge to the region and to create community partnerships.

Rural development in Andalusia

Andalusia's rural areas have a rich natural and cultural heritage and considerable productive strength in agriculture. Despite the assets and the favourable framework conditions created by the Regional Government of Andalusia through investments in connectivity and capacity building, rural development has not yet reached its full potential in terms of tourism and agriculture, which remain at the low end of the production chain.

Andalusia has a major asset for the development of rural areas in forward-looking rural development policies. It was the leading region in Spain for the European Union LEADER programme that has provided for bottom-up capacity building in rural areas. Universities, in collaboration with local and regional authorities, have played an important role in training community development practitioners (University of Cordoba), providing lifelong learning and re-skilling and up-skilling opportunities (University of Pablo de Olavide), conducting research into specific issues and best practices and developing co-operation and research opportunities (UNIA through CEADER, the Baeza site and international co-operation office). The universities also organise cultural events in remote communities (University of Huelva, University of Jaen and UNIA). However, so far, many of these activities have been driven by individual academics and/or departments

without institutional commitment or inter-institutional collaboration between the universities.

The Regional Government of Andalusia has made systematic efforts to improve connectivity in rural areas, providing them with adequate ICT infrastructure and services and a framework to improve productivity of rural firms through high-speed internet. The Guadalinfo programme has created a network of public broadband internet centres in rural areas. Furthermore, the regional government's investments in broadband networks in the Andalusian University system and the online university e-learning platform have helped to widen access to higher education in rural and remote communities.

Despite the progress made in the creation of bottom-up capacity building improved ICT infrastructure, full advantage has not yet been taken of the many assets of the rural areas. While Andalusia has a rich natural and cultural heritage in rural areas, including national parks and renaissance towns, quality rural tourism has not yet reached its full potential and universities and vocational higher education institutions remain relatively passive players in the fields of hospitality and tourism through limited provision of education and training programmes, R&D and outreach activities.

In addition, agriculture remains at the low end of the production chain but provides considerable potential for further development: Andalusia is the leading region in Spain for organic agriculture with more than half the organic land cultivated in Spain, but holds fewer processing companies than Catalonia. Andalusia produces over 80% of olive oil in Spain, but most of it is shipped to Italy for packaging and branding. While the universities in Andalusia play an important role in the research and training programmes in olive oil (University of Jaen), supporting the move from traditional green house production to modern precision farming (University of Almeria) and R&D on citrus fruit and strawberries (University of Huelva), so far the efforts have remained fragmented.

The new international excellence campus on agri-food provides an important opportunity to climb up the value chain in Andalusia. This project will be in a good position to address the challenges of the rapidly growing niche areas in agriculture and can help the universities to play a more important role in promoting the development of agri-food production and helping to transform the focus from raw material production to higher value-added products. This project also has the potential to overcome the key weaknesses of the Andalusian innovation system: the limited university-industry linkages, the lack of private sector involvement, the lack of collaboration between universities and with vocational education sector and workforce development and inadequate levels of internationalisation. Strong

efforts are needed to collaborate with industry and the vocational higher education sector.

The following measures would enhance the contribution of universities to the rural development in Andalusia:

- A systematic exchange of information and experience should be put in place between universities in rural development matters facilitated by the regional government and/or the international campus of excellence in order to bring greater efficiency and more balanced coverage. Such a forum could organise thematic events, with regular information retrieval and exchange facilitated by a dedicated website. Universities' current connections, initiatives and projects involving stakeholder collaboration, community development and/or outreach in rural areas should be mapped and published on the collaboration platform.
- The Agri-food Campus of International Excellence should work systematically to improve the university-industry linkages and private sector involvement in innovation activities in the agri-food sector. It should focus on collaborative efforts between universities and allow for stronger collaboration with the vocational higher education sector and workforce development to improve job creation in the region. Strong international links with the leading agri-food regions should be created.
- Universities and vocational higher education institutions should combine their efforts to enhance rural tourism through R&D, innovation, education provision and outreach.

Social, cultural and environmental development in Andalusia

Andalusia has considerable cultural, historical and natural assets that offer a broad range of opportunities for the development of the region. At the same time, the region is faced with social and economic challenges including ageing, unemployment and social exclusion. Universities are playing an increasingly important role in facilitating social, cultural and environmental development, but more could be achieved through collaboration and aligning the activities to regional needs.

Universities play an increasingly important role in facilitating social, cultural and environmental development in Andalusia. They provide significant contributions to local development by providing training for health professions in collaboration with the Andalusian Health System. Universities are also making available for public access a wide range of culturally-specific programmes and infrastructure, such as museums, libraries, theatre groups and sporting facilities. They contribute with education and community outreach to sustainable development, cultural vibrancy and public health services. Faculty and students are engaged in outreach activities. Activities are often carried out in the provinces where the universities are located reaching out to urban and rural communities in ways that bridge the gap between the university and the society.

There is, however, a lack of critical mass to generate projects which have strong impact at the local and regional level. There are some impressive collaborative mechanisms among the universities and the regional government, most notably in the field of public health services to ensure quality personnel, but also between universities for example in the cultural programming through the Atalaya project. In many cases there is, however, scope for stronger collaboration to build joint capacity and to foster joint efforts for regional development. This is necessary to ensure that limited resources are not spread thinly and that the projects will generate multiplier effects.

There is considerable potential in a number of fields, such as generating green growth, supporting cultural tourism and cultural and creative industries and enhancing long-term community development. This would

entail mobilising universities' teaching, research and service functions and better aligning them with the region's needs.

Andalusia could capitalise on its accumulated know-how and wealth of experience in the development of comprehensive training for the public health system.

One of the major successes in regional collaboration between the Regional Government of Andalusia and the tertiary education sector has been the development and implementation of the Strategic Plan for Comprehensive Training in the Andalusian Health System. The plan provides for compulsory clinical practice for health professionals as well as specialist training and professional development. Joint investments and collaboration in training have helped improve the health outcomes in Andalusia and the quality of healthcare delivery. This is one of the significant strengths in the region and could entail significant export potential.

Andalusia could also capitalise on its multi-cultural heritage with three cultures and the presence of migrants from North Africa to boost cultural tourism, foreign direct investment and ethnic entrepreneurship.

Andalusia's multi-cultural heritage, geographical location, connections with North Africa and the presence of migrants from this area constitute strong assets that the region could capitalise on in developing cultural tourism, attracting foreign direct investment, integrating migrant population and encouraging ethnic entrepreneurship. There is scope for expanding joint efforts in this domain which represents "a low hanging fruit" for the region.

The growth of the markets and improvements in educational attainment levels and public management in the Middle East and North African countries (MENA) provide Andalusia an opportunity to improve its export balance and economic development. Andalusia's unique history with co-existence of three cultures in *Al Andalus,* Islamic architectural heritage and the largest mosque in the western world are potential magnets for attracting high-end tourism from the Arab countries. Universities could provide their expertise in designing new services with the help of their partners in North African countries. They could also assist in targeting part of their entrepreneurship activities at the immigrant community which often represents the most entrepreneurial segment of the society.

The following measures would enhance social, cultural and environmental development in Andalusia:

- The regional government could capitalise on its accumulated know-how and wealth of experience in the development and implementation of comprehensive training in the Andalusian Health System, that provides compulsory clinical practice for health professionals as well as specialist training and professional development. This is one of the significant strengths in the region and could entail considerable export potential.

- The regional government and the universities could capitalise on Andalusia's multi-cultural heritage, geographical location, connections with North Africa and the presence of migrants from this area constitute in developing cultural tourism, attracting foreign direct investment, integrating migrant population and encouraging ethnic entrepreneurship. There is considerable scope for expanding joint efforts in this domain for example in cultural tourism.

- The regional government could encourage collaboration between tertiary education institutions and industry to boost green growth and eco-innovation. Skill creation for green jobs should be more efficiently organised by pooling learning resources of educational institutions and industries in Andalusia and providing flexible pathways between educational institutions.

- The regional government could consider providing stronger incentives for "challenge-driven" research to connect university research to community development. In order to make the connection between the current research focus and a more broadly defined third mission, "translational research" could be adapted to address the critical issues that bridge the university and community. In addition, university leaders could develop initiatives supported by small research grants to encourage faculty to undertake research activities that connect with community agendas.

- The Andalusian universities should develop a forum for social, cultural and environmental development to build on strengths, to identify unexploited opportunities and to address the regional needs. An exchange forum should be put in place to, track and monitor different initiatives and their outcomes and identify best practices for publication and policy fine-tuning. Such a forum could organise thematic events, with regular information retrieval and exchange facilitated by a dedicated website. As a first step, universities' current connections, initiatives and projects involving stakeholder

collaboration, community development and/or outreach should be mapped and published in the collaboration platform. Universities' social responsibility reports could serve as a basis to develop a social responsibility plan for the Andalusian University System to further enhance their engagement in cultural, social and sustainable development.

- Universities in Andalusia should capitalise on Andalusia's attractiveness to international students and tourists. Universities in Andalusia could take a leadership role in regional initiatives to develop strategies to take full advantage of its cultural and historical heritage. They could contribute to the development of the regional creative economy by developing and expanding programmes in entrepreneurship and non-profit management both in formal degree programmes and through extension efforts. Existing programmes should be extended further and linkages should be established with the cultural industry and international networking to connect the region internationally. Universities should also more actively contribute to the skills development and innovation needs in tourism.

- Universities should improve the monitoring and follow-up of the success and results of their initiatives, projects and programmes to show return on public investment. The lack of robust and comparable data constrains the visibility and impact of universities' activities. It also makes difficult to measure the success or failure of programmes. Universities' social responsibility reports could be used as a framework for the systemic mapping of activities.

- Universities should in collaboration with regional and local governments, schools and the private sector, reach out to socially underprivileged population to ensure social and economic cohesion. Current activities need to be scaled up in a systematic way, including long-term multi-stakeholder collaboration to raise aspirations among youth in socially unprivileged population and to improve their quality of life. Universities should also reach out and empower the migrant population to address their own challenges through community development programmes.

Chapter 1: Andalusia and its tertiary education institutions

This chapter presents the profile of Andalusia, with its socio-economic characteristics including tertiary education. It identifies the main strengths and weaknesses of the region so that the major challenges it now faces in the context of the world economic and financial crisis, can be addressed by mobilising the potential of tertiary education.

Andalusia is the most populous region in Spain with over 8 million inhabitants. Traditionally a crossroads between three cultures – Christians, Jewish and Muslims – Andalusia has transformed itself from a region from where low skilled population outmigrates, into a host region for a large number of immigrants. While heavily dependent on external funding, Andalusia has experienced remarkable growth and development over the years bridging the gap in GDP per capita with the rest of Spain and EU27, but still lags behind the Spanish average in key economic and social indicators.

The current economic crisis has affected Andalusia harder than other regions due to its economic structure that is over-dependant on construction and tourism and is lagging behind industrial diversification. The deterioration of the labour market situation in 2008 disrupted the positive trends in employment growth revealing the vulnerability of the regional labour market.

The Regional Government of Andalusia has had a strong leadership role in steering the region towards a knowledge-based economy through investments in innovation, human capital development and connectivity. The economic crisis and the fact that beyond 2013 Andalusia will no longer be a "convergence region" constitute a challenge for the region and its authorities and a new opportunity to focus on the existing assets of the region.

1.1 Economic and historical overview

Andalusia holds a specific place in the history of Europe, the Mediterranean and America. With the establishment of contact between the Americas and Europe, it became a major gateway to America, after having been the centre of an Islamic presence during more than seven centuries. This historical heritage has marked the region, giving it today a unique place in Spanish history and culture, with higher education links to Latin America and the Arab countries.

With its favourable climate, the economy of Andalusia has been traditionally based on the exploitation of large agricultural domains: citrus, olive oil and fresh vegetables for which it is a major supplier to the European market. The industrial tradition in Andalusia, however, remained limited. Apart from the development of petrochemical and the recent development in aerospace industry, the secondary sector is mostly based on agro-industry and consumer goods. Today, services predominate, with tourism (and the construction sector) representing a large share of an economy, capitalising on a natural and historical heritage.

Andalusia is the second largest region in Spain and the most populated, with more 8.35 million inhabitants out of a national total of 46.7 million in 2009, followed by Catalonia (7.4 million), Madrid (6.3 million) and Valencia (a little over 5 million). After enjoying higher economic growth than the Spanish average between 1996 and 2007, in 2008 Andalusia fell below the national average due to the impact of the international economic and financial crisis, with tourism and the construction industry particularly affected. The unemployment rate in Andalusia, traditionally higher than in other regions, significantly worsened in 2009. In the second quarter of 2010, the Andalusian unemployment rate (27.78%)[1] – the second highest among Spanish regions behind the Canary Islands (29.48%) – was significantly higher than the national average (20.09%).

Before this major crisis, Andalusian economic development strategies based on innovation and the knowledge society contributed, alongside favourable international economic trends, towards bringing the region closer to national and EU averages in terms of overall economic performance. In the context of a global recession, increased competition from emerging economies and the loss of the EU convergence regions status, the Regional Government of Andalusia is facing the challenge to mobilise policies and strategies to contribute to the re-establishment of a sound economy and social cohesion. Tertiary education in Andalusia will have an increasingly important role to play in the future and the mobilisation of universities and

vocational higher education institutions for regional development will be one of the keys to the success of such strategies.

1.2 Geography and connectivity

Due to its position in the south of the Iberian Peninsula, Europe's most southern point, Andalusia bridges across continents, Europe and Africa, while linking the Atlantic Ocean and the Mediterranean Sea. Andalusia has traditionally been Spain's gateway to Latin America as well as to North Africa and the Middle East. The second largest region in Spain, it has a land area of 87 598 km^2 stretching on an East-West axis from the south-eastern tip of the Iberian Peninsula to the southern border with Portugal.[2] It is larger than more than half the European Union countries, occupying approximately 16.7% of Spanish territory and about 2.3% of the entire EU.

Andalusia presents rugged terrain, Mediterranean climate with dry summers and spectacular natural and cultural heritage: the Mulhacen in the Sierra Nevada is the highest point in mainland Spain, culminating at 3 478 metres. Andalusia's climate is very warm and rainfall is irregular, producing a hydrological regime marked by extremes in which seasonal droughts alternate with short periods of abundant and even torrential rains that increase erosion. Major natural parks are located in Andalusia: the natural park of Cazorla and Las Villas (Province of Jaen), the national park of Sierra Nevada (provinces of Granada and Almeria) and the national park of Doñana (provinces of Huelva and Seville). Sierra Nevada and Doñana were both declared World Heritage sites in 1994 by UNESCO.

Spurred by investments of EU structural funds, improving connectivity has received priority attention of the Regional Government of Andalusia. Systematic investments in high speed trains and high-speed internet infrastructure have improved the connectivity and mobility in the region which has the third lowest GDP in Spain.

Topography has impeded the development of transport infrastructure, with some internal rail and road links requiring long detours, but the overall connectivity and accessibility has considerably improved in recent years.[3] High speed trains link major urban centres in Andalusia to Madrid.[4] There are many international and domestic flights into the region.[5] Andalusia also boasts two major ports: Algeciras (number one in Spain and the third in Europe) and Malaga (second most important Spain for cruise ships).[6]

Telecommunication infrastructure is well deployed across Andalusia, with broadband services reaching both urban and rural areas. The Spanish Information Society Programme and the Guadalinfo project, carried out at the instigation of the Regional Government of Andalusia, address the needs

of the population at large, with a dense network of information centres aiming to bridge the digital divide and provide Internet accessibility regardless of level of income. The regional government has also invested in the developing broadband network for the Andalusian higher education system and online learning platform. Developments concerning the impact of telecommunication services in rural areas are presented in Chapter 4 (Box 4.2).

1.3 Administrative organisation

Juan Carlos became King of Spain at the end of 1975, the first free elections since 1936 were held in 1977, and the new constitution was approved in 1978 allowing the creation of a decentralised governance system. Seventeen regions or autonomous communities (*Comunidades Autónomas*) covering all of Spain were created between 1979 and 1983. In Andalusia, voters approved by referendum in February 1980 the Statutes of the Autonomous Region of Andalusia, which was approved by Organic Law in 1981 and published in the Official National Gazette in January 1982. As set out in the new constitution, each region has a parliamentary form of government similar to the central government structure, on the basis of which the regions set their own election dates and enjoy substantial law making power. Since the return of democracy, many powers have been either entirely devolved to the 17 regions or are shared with the central government, as is the case for education and research.

Each autonomous region has its own government and parliament and, within the regions, provinces constitute an intermediate governance level representing municipalities. In Andalusia, there are eight provinces (Almeria, Cadiz, Cordoba, Granada, Huelva, Jaen, Malaga and Seville) and 770 municipalities, many of these being quite small. The regional capital is situated in Seville. Central administration is co-ordinated through the "government office" (*Delegación de Gobierno*), which represents the Spanish central government in each region, with headquarters in the regional capital and a branch office in each of the other provinces. The regional administration is carried out by the Regional Government of Andalusia (*Junta de Andalucia)*, under the control of the region's government. There is a regional government office in each province. Each province in Spain is governed by a provincial office (*Diputación Provincial*) in which all the town/city councils in the province are represented, also collaborating in the management of certain services for the smallest municipalities. Lastly, local administration resides in the elected municipalities (see Table 1.1.).

Table 1.1. The governance structure of Andalusia

National Government	**Government Office *(Delegación del Gobierno):*** represents the national government in the autonomous region. Its headquarters is in Seville with branch offices in each province. **Main functions:** migration affairs; general co-ordination and promotion of scientific and technological research; public works of general interest or affecting two or more autonomous regions; regulation of academic and professional qualifications. **Judicial Power: Superior Court of Justice *(Tribunal Superior de Justicia)*:** Highest judicial institution in Andalusia, Ceuta and Melilla. It has administrative, civil, criminal and social chambers. Its head office is in Granada with branch offices in Malaga and Seville.
Autonomous Region of Andalusia (Junta de Andalucía)	**Executive power** **President:** leads and co-ordinates the Governing Council of the Regional Government, co-ordinates the administration and appoints the Regional Ministers. **Governing Council:** holds executive and administrative powers. Council – president and regional ministers – holds weekly meetings. **13 regional ministries:** presidency, governance and justice; financial and public administration; education; economy, innovation and science; public works and housing; employment; health; agriculture and fishing; tourism, trade and sports; equity and welfare; culture and environment. **Legislative Power** **Parliament of Andalusia:** passes regional legislation, monitors and encourages the performance of the governing council and approves the of region's budget. The Parliament is democratically elected every four years. The **legislative powers** of the region are exclusive or shared powers, depending on the policy area. The Autonomous Region of Andalusia has wide powers in: agriculture and fishing; energy and mining; education and universities; health; urban planning; environment; social services; transport and communication; civil protection; culture and heritage and tourism. The **executive powers** also apply to employment. **Other authorities independent from the regional government** The Andalusian Ombudsman, the Andalusian Chamber of Commerce, Audiovisual Council of Andalusia and the Andalusian Social and Economic Council.
Provinces (8) Almeria, Cadiz, Cordoba, Granada, Huelva, Jaen, Malaga and Seville	**Provincial Office (Diputación Provincial)** The selection of members at the provincial level is based on the results of municipal elections. **Main functions:** Municipal co-ordination, legal assistance and advice. Assistance in fire and rescue service, waste management, water services, inter-urban transport etc. for the smallest municipalities.
Municipalities (770)	**City Council:** Members are elected every four years in municipal elections. City Council is led mayor. **Main functions:** urban planning; social housing, community social services; water supply and waste management; public lighting; fire prevention; public transport; maintenance of roads; customer service; tourism, culture and sport promotion; co-operation with other administrative linked to Andalusian heritage *etc*. Municipalities can collaborate in delivery of services (*mancomunidades)*.

Source: Regional Government of Andalusia

The distribution of responsibilities among the three levels of governance in Spain is established by the constitution, in turn complemented by the

statutes of autonomy of each region. In Andalusia, the sharing of responsibilities between the central government of Spain and the region covers most areas except housing, town planning, zoning and public works which are the sole prerogative of the regional government. The sharing of responsibilities between the autonomous region and the municipalities is also quite extensive, with only strategic sectors such as economic development, tertiary education, research and technological innovation being an exclusive competence of the region.

In 2009, with 8.35 million inhabitants, Andalusia was the most populated region in Spain, accounting for 17.76% of the total Spanish population and 1.66% of that of the EU-27.[7] As compared to EU 27 countries[8], Andalusia has more inhabitants than Bulgaria, Cyprus, Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Luxemburg, Malta and Slovakia.

Andalusia has experienced regular population growth over the past 20 years (+1 255 639 between 1988 and 2008), but the growth rate (13.4%) is lower than the national average (15.8%). There has been a drop in birth rates during the last few decades, albeit with a slight recovery after 2003. Immigration inflows compensate for the increased ageing of the population, but have not prevented population losses in certain provinces because of economic uncertainty. In 2006, the provinces of Almeria, Cordoba, Huelva and Jaen registered net out-migration (IEA, 2008). Migratory figures for the period 1997-2007 show a positive balance of 597 000 people, 96.2% of which came from abroad (INE, 2008). The residential variations registered in 2008 show that 23% of the foreign population came from Africa, 19% from South America and 15% from the EU 15[9] (Laurent, Periáñez and Petit, 2010).

Despite the significant contribution of immigration to demographic growth, the proportion of foreign-born population in Andalusia in 2008 is lower, 7.6%, than the national average (11.4%), with much higher rates attained in the Balearic Islands (close to 21%), Valencia, Madrid or Murcia (over 15%) (Junta de Andalucía, 2009). In Andalusia, the highest concentrations of foreign population are in Malaga, where natural amenities and a warm climate attract a high number of EU retirees, and Almeria, where many agricultural workers, mostly from North Africa, are employed. Thus, out of 531 827 foreigners residing in Andalusia in 2007, close to 220 000 were in the Province of Malaga and 116 214 in the Province of Almeria, the third position being held by Seville (close to 50 000), followed by Granada (close to 49 000) and Cadiz (around 37 000) (IEA, 2010).

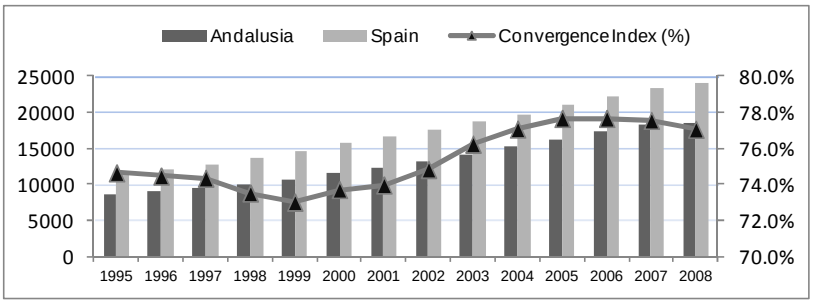
Population density in Andalusia is higher than the national average (92 per km^2 versus 89.3 in 2007) but lower than in the EU 27 (115.1).

Nonetheless, there are important internal differences: Malaga registers the highest population density with 207.65 inhabitants per km^2 while Huelva has the lowest with only 49.30 inhabitants per km^2 due to diverse rates of urbanisation. There is an increasing concentration of the population in coastal areas that brings forward issues of rural devitalisation. The urban fabric of Andalusia is relatively well balanced: Seville and Malaga have over 500 000 inhabitants, Cordoba 328 425 and Granada 234 325. Almeria, Cadiz, Huelva and Jaen have more than 100 000 inhabitants.

Significant progress has been made in socio-economic development over the last twenty years in Andalusia. Life expectancy, although slightly lower than the national average figures, has grown about three years in both sexes; the infant mortality rate has fallen by almost half and the number of doctors has increased by 45.64 for every 100 000 inhabitants (Laurent, Periáñez and Petit, 2010).

Between 1995 and 2006, Andalusia's GDP per capita grew more than the national average (93.3% as compared to 83.3%), see Figure 1.1. This has led to a convergence index in the region in 2007 of 78.6%, that is, an increment of 3.6% as compared to 1995. This convergence is due to both the significant increase in regional production and the demographic growth differential, which is slightly lower in Andalusia than the national average. However, in spite of these positive trends, GDP per capita in Andalusia, at EUR 18 359 still remains far below the national average in 2008 (EUR 23 874), placing it in the 15th position in Spain. By comparison, the best performing Spanish regions are situated above EUR 30 000 of GDP per capita (Basque Country, Madrid, Navarra) or close to that figure (Catalonia, Aragon) (Junta de Andalucía, 2009).

Figure 1.1. GDP per capita in Spain and Andalusia



Source: Laurent, Periáñez and Petit, (2010), *Andalusia, Spain: Self-Evaluation Report*, OECD Reviews of Higher Education in Regional and City Development, IMHE, *www.oecd.org/dataoecd/32/27/44666367.pdf*

1.4 Regional economy

Economic growth in Spain and Andalusia

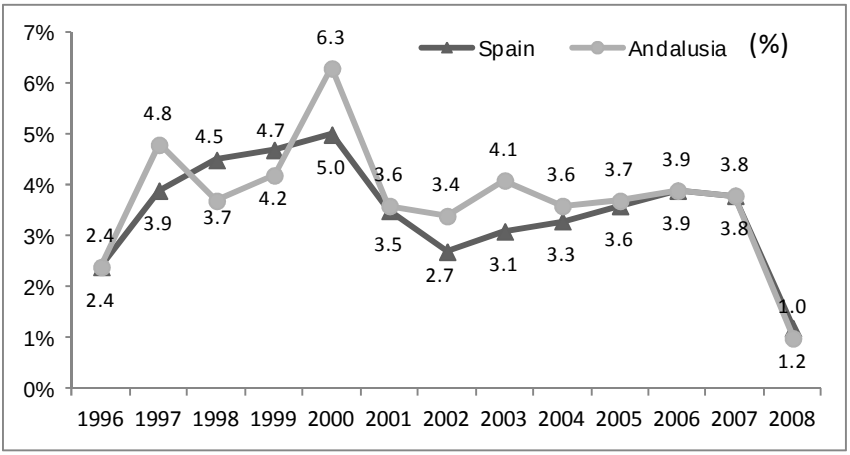
The international financial crisis has produced a period of global economic deceleration that has affected industrialised countries, emerging economies and developing countries. In Europe, Spain, the fourth economy of the Euro zone, has been particularly affected, after years of continuous growth and in spite of generally sound macroeconomic and budgetary policies. One of the reasons for this rapid down-turn is the massive reduction in activity of the construction sector.[10] In parallel, the reduction in tourism flows, which represent a sizeable portion of Spanish GDP, has also contributed to a decrease in economic activity that results in a 18.83% unemployment rate for 2009 (INE, 2010).

Andalusia reflects the weaknesses of the Spanish economy due to the dominance of construction industry and tourism which have been labour-intensive sectors with low value added. In spite of years of progressive convergence, Andalusian economy has been more affected by the economic downturn as evidenced in high unemployment levels, exceeding the national level. Andalusia has also evidenced difficulties in moving towards knowledge-based economy and until recently, the region's growth can be at least partly explained by a competitive advantage stemming from cheap labour costs, 20% lower on average than in other Spanish regions (IDEA, 2008).

Before the crisis (1995-2006) nominal GDP growth in Andalusia was situated at 7.7%, positioning the region's economy above the national average of 7.4% (Laurent, Periáñez and Petit, 2010). Likewise, in real terms, the region's average annual GDP growth for 1996-2007 was 4%, above that of Spain as a whole (3.7%), placing Andalusia as the region with the third best GDP growth during that period, behind the regions of Madrid (4.5%) and Murcia (4.3%). However, in 2008, Andalusia's real growth was 1%, lower than the national average (1.2%) (see Figure 1.2). In this context Andalusia's GDP for 2008 amounted to EUR 152.3 million, (13.9% of the national total and 1.2% of that of the EU 27).

In terms of foreign trade, Andalusia represented only 8.7% of Spanish exports in 2007, centred mostly on the primary sector (vegetables, 17.9%; mineral products, 17.2%), with the secondary sector (metal industries, 16.68%) representing less than half of total exports.

Figure 1.2. Real GDP growth in Spain and Andalusia



Source : Junta de Andalucía (2009), *Informe Económico de Andalucía 2008* (Andalusia's 2008 Economic Report), Consejería de Economía y Hacienda, Sevilla *www.juntadeandalucia.es/haciendayadministracionpublica/servicios/publicaciones/docs/informe2008.pdf*

Economic sectors

Andalusia features specialisation in activities that are labour intensive and low value added resulting in low labour productivity. As regards the evolution of Andalusia's productive structure, data for 2000-07 (Junta de Andalucía, 2009) shows trends that partly explain why Andalusia is currently more affected than other Spanish regions by the international economic crisis. These trends are closely associated with the dominance of construction and tourism, the importance of agriculture and the weaknesses of the industrial sector in Andalusia.

Up to 2007 the construction sector grew sharply, its weight in Andalusia's Gross Value Added (GVA) going from 9.4% in 2000 to 14.7% (+5.3) in 2007. This steep growth curve also took place in the rest of Spain but at a lesser degree, where the sector accounted for 12.3% of the GAV in 2007, compared to 8.3% in 2000 (+4%). In 2008, the GVA generated by this sector in Andalusia was reduced in real terms by 4.7%, above the average slowdown at the national level (-3.3%). The situation has deteriorated in 2009, following international economic trends. The GVA in Andalusia has decreased in real terms by 11.8% in 2009, much higher than the national decrease of (-6.3%) and the Eurozone (-5.6%). In nominal terms, the GVA

generated by the construction sector was EUR 15 385.4 millions, 14% less than in 2008. This means that the weight of the productive sector in Andalusia was reduced by 2 percentage points (Andalusia Economic Report, 2010).

The services sector, including tourism, enjoyed the highest relative growth of all productive sectors in Andalusia, making it the most important contribution to the region's GDP. Its slowdown, which started in 2008, is all the more critical because of the impact on the whole Andalusian economy. The GVA generated by this sector's activities still increased in real terms by 3% in 2008, a 1.7% lower than in 2007, but about equal to national average growth for the sector (3.1%). As a result, the GVA generated by the service sector in the region amounted to a hefty 67.9% of the total regional GVA, corresponding to a 14.2% of this sector in Spain in 2008. In 2009, the service sector's GVA registered a real decrease of 0.9%, below the national average (-1%), and almost half of Eurozone average (-1.7%). In nominal terms, the GVA generated by the services sector in Andalusia is EUR 99 277 millions, which amounts to 14.2% of this sector in Spain and 73.6% of the total regional GVA (Andalusia Economic Report, 2010).

The slower growth of the service sector, started in 2008, reflects the downward trend in tourism, caused by a reduction of foreign visitors (minus 2.5%) in the region. A total of 25.1 million of tourists visited Andalusia in 2008. This was 739 140 less than in 2007 (a reduction of 2.9%), the first decrease since 1999.[11] The reduction also includes domestic tourism (minus 3.1%). Overall, the reduction in tourist flows was significant for incoming EU visitors (minus 4.6%), which represent 75.2% of foreign tourists in Andalusia, explaining that the 4.4% increase in visitors from other parts of the world did not offset the negative trend. In any case, in absolute terms and in spite of its major fall in 2008, domestic tourism retains the highest relative importance in the region (61.2% as compared to 55.7% in 1999). Tourists from within the region amounted to more than half of domestic tourism in 2008 (51.9%). Such features point towards the need for policies aiming to address the domestic market with new forms of tourism such as rural and adventure tourism.

About 20 years ago, agriculture accounted for 13% of Andalusia's GVA, nearly double the Spanish average. The sector has reduced considerably its share in the regional GVA (4.9%) remaining only 2 percentage points higher than the national average (2.9%). In 2008, Andalusia produced over 80% of olive oil in Spain and Spain is, with Italy, the leading producer in the world. Andalusia also produced close to 45% of vegetables in Spain, slightly over 20% of citrus fruits and 5% of its wine (Junta de Andalucía, 2009). The region represents a sizeable share of national production, strong climatic assets and know-how and has capacity

to develop new niche markets such as organic agriculture with the help of university research and innovation (see Chapter 4 Box 4.7. for International Campus of Excellence).

The contribution of the industrial sector to the regional GVA (11% in 2000 and 9.1% in 2007) continuously declined, remaining below the levels recorded in the rest of Spain. Likewise, modernisation of the sector in Andalusia is lagging with efforts to introduce innovation in low-tech firms. Food, beverages and tobacco represent the main sub-sector branch of Andalusian industry, generating a little more than 20% of its total GVA, eight percentage points higher than the national average (12.1%). In the second place, electric energy, gas and water, represent 15.1% of the sector GVA in Andalusia (11.3% in Spain), followed by metal industries (11.1%), a share lower than that of national industry (14.2%). Positive trends include the growth of the energy sector which grew from 2.8% of the GVA in 2008 to 3.3% in 2007, above the national growth rate for this activity. Andalusian assets in renewable energies (wind, solar, bio-mass) and developments based on university research can compensate negative trends in other sectors.

Firm profiles – SME-based economy

As in the rest of Spain, the business fabric in Andalusia is dominated by small and medium-sized enterprises (SMEs) with over 99% of firms having less than 500 employees, placing Andalusia well below the Spanish and national average (Romero and Javier Santos, 2007). Micro firms – either self-employed or employing less than ten people – account for over 95% of enterprises (see Table 1.2.). This explains why Andalusia's GDP is so highly dependent on the results of small enterprises in sectors such as agriculture, services and construction. There is structural vulnerability in the regional economy and low absorptive capacity. These factors call for training that is better aligned with the needs of the region and measures to improve the absorptive capacity of the SMEs.

Table 1.2. Size structure of firms in Andalusia, 2008

Size of firm	% of total enterprises	% change 2007-08
Micro-enterprises:	95.06	-1.73
Self-employed (no employees)	*51.57*	*0.38*
1-9 employees	*43.48*	*-4.30*
Small firms (10-49)	4.31	-13.95
Medium-sized firms (50-499)	0.55	-11.68
Large enterprises (+500)	0.08	-37.46
Total	100.00	-2.44

Source: Consejo Economico y Social (2009), Andalusia

The imbalanced economic base and firm structure presents a structural problem and a failure to grow indigenous enterprises to a level that can significantly contribute to job creation and regional growth. The SME-based economy is also faced with difficulties in internationalisation: only 1.4% of Andalusian firms are involved in export markets, the most active firms being in the agri-food, minerals extraction and the aeronautical sector.

Andalusia experienced a high rate of new business start-ups and a significant increase in jobs from the mid-1990s until 2007. However, the lack of medium-sized firms between 50 and 500 employees reveal an underlying structural problem (OECD, 2010a). The annual growth of Andalusia's businesses between 1996 and 2007 (3.8%), exceeded the national average (3.1%), reflecting the regional economic boom experienced during that decade. The entrepreneurship performance of Andalusia improved significantly, with business density increasing from 51.3% to 63.7% between 1999 and 2007 (Spain 74% in 2007, see table 1.3.). In 2007, Andalusia's business sector accounted for 15.3% of the national total, with 511 728 enterprises. During this year, Andalusia's businesses grew in all economic sectors, the most significant being construction with 81% of all the enterprises in Andalusia, explaining the vulnerability of the economy in periods of recession (for firm distribution by sector in Andalusia see Table 1.4.).

Table 1.3. Firm density by region, 1999-2008

	1999 (%)	2007 (%)	2008 (%)	Difference 2007-08	Difference 1999-2008
Almeria	57.72%	67.60%	63.56%	-5.97%	10.11%
Cadiz	40.78%	52.85%	51.05%	-3.42%	25.16%
Cordoba	52.46%	62.66%	60.92%	-2.78%	16.12%
Granada	55.76%	69.09%	66.14%	-4.28%	18.61%
Huelva	45.47%	54.07%	52.17%	-3.52%	14.72%
Jaen	47.74%	55.99%	54.58%	-2.51%	14.32%
Malaga	59.49%	74.64%	71.16%	-4.66%	19.61%
Sevilla	50.49%	63.63%	62.13%	-2.36%	23.05%
Andalusía	**51.31%**	**63.74%**	**61.43%**	**-3.62%**	**19.72%**
Spain	64.08%	74.14%	71.79%	-3.17%	12.02%

Source: Directorio Central de Empresas y Censos de Población, INE, courtesy of Consejo Económico y Social

Table 1.4. Firm distribution by sector in Andalusia, 2001-08

	Andalusia						
	2001		2007		2008		
	Number	(%)	Number	(%)	Number	(%)	Variation 2006/07 (%)
Industry	31 569	7.93	34 208	6.54	33 633	6.59	-1.68
Construction	37 247	9.35	65 078	12.45	54 918	10.77	-15.61
Commerce	136 251	34.21	148 021	28.31	145 845	28.59	-1.47
Other services	193 235	48.51	275 508	52.70	275 676	54.05	0.06
Total	**398 302**	**100.00**	**522 815**	**100.00**	**510 072**	**100.00**	**-2.44**

Source: Directorio Central de Empresas (DIRCE), INE, courtesy of Consejo Económico y Social

Economic dynamism is reflected in the quotient between the number of enterprises dissolved and the number of enterprises is created as an indicator of "enterprises mortality". In 2008, this ratio for Andalusia stood at 17%, substantially higher than that of the entire Spanish economy (15.7%), in both cases the highest since 1996. By provinces, the highest dissolution rates were registered in Cordoba (22.3%), Jaen (20.6%), Cadiz (20.5%) and Malaga (18.1%), all being significantly above the Andalusian average of 17%. Substantially lower were Almeria (12.7%) and Seville (13.6%), far below the national average, whereas Huelva (16.7%) and Granada (16.8%) were close to the national average.

Unemployment

The current economic crisis brought along a dramatic surge in unemployment rate (27.78%) (INE, 2010), a rate close to that of the Canary Islands, the worst situation in Spain and substantially higher than the national average standing at 20%. The youth unemployment rate is above 40%.

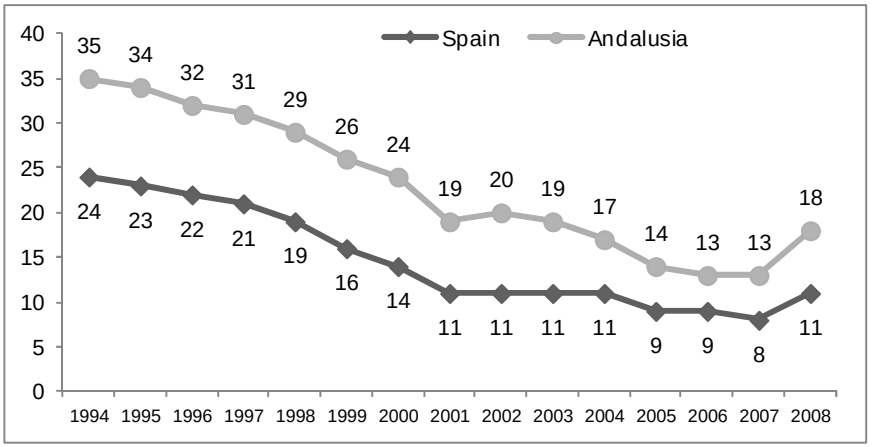
The worsening situation in 2010 has translated in certain cases into increased territorial disparities.[12] Intra-regional disparities were visible already in 2007 and the situation has deteriorated due to the crisis. In the second quarter of 2010, the unemployment rate was highest in Malaga (29.62%) and the lowest in Seville (24.67%) (INE, 2010).

Unemployment in Andalusia is traditionally higher than Spanish averages, as Figure 1.3. shows.

Unemployment affects particularly people with low skills. In 2008, 29.2% of the employed population in Andalusia had completed higher

education, whilst only 15% of the unemployed population had higher education qualifications, as compared respectively to the corresponding national figures of 33.5% and 17.7% (Laurent, Periáñez and Petit, 2010). The fact that a lower proportion of employees in Andalusia than in Spain have completed tertiary education while at the same time a lower proportion of unemployed with higher education degrees is registered in the region than in the country as a whole may indicate a brain drain. These figures call for improvements of higher education outcomes and labour market linkages (see Chapters 2 and 3).

Figure 1.3. Unemployment rates in Spain and Andalusia, 1994-2008



Source: Laurent, Periáñez and Petit, (2010), *Andalusia, Spain: Self-Evaluation Report*, OECD Reviews of Higher Education in Regional and City Development, IMHE, *www.oecd.org/dataoecd/32/27/44666367.pdf*

R&D and innovation

While investment in R&D in Andalusia in the last few years has increased at a higher rate than the national average, Andalusia still lags behind the rest of the country. According to 2006 data, investment in R&D in Andalusia amounted to EUR 1 214 billion, representing 10.3% of the national total and positioning Andalusia as the third autonomous region, after Madrid and Catalonia, in terms of R&D spending. In 2007, the last year for which figures are available, this investment (EUR 1 478 billion) corresponded to 11.1% of national spending.

The figures for 1987-2006 show that Andalusia increased its investment in R&D at an annual rate of 13.7%, which is 1.8 percentage points above the national average growth of 11.9%. These data confirm the investment effort made in the region during the last twenty years. In relation to its GDP, Andalusia multiplied its R&D investment by 2.5, growing from 0.36% in 1987 to 0.89% in 2006. Nevertheless, this figure continues to be below the national average (1.2% of GDP) and it is also considerably below the OECD average (see Chapter 3).

At the regional level, public sector dominates the R&D expenditure while private sector involvement in R&D and its funding remains at a low level. Public sector and universities invested the greatest amounts in R&D, accounting for 66.8% of the total spending, a much higher rate than in Spain (45%) or in the EU 27 (34%) (Laurent, Periáñez and Petit, 2010). Higher education is the sector that has developed the most in R&D since 1987, with an annual increase of 15.5%. On the other hand, at the national and EU levels the sectors that have been investing more actively in R&D are the enterprises and the private non-profit institutions (PNPI): 57% in the case of Spain as a whole and 65% for the EU 27 (see Chapter 3).

Regional assets

To evaluate the challenges that the Andalusian economy faces, it is useful to have a territorial vision of the region's economy and the main assets on which it will build on to create wealth and prosperity, with the active participation of universities. The key regional assets are presented in Box 1.1.

Box 1.1. Regional assets in Andalusia

The Province of Seville accounted to close to one quarter (24.1%) of Regional GVA at basic prices in 2005, followed by Malaga (18.9%), Cadiz (15.2%) and Granada (10%), the other four provinces ranging from 9.1% in the case of Almeria to 6.7% for Huelva. Each of these provinces retains strong assets for future economic development and industrial specialisation:

- Tourism, mostly in Malaga and Cadiz, a prestigious historical heritage in Seville, Cordoba, Granada and Jaen and a diverse natural heritage in all provinces.

Box 1.1. Regional assets in Andalusia (continued)

- Food industry: olive oil predominantly in Jaen but also Cordoba. year-round vegetables from industrial agriculture in Almeria, strawberries and meat in Huelva and Sherry wine in Cadiz. 5000 food and agricultural business, that account for 22% of total industry value and generate 52 000 jobs (20% of total industry).

- Growing bio-health sector with clusters in Granada and Jaen. Andalusia is the second autonomous region in Spain in terms of bio-health: 19% of the total corporate sector in Spain with over 100 companies generating 2 800 jobs. 270 research groups, 170 in life sciences and 120 in agrobiologyIndustrial base in Huelva (petro-chemical), albeit with environmental impact now a major concern.

- Nascent aerospace industry in Seville and Cadiz (Airbus). Andalusia has consolidated itself as the second region in Spain: 120 companies specialising in mechanical activities and tooling, engineering and consultative services.

- Strengthening ICT cluster in Malaga.

- Developing energy sector, with a good potential in renewable energies (wind, solar, bio-mass) in several provinces. Andalusia is among the leading Spanish regions in biomass sector, photovoltaic installations and wind installations. The sector employs 8 786 people.

Some of the fields are nascent and are already the object of specific measures that will need to be amplified with stronger university links. Others are more traditional but will require diversification to adapt to a changing context and new markets, with a more active participation of universities. All imply collaborative research efforts in which universities can play important roles. Most of them also involve human capital development at university and vocational higher education level.

The international economic downturn requires increased mobilisation of regional assets on the basis of innovation and knowledge transfer. Diversification of activities in areas such as tourism or agriculture where strengths are volatile is necessary. Excellent accessibility and a solid tourism infrastructure place the region in a good position to capture new tourism flows and to move away from mass tourism. The renewal of tourism will require new approaches to capitalise on the unique historical, cultural and

natural heritage, including 12 World Heritage sites.[13] Promoting sustainable rural tourism, adventure tourism, cultural tourism and seeking to attract visitors with higher average spending potential is advisable. Universities should be able to participate more actively in all these areas, for example through market analysis, research, development and innovation, study programmes and student's work-based learning activities.

Promising developments in the field of tourism include the joint application for International Campus of Excellence in 2010 in which all universities participated. Albeit unsuccessful, it signals a move away from the narrow science-push innovation model. Also noteworthy is the AndalusiaLab (*www.andalucialab.org*), launched by the regional ministry of tourism, trade and sport, to foster a more competitive and sustainable tourism sector through enhanced collaboration.

In rural development, new opportunities arise with the emergence of organic agriculture, which is a strength to build upon for Andalusia, as this fast growing sector is one in which the region is leading the national development. Renewable energies, for which Andalusia possesses important resources (solar, wind, bio-mass), offer new sources of employment in rural areas. Just as organic farming, the renewable energies sector is one of the few industries today that registers regular growth. In the field of agriculture, the regular growth of the organic product market worldwide, in spite of the crisis, shows that this is not a fad but responds to new consumer behaviour patterns, with purchases increasingly linked to considerations of quality and health. Universities could play a key role in all of these areas through collaborative action. For this reason, initiatives such as the Agri-food International Campus of Excellence in Cordoba that brings together several higher education institutions are commendable developments.

Andalusia also has a fast developing high-tech base in aerospace (second behind Madrid, approaching a quarter of national sales in 2008 and generating nearly 5 000 new jobs over the period 2001-09[14], bio-tech (medicine, health and nutrition) and ICTs.

The different assets of Andalusia, both historical and contemporary, added to a year-round rather warm climate, build up the profile of a region well tuned to present environmental challenges and presenting a good quality of life. The images of a "green region", a "leisure region", a "vibrant region" and a "hi-tech region" are elements of international tourism promotion and efforts to attract foreign investment and/or top-level researchers. Present policies have opened new perspectives: even if the economic crisis has slowed down the process, they open future growth opportunities in sectors for which Andalusia is well prepared.

1.5 Education in Spain and Andalusia

Secondary education

After the return of Spain to democracy, one of the main challenges facing the country was raising the educational level of the population. In the mid-1970s, about 80% of the population had attained primary education levels, 15% secondary level and only 2% acceded to higher education. Even for the compulsory education ages (6 to 14 years), attendance was low: only 88% of 13 year-old attended school and 80% of 14 year-old. Legislative measures starting in the 1980s, along with an important financial effort bringing investment in education from 1.2% of GDP investment in 1975 to 4.7% in 1995, have radically changed the educational scene in Spain. Schooling from 6 to 16 years is now compulsory and universal in practice. These major efforts have paid off as the population without formal studies has been reduced by 7% and the illiterate population by 45% (Laurent, Periáñez and Petit, 2010).

The last three decades in Andalusian human capital development have been a period of sustained convergence with the Spanish regions, so that the degree of relative inequality of the support of human capital was reduced by half (Pastor *et al.*, 2010). The years of education of the working age adults in Spain increased by 3.6 years, those of the active and employed population by 4.5 years; in Andalusia the figures were 3.9, 4.8 and 3.6 (Fundacion Bancaja, 2008). Despite the progress made, gaps remain between Andalusia and Spain for example in terms of vocational training and proportion of university graduates in the total population.

Table 1.5. Evolution of registered students all kinds in Andalusia (1997/09)

Education Level. Total students	1997-98	% Total	2003-04	% Total	2008-09	% Total
Pre-primary and primary education	769 051	42.1	772 814	43.2	876 833	45.9
Compulsory education	432 688	23.7	405 782	22.6	383 164	20.4
Special education (*)	132 807	7.2	155 599	8.7	207 054	10.8
Post-compulsory education	151 000	8.2	127 293	7.1	123 423	6.5
Vocational training	77 978	4.1	88 064	4.9	94 718	5.0
University education	271 914	14.7	242 608	13.5	222 672	11.7
TOTAL	108 3017	100	179 2160	100	190 7868	100
Total students/total population	24.7		23.6		22.8	
(*) Includes adult education						

Source: IAE, 2010

In Spain, the quality of secondary education poses a serious challenge for the economy. Nearly one in three Spaniards between the ages of 18 and 24 have not completed high school and are not enrolled in school, which is more than double the EU average (EU-27). Secondary education learning outcomes of Spanish teenagers are well below the best-performing countries according to the OECD Programme for International Student Assessment (2006). In the PISA assessment of science, Spain scores 27th out of 57 countries, in mathematics the 33rd and in reading the 36th position. Fewer than one in 20 of Spain's 15-year-olds reach the top levels of science proficiency, compared to one in five in Finland. Only 1.5% of 15-year-olds in Spain reach the top performers for reading, the lowest percentage in the OECD countries apart from Mexico. Among ten Spanish regions, Andalusia has the lowest scores in science, reading and mathematics.

The secondary education in Spain suffers from high drop-out rates. On average, 35% of 16 year old boys and 20% of 16 year old girls drop out of the educational system without a secondary education degree (Laurent, Periáñez and Petit, 2010), many seeking jobs without prior professional training. Authorities have recognised these challenges and addressed them with a range of measures. At the national level, these comprise scholarships especially designed to recover drop outs, a permanent teachers training programme and a more attractive and market-oriented vocational education. At the regional level, free school books are guaranteed for ages 8 to 14 and specific social services are dispensed in schools located in distressed urban areas such as day care in public nursery schools for every 3-year-old child with a father/mother in the midst of secondary schooling.

Tertiary education system and the degree structure

The Spanish tertiary education system is divided into universities and non-university institutions, but in practice it functions mainly as a unitary system dominated by the universities (Santiago *et al*., 2009). The university system consists of 75 universities (50 public and 25 private) in 2007, compared to 34 in 1984. Non-university tertiary education is divided into post-secondary higher vocational education (89% of students in non-university tertiary education)[15] and specialised tertiary education, such as study of arts, sports education or military education. Higher vocational education encompasses a series of modular training programmes that vary in duration (one or two years). The programmes typically comprise work placements to account for 350-750 hours of the training that varies between 1 300 and 2 000 hours. In Andalusia the separation between university and vocational higher education is reinforced by the organisational divide within the regional government.

The university degree structure in Spain, which included short cycles, second cycle, long cycle and third cycle courses,[16] has recently undergone a change in order to adjust to the requirements of the Bologna declaration.

Since 2009-10 the new university degree structure, has consisted of undergraduate (240 ECTS credits) and postgraduate education, which is divided in to master's (60-120 ECTS credits) and doctor's level studies in Spain. The application of the Bologna process was launched at the master's level contrary to most EU countries.[17]

Universities can offer courses that lead to official degrees valid throughout Spain as well as "non-official" courses that may not lead to a registered degree but may be part of a professional specialisation (for example non-official masters). Until late 2007, the state retained control over a large portion of the curriculum of each official degree in order to ensure "national diplomas" (Santiago *et al*., 2009). Official degrees were part of the Registry of Universities, Centres and Courses (RUCT).[18] Today, however, Spanish universities are able to define their curricula themselves. Nonetheless, in Andalusia, a voluntary decision has been made to retain 75% of undergraduate programmes similar throughout the universities.

Tertiary education access and attainments

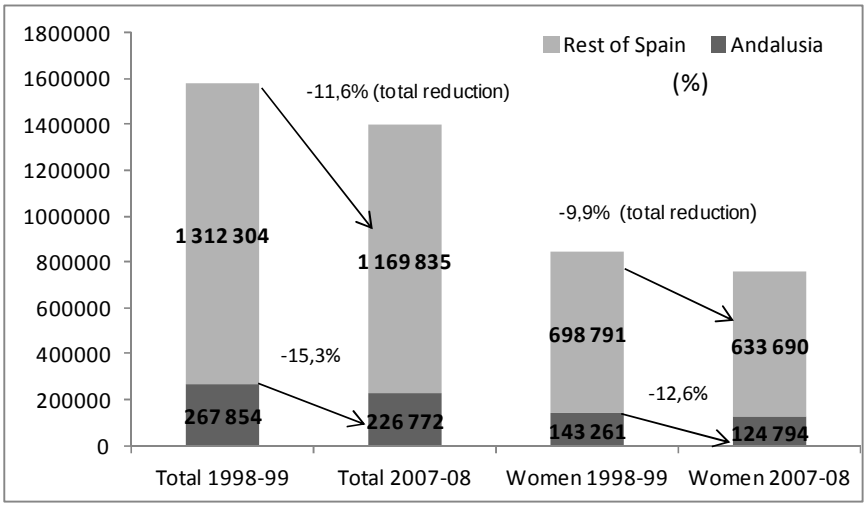
The OECD's annual publication, Education at a Glance (2010) shows that for 2008, Spain was one percentage point above the OECD average of 28% for the 25-64 year-old age segment with tertiary education. Among the age group 25-34 the higher education attainment level is nearly 39% exceeding the OECD average of 35% (See Chapter 2 Figure 2.1). There has been a considerable increase in the student population, which has improved the overall level of educational attainment. 29% in 2008 of the population aged 25-64 years-old held a tertiary level degree, compared to 25% in 1975, before the return of democracy (Laurent, Periáñez and Petit, 2010).

Over the past ten years, there has been a stabilisation of first year student enrolment in tertiary education. The progressive reduction in birth rates in Spain since the 1980s has led to a significant reduction of population in the 18 year-old age cohort that corresponds to entry into higher education. Over a ten year period this age cohort dropped from 610 538 (1998) to 475 649 (2007), a 22% reduction. In parallel, the percentage of students that registered for university access exams decreased but in a lesser proportion (3%), now amounting to around 1.5 million in the whole country. While the success rate in the entry examinations increased by more than 5%, the percentage of first year university students remained stable over the period, at 37.77% of an age category that dropped from 230 512 to 179 662 inhabitants in ten years.

The total number of students enrolled in Spanish universities has decreased, in proportion, below the number of students enrolled for the first time. At the national level, the total number of students enrolled in Spanish universities has gone from 1 580 158 students in 1998 to 1 396 607 in 2008 (see Figure 1.4.). At the national level, the accumulated reduction in students for the period was of 11.62%. The reduction was greater among male students (13.55%) than among women (9.92%).

In Andalusia, the reduction in the university student population was sharper than at the national level up to 2009, when the number of students enrolled increased by 2% due to economic crises, reversing the trend initiated in the previous decade. University enrolment in the region dropped from 267 854 students in 1998 to 226 772 students in 2008 before rising to close to 230 000 students in 2009.

Figure 1.4. Evolution of the number of university students 1998-2008



Source: Laurent, Periáñez and Petit (2010), Andalusia, Spain: Self-Evaluation Report, OECD Reviews of Higher Education in Regional and City Development, IMHE, *www.oecd.org/dataoecd/32/27/44666367.pdf.*

The percentage of women accessing university studies for the first time remained stable over the 1998-07 period, at 57.8% of the total. Around 13% of total enrolments in 2004-05 were in higher vocational education, which offers entry into university: 25% of graduates from these institutions entered tertiary education in 2000-01 (Santiago *et al.*, 2009).

A major concern in the Spanish University System relates to the high drop-out rates. 30% of students do not finish their degree (as compared to 16% on average for the EU-15). Most drop-outs take place after the first year, especially in technical studies. The lowest dropout rates occur in health science studies and in socio-legal studies. Adjustments are required for reasons of efficiency within the university system to better align educational offer with labour market needs.

Policy emphasis in Spain has mostly focused on the expansion of overall enrolment while limited attention has been paid on the socio-economic background of students and widening access to higher education. A significantly lower proportion of university students have parents with only primary education (13%) as compared to that of young people whose parents had a tertiary education degree (65%) (Santiago *et al.*, 2009). While the socio-economic and cultural background of parents has an impact on entry into the university system as well as on outcomes, student support system is one of the measures that can counter-balance these factors. In Spain, there is room for improvement in this area: while tuition fees are at a low and payable only if the student does not pass the course requirements, scholarships are not sufficient to cover real costs of living and only a limited number of students have access to them. Furthermore, publicly subsidised or guaranteed loans are not available to students, unlike in other countries.

Tertiary education framework in Spain

Tertiary education framework in Spain is based on sharing of responsibilities between the central government and regions, with principles set out in the constitution.[19] Regulation of conditions for obtaining, issuing and validating academic degrees, qualifying teaching staff and measuring quality rest-upon the national government,[20] as well as the promotion and general coordination of scientific and technical research and knowledge transfer. Education and research are under the responsibility of two different ministries: since April 2009, the Ministry of Education is in charge of universities and the Ministry of Science and Innovation remains responsible for research. The overall organisation, implementation and financing of the tertiary education system in each region, including the creation of new universities is the responsibility of the regional government.

Each of the 77 Spanish universities (50 public, 27 private) is governed on the principle of autonomy, with the participation of civil society through a Social Council.[21] The main governing bodies of the Spanish University System are:

- The General Conference of University Policy that ensures co-ordination between the central government and regional government in tertiary education policies and measures.
- A Universities Council created in 2008, presided by the minister in charge of universities, bringing together the Chancellors of public and private universities and five other government members.
- The Conference of Rectors of Spanish Universities (CRUE), created in 1994.
- The Conference of Social Councils of Spanish Universities, created in 2004.

The governance structure of public universities in Spain includes a number of collegial bodies and individual roles:

Box. 1.2. Governing bodies in Spanish public universities

- The Social Council (*Consejo Social*): is the body intended to represent the public interest and act as a bridge between society and the university.
- The Governing Council (*Consejo de Gobierno*): is the university's main governing body. It sets out the strategic and programmatic lines for teaching, research, human and financial resources, as well as the guidelines and procedures for their application.
- The University Assembly (*Claustro Universitario*): brings together the entire university community. With a membership of up to 300 people, it comprises the Rector (the chairperson), the Secretary General, the Manager and representatives of all groups within the university and the community.
- The School and Faculty Councils and Departmental meetings: the Faculties or Schools elect councils chaired by the Dean or Director. The majority of the members are teachers or professors with a permanent appointment at the university.
- Individual roles: Rector, Vice-Rector, Secretary General, Manager, Faculty Deans, School, Department and Institute Directors of Research.

Box. 1.2. Governing bodies in Spanish public universities (continued)

The Rector is the university's highest authority and representative. He or she is elected by the Assembly or directly by the university community as required by the university's statutes, which also regulate the election procedures, and the length of his or her mandate. The Rector appoints the Vice-Rectors from the academic body and the Secretary General from the group of public servants who work at the university and have an appropriate qualification. The management of administrative and financial services is the responsibility of the Manager. The Rector proposes a candidate with the appropriate qualifications for the Social Council's approval. The Faculty Deans, School Directors and Directors of Research Institutes are elected by permanent and temporary academic staff, students and administrative staff members, and represent their unit and provide leadership.

Source: Santiago *et al*., (2009), Review of Tertiary Education in Spain, OECD, Paris

The governance of the Spanish University System is complex and controlled by a two-tier structure at the national and regional level. In Andalusia, the autonomous region has extensive powers for planning and management in relation to universities attributed by its Statute of Autonomy. The distribution of powers involves a risk of over-regulation. For example, Salaburu (2007) has commented that:

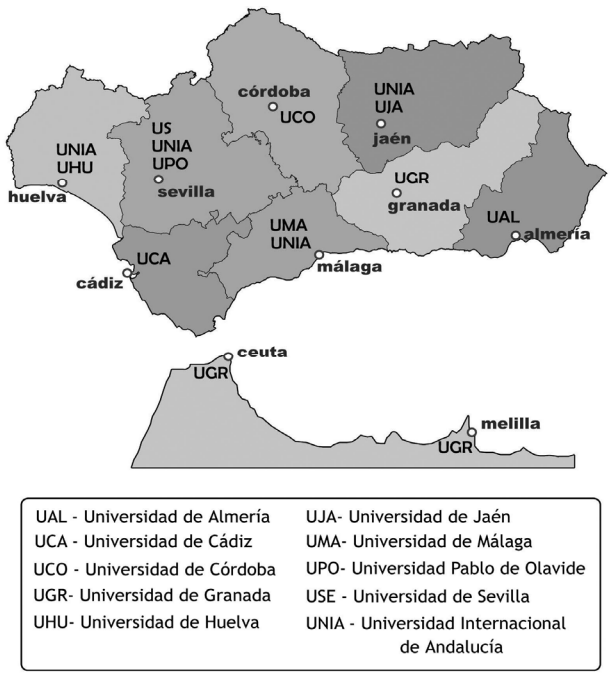
> the wish to regulate these powers until exhaustion has given way, in practice, to a wave of state, community and university regulations […] so that the university system is one of the most regulated environments that exist today. There are two consequences: the difficulty of university authorities to take autonomous decisions with agility – there is always a regulation to consult – and the difficulty of demanding that someone is responsible because it is not completely known which body should assume responsibility; on one occasion someone said that in the university everyone is empowered but no one is responsible.

1.6 University education in Andalusia

Evolution of the system and framework

The Andalusian University System is the result of a long historical evolution: The University of Seville (1505) and the University of Granada (1512) count among the oldest in Europe and it was not until the last century that universities were created in other provinces. During the 1970s, three universities were created (University of Cordoba and University of Malaga both in 1972 and University of Cadiz in 1979). It was not before the 1990s that each Andalusian province had its "own" university, both to satisfy the increasing demand for university studies encouraged by new education policies and as a deliberate regional policy move. In Andalusia, which has a wide territorial spread, a university per province has meant that educational opportunities are within geographical reach of the population.

Figure 1.5. Universities in Andalusia



Source: Regional Government of Andalusia

There are now ten universities in Andalusia (see Figure 1.5.): the two most recent are the Pablo de Olavide University in Seville (the only province with two universities) and the International University of Andalusia (UNIA), which delivers exclusively master's and PhD level studies as well as summer courses. The oldest universities have the highest enrolment (over 60 000 for the University of Seville and 54 000 for the University of Granada in 2010-11), followed by those created in the 1970s (Malaga, over 35 000; Cordoba, close to 17 800 and Cadiz, 20 250). The younger universities – University of Almeria, University of Huelva, University of Jaen, International University of Andalusia and University Pablo de Olavide – created in the 1990s, have smaller enrolment (from less than 10 000 to over 15 000), as indicated in Table 1.6.

The Andalusian Universities Council is the body in charge of co-ordination on university matters within the region. It brings together the regional ministry in charge of universities and research matters, the university chancellors, the chairs of the university social councils, five members designated by parliament, the director of the body in charge of quality insurance and the chair of the Andalusian Schools Council, but no representation from students.

Table 1.6.Enrolment and staffing of universities in Andalusia, 2007-08

	PDI[1]	%	Students*	%	PAS[2]	%
Almeria	859	5.10	11 307	4.95	486	5.41
Cadiz	1 637	9.72	19 544	8.55	714	7.94
Cordoba	1 369	8.13	17 679	7.73	610	6.79
Granada	3 682	21.85	56 091	24.53	2 045	22.76
Huelva	897	5.32	10 102	4.42	439	4.88
Jaen	1 129	6.70	14 515	6.35	427	4.75
Malaga	2 208	13.11	33 423	14.62	1 294	14.40
Pablo de Olavide	825	4.90	8 567	3.75	369	4.11
Seville	4 242	25.18	57 426	25.11	2 603	28.96
Total	**16 848**	**100.00**	**228 654**	**100.00**	**8 987**	**100.00**

1. PDI: Research and teaching personnel (*personal docente e investigador*)

2. PAS: Administrative and service personnel (*personal de admnistración y de servicios*)

* Undergraduate students only

Source: INE (*Instituto Nacional de Estadística*) (2010), INEbase website, *www.ine.es/inebmenu*, accessed 30 March 2010.

The 2003 Andalusian law on universities refers to the "Andalusian University System", defined as a group of public and private[22] universities, created or recognised by the Andalusian parliament. At least 75% of the

curricula is shared. The universities function as a co-ordinated system, with very frequent meetings bringing together the rectors facilitating the process.

Another organisational feature of universities and research in Andalusia is rather unique: the Regional Ministry of Economy, Innovation and Science brings together competencies in higher education, research, innovation and economic development that are usually scattered between different ministries. This organisation reflects the current innovation concept with a strong technology and R&D push. Strong inter-ministerial collaboration is required to address the entire tertiary education sector including the vocational higher education as well as the work force and labour market needs.

Universities' financing system

An innovative funding model was adopted in 2001 for Andalusian universities by the regional government to encourage both competition and convergence of goals of the different universities: 30% of funding is conditioned on performance assessment by indicators relating to course offering, research and innovation. The model also aims to better control expenses and ensure a higher return on public investment in higher education. In a context of budgetary pressure, the Regional Government of Andalusia also recently engaged universities to obtain 30% of resources from their own and private sources by 2011. The planned funding model, reviewable every five years, is based on some basic principles: financial sufficiency and joint responsibility, costs commitment, universities co-ordination, limitation of enrolment fees, strategic planning and management transparency and evaluation (operational plans, analytic accounting and contracts schedule). Within the framework of this model, now in its second five year period, overall funding of universities in Andalusia has substantially increased: from EUR 600 million in 2001 to EUR 1.6 billion in 2009 which combines operational, investment and research financing. In 2010, the overall funding of universities in Andalusia has remained stable at EUR 1.6 billion.

The regional government ensures functioning of the funding model by seeking consensus with the universities through the Andalusian Universities Council. This model establishes the budget distribution parameters taking into account the participation quota of each university in the system, based on "standardised credits". Standardised credits make the credits of the different degrees and universities comparable by taking into account factors such as enrolment, the experimental nature of the teaching and the teaching staff. Once the quota has been calculated, establishing the maximum possible financing for each university, 30% of the amount is conditioned on

fulfilment of an annual contract. Each university establishes its performance engagements in the contracts with the Regional Ministry of Economy, Innovation and Science. Monitoring and control of fulfilment is carried out through an extensive catalogue of indicators in three specific areas: education, research and innovation. The amounts discounted from the financing of each university for failure to perform as planned go into a fund that is redistributed based on three criteria: the universities' debts, master programmes offered and rewards to universities that have complied with 100% of their engaged performance.

Although the Andalusian University funding model seems to be well functioning, there is a lack of transparency of the system as the information and data on which the contracts are based is not open to other institutions nor is the outcome of results from the indicators, so no public discussion on the level of fulfilment is possible. Likewise, the lack of commonly established calculation bases and concepts underlying the determination of the indicators themselves is criticised (Laurent, Periáñez and Petit, 2010). Furthermore the funding formula gives limited weight to regional impact of university activities whether teaching, research or service and there is no financial (or career) incentive for regional engagement by professors or researchers. There is room for improvement in the funding model to address more explicitly regional development aims while pursuing international excellence (see also Chapter 2).

Functioning of the Andalusian University System

Over the last ten years, Andalusia's universities have grown along the same lines as universities in Spain. The number of professors increased by 20.7%, compared to the Spanish average of 23.3%. Concerning the number of students, the reduction has been more pronounced in Andalusia than in Spain as a whole (see Table 1.6). This has resulted in significant improvement in the student/professor ratio (from 19.3 students per professor in 1 998 to 13.6 students per professor in 2 008), better than in the rest of the country (19.8 students per professor in 1998; 14.2 students per professor in 2 008). The favourable student/professor ration may, however, be unsustainable in future given the tightening university budgets. Finally, the total number of administrative and services personnel increased in the same period by 22.6%, whilst in Spain it grew by more than double (53.6%). Also, the percentage of civil servants in this personnel category in Andalusia grew less than in the whole of Spain (from 41.72% to 45.71%) whilst the national average rose from 42.9% to 59.77%.

As Andalusian universities function within a system – the Andalusian University System – their relations are based on co-operation with regular

meetings between rectors scheduled to exchange information, discuss different items relating to courses or research and prepare common positions in discussions with the Andalusian Ministry of Economy, Innovation and Science. The setup of new courses is subject to careful scrutiny by the ministry in order to prevent overlapping or duplication. This can be a potential source of inflexibility if it prevents the universities to respond quickly to the needs arising from the region. However, in the case of Andalusia, it can also be seen as a tool for the regional government to encourage regional engagement of traditional universities which are more geared towards research measured in publications.

Collaboration between universities is stimulated by national or regional initiatives. An example at national level is the International Excellence Campuses. At regional level, collaboration manifests itself in joint research groups, joint courses and master programmes, common projects and "shared services" that enable, for instance, access to certain university services including the digital library and the Andalusia Virtual Campus.

1.7 Regional development perspectives

Andalusia has experienced remarkable growth over years until 2007, higher than the Spanish average, which has had positive effects on unemployment rates that remain above national figures: the differential narrowed from 11 percentage points in 1994 to only 4 points in 2006. During that time, Andalusia was able to build the basis for endogenous growth: EU structural funds amounted to 34% of investments in the region in 1996, but only 12.3% in 2008. In spite of this reduction, the region was able to ensure good economic performance by building up on its assets.

The economic and financial crisis has hit all countries but to varying degrees: in Europe, Spain is one of the countries where its impact is particularly felt and Andalusia has been more affected than most other regions, with an unemployment rate in 2010 of almost 28%. Spain's unemployment rate has risen steadily from 7.95% in the second quarter of 2007 to 20.09% in the second quarter of 2010 as the global financial crisis hastened the collapse of a labour-intensive property boom that had fuelled growth for over a decade. The crisis underlines the need for the transformation of the regional economic model which can only happen if the education system adequately trains the work force and the economy becomes more diversified. Education is the only long-term solution to put an end to unemployment.

Linking the missions of the university system to regional economic development was one of the main pillars of the Second Modernisation Plan

for Andalusia (2003), followed in 2005 by the Innovation and Modernisation Plan for Andalusia (PIMA). It indicates that university and research policies are "*specifically oriented towards the knowledge industry*" and that:

> [U]niversities as regional agents of innovation are essential for the development of a modern and advanced society, capable of generating employment and social welfare". It indicates that "the aim is to develop an Andalusian Knowledge System, conceived as a whole, which integrates all the agents and organisations involved in the processes of human resources training, knowledge and technology production, transfer of these resources to the productive, social and cultural sectors, and their application to generate wealth through innovation". It underlines that "the universities play a key role, as agents involved in the conception, planning, implementation and assessment of training, research, technological development and innovation policy" and that "the universities' main mission is to become a strategic asset of regional competitiveness.

The refocusing of regional development policy constitutes a first indicator of concerns relating to economic diversification and competitiveness. The Andalusian Development Institute, created in 1987 as a regional development agency mostly addressing the needs of small and medium-sized enterprises (SMEs) in traditional sectors, was replaced in the year 2000 by the Innovation and Development Agency of Andalusia (IDEA). The main objective of the agency, ensuring both co-ordination and financing of major projects, is the creation of new firms and entrepreneurial modernisation, giving priority to added value projects based on innovation in products, services or systems (see Box 1.3.). In line with such principles and to facilitate accomplishment of the Knowledge Society policy goals contained in the Innovation and Modernisation Plan for Andalusia (PIMA), administrative responsibilities towards higher education institutions and the private sector were brought under the responsibility of one single ministry (Innovation, Science and Enterprise) in 2004, and which oversees the activities of the Innovation and Development Agency of Andalusia (IDEA).

More recent policy decisions aim to increasingly mobilise the well spread innovation infrastructure (technology and science parks, technology centres) by increased networking: such is the aim of the Network of Technology Spaces of Andalusia (RETA) created in 2005. RETA brings together 20 accredited Technology Centres with the aim of facilitating access to innovation by all Andalusian firms regardless of size, particularly in traditional sectors. 2 300 firms have benefited up from the training and advisory services provided by the centres which are specialised by location. For instance, the Technology Centre for Olive Trees and Olive Oil is located

in Jaen and the Innovation Centre for ICTs is situated in Malaga but all are expected cater to the needs of firms regardless of the province where they are established.

Box 1.3. Innovation and Development Agency of Andalusia (IDEA)

IDEA has a staff of around 250 employees, with headquarters in Seville, offices in each province and two offices abroad (Brussels and Tokyo). Its 2009 budget (EUR 729 million) is 56% higher than in 2008. Its 2008-12 Action Plan targets three strategic sectors: aeronautics, metal-mechanical industries and the food industry, within a wider mission including all activities except tourism and agricultural commodities.

Policy tools and incentives apply to firms regardless of size. Creation of firms represents 45% of incentives distributed and firm modernisation, 34%, the remaining 21% corresponding to specific innovation activities (17%) and aid for firms undergoing temporary difficulties (4%).

IDEA engages in risk capital funding (INVERCARIA), manages a specific programme for innovative SMEs (Innoempresa) and promotes FDI.

"Campus", created in 2004, is one of its major programmes, aiming to foster the creation of technology-based firms in Andalusia. This programme is carried out in close co-operation with university research and the technology transfer offices (OTRIs). By early 2010, 80 projects have been approved, each firm being initially awarded a maximum of EUR 200 000 in participatory loans. ICT projects predominate (33), followed by life sciences and health (27). Total funding per province ranges from EUR 2 220 763 (Malaga) to a mere EUR 17 580 (Huelva), the former with 20 projects and the latter with just two.

Source: OECD from IDEA

Role of universities in regional development

The existence of a university in each province has provided inhabitants with educational opportunities in the vicinity and contributed to an increase of enrolment and educational outcomes. For example, the number of university graduates in the province of Almeria has doubled since the creation of the university in 1993. Overall, the wide territorial coverage of the universities has had a positive impact on the Andalusian economy, as the constant increase in the percentage of the population of working age with a university degree (from 2.7% in 1977 to 13.3% in 2007) shows. While no robust data were available, it was widely acknowledged that universities are important job providers (teaching and research staff, administrative

personnel) and customers to the local economy which satisfies basic service and product needs. One of the smallest universities, the University of Huelva (slightly over 10 000 students in 2007-08) had a teaching staff at the time of 897 people and an administrative staff of 439.

The build-up of the new universities has also brought a sense of purpose, opportunity and pride to the population in areas that had begun to experience loss of vitality. In a little over than 16 years since their creation in 1993, the universities of Jaen (14 515 students in 2007-08), Almeria (11 307 students) and Huelva (10 102 students) have contributed, if only by their sheer weight to the revitalisation of the local economy and local society. The University of Cadiz, opened in 1979 (19 544 students), played a similar role as, alongside its main facility in the City of Cadiz, it maintains campuses in Puerto Real, Jerez de la Frontera and Algeciras. Recently created universities have a strong sense of commitment to the local community and engagement in many activities opening the institutions to society at large.

The research conducted in the new universities, often in conjunction with specialised technology centres located in the area, is usually of direct relevance for the provincial economy, showing the economic impact these activities have in rural areas of Huelva, Cadiz or Jaen. Likewise, cultural and social outreach is not limited to the municipality where the university is located but extends to the whole of the provincial territory.

While the creation of new universities in Andalusia has widened access to higher education, issues of critical mass, co-operation and international excellence arise. At the same time, the proclaimed goal of leveraging knowledge for regional development should translate into new measures that would facilitate the process. The newest universities remain of a small size by international standards so the optimisation of the system implies stronger co-operation between institutions. Furthermore, although the role of the universities in regional development is increasingly recognised, particularly in the new universities, the more traditional universities in Andalusia remain often detached from the needs of the region. Currently, co-operation between universities appears mostly pragmatic and based on individual initiative rather than systematically pursued by the institutions, except within certain programmes such as the international campus of excellence.

The national programme International Campus of Excellence has now gone through two calls in 2009 and 2010.[23] The rules of the programme require the submitting university to design a strategic plan indicating the role of associated organisation such as research and technology centres, other universities, firms. During the first call in 2009, the Agrifood Campus (CeiA3) led by the University of Cordoba in collaboration of the

Universities of Jaen, Huelva, Cadiz and Almeria was awarded the status of International Campus of Excellence with a regional scope, while the University of Seville gained financial support to strengthen its application. As a result of the 2010 call, Andalusia TECH by the University of Seville and Malaga, was awarded the status of the Campus of International Excellence while the Campus of BioTic Granada, led by the University of Granada in the collaboration with the Spanish National Research Council and the Health-Science Technology Park, gained the status of the Campus of International Excellence with regional scope. Co-operation between universities could be strengthened if regional programmes were based on similar principles, but with inter-university co-operation made compulsory.

Despite the efforts made by the Regional Government of Andalusia, current incentive structures to mobilise universities for regional and local development are inadequate. To allow for maximum impact of the university system on regional development, regional engagement should be a distinctive and sufficiently weighted part of the funding formula whereby 30% of annual funding is subject to fulfilment of certain goals by the institution. In education, research activities and service, those with direct impact on regional development or linked to regional assets, know-how or issues should be accordingly credited. Regional engagement by professors and researchers should be appropriately incentivised, whether financially and/or career terms. Analysis and studies on topics of regional relevance (economy, sociology), that could also be of use to regional government should be encouraged.

Analysis on topics of regional relevance is partly fulfilled by the Andalusia Studies Centre Foundation that was established by the Regional Government of Andalusia in 2001. This foundation provides a framework for the exchange of knowledge between the Andalusian, Spanish and international scientific community and finances studies related to the economic, social and cultural situation of Andalusia. To what extent the region benefits from this work is, however, unclear and evaluating of the evolution of the impact of the activities would be useful.

Finally, to ensure maximum impact to the findings of this report it is recommended that once it has been submitted to the Andalusian Universities Council for discussion, regional and provincial meetings with university, private sector and civil society representatives be organised so that some form of debate can take place between the main stakeholders before implementation of certain measures.

Notes

1. According to the National Statistic Institute, accessed on 08 September 2010, the unemployment rates in Andalusia by provinces were the following: Almeria (29.43%), Cadiz (29.43%), Cordoba (28.69%), Granada (29.21%), Huelva (23.87%), Jaen (29.62%) and Seville (24.67%).

2. Close to 2 000 km (1 971) are constituted by land boundaries and nearly 1 000 km (948) by coastline.

3. Andalusia's railway network provides connections between its provincial capitals and a large number of its towns, as well as to and from the rest of Spain. Notwithstanding this, because of topography, some links require long journey times. Thus, even though Jaen and Granada are only 93 km apart, passengers have to change at Cordoba, a 361 km trip. Likewise, there is no direct rail connection between Huelva and Cadiz, which are only 64 km apart. Connections are made via Seville, with a total distance of 250 km. The Doñana National Park is off boundary for rail as well as for road transportation. Andalusia has an important highway and road network (24 000 km in 2007, amounting to 14% of the national network). The main connection with the national system is in the Province of Jaen, with links to Cordoba, Seville and Cadiz. The main longitudinal communication axis in the region connects Seville with Almeria, through Malaga (Antequera) and Granada, while another road, along the Mediterranean coast links Almeria with Algeciras. It is in the Western part of Andalusia, between Huelva and Cadiz that road coverage is less adequate because of the Doñana National Park that does not allow for a direct road link between the two cities. At the provincial level, all municipalities are linked via the provincial, regional and national road networks.

4. High speed trains (over 250 km/h) mean that the journey from Seville to Madrid now only takes a little more than 2 hours and 25 minutes and these insure rapid services between Seville, Cordoba and Malaga, the latter cities also directly linked to the national capital by this network.

5. Six airports connect the region to different cities in Spain and Europe, with a few non-European destinations from certain airports. However, there are no direct air links within the region, except for a line between Seville and Almeria opened at the end of 2009. At the national level, besides the major links between Seville or Malaga and the rest of the country and Europe, there are also direct flights for shorter distances from cities such as Almeria.

6. The region's extensive coastline offers over 50 different harbours: 15 are devoted to commercial activities, 28 to fishing and 45 to leisure, including Malaga; a major port of call for cruise ships. All generate high levels of commercial and tourism activities, but commercial fishing has diminished because of the drop in resources and EU fishing quota policy. The port of Algeciras is of particular importance, as it is the leading port in Spain, accounting for 20% of the passenger traffic and 15% of the freight traffic in 2007.

7. Total population on 1 January 2009, EU-27 countries, according to Eurostat.

8. EU-27: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

9. EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

10. The construction boom was spurred until recently by the establishment of Spain as a prime location for vacation homes and retirement due to lower prices than many other European countries, the pleasant climate and its many amenities.

11. By province, Malaga is the favourite destination for tourists (31% of the total), followed by Cadiz (15.5%), Seville (14.5%) and Granada (14.4%).

12. The regional development agency, IDEA, maintains a list of municipalities with below average economic activity (up-dated twice a year), based on at least two out of three criteria: unemployment, GDP per capita, number of firms per inhabitant. On this basis, 541 municipalities (out of 770) representing close to 17% of the population and 56% of the regional territory were in this case.

13. Alhambra, Garden of the Generalife and Albaicin in Granada; Cordoba historical centre; Cathedral, Alcazar and Archivo de Indias in Seville; Ubeda and Baeza Renaissance ensembles in the Province of Jaen; various grottos with pre-historic frescoes; Doñana and Sierra Nevada National Parks.

14. The Andalusian aeronautic sector has experienced for the 2001-09 period a turnover growth of 211.3% (EUR 1 046.2 million) and a job creation growth of 131.2% (4 986 new jobs).

15. Post-secondary higher vocational education is seen as a continuation of secondary education and is in process of being integrated into the tertiary education system.

16. Short cycle courses (first cycle) were oriented towards professional skills, with duration of two to three years and leading to the Diploma degree. Second cycle courses led to the Licenciatura and generally last two years. Students could take this type of course once they had gained a first cycle qualification or completed the first cycle of a long cycle course. In the case of long cycle courses (first and second cycle), the completion of the first cycle did not lead to a university or professional qualification. Depending on the type of course, completion of the first and second cycles led to the degree of Licenciatura. The duration of these courses was four to five years. Third cycle courses could be undertaken by holders of a second or long cycle degree and are aimed at specialisation in various scientific, technical and artistic fields, as well as training in research techniques. Following some course work students obtained an accreditation certificate for advanced education, after which they could submit a doctoral thesis or an original research subject to obtain the academic title of Doctor.

17. Spain's tertiary education system is affected by a dual process of Europeanisation and internationalisation. Spain is building a European approach to higher education through: *i)* the adoption of a common framework of readable and comparable degrees, including the implementation of the Diploma Supplement, *ii)* the introduction of undergraduate and postgraduate levels, with first degrees not shorter than three years and relevant to the labour market, *iii)* ECTS-compatible credit systems also covering lifelong learning activities, *iv)* a European dimension in quality assurance, with comparable criteria and methods, *v)* the elimination of obstacles to the free mobility of students and university staff and *vi)* the promotion of the European dimension in higher education, with regard to curricular development, inter-institutional co-operation, mobility schemes and integrated programmes of study, training and research. Spain has applied the various phases of the Bologna Process and adapted the country's regulations to the specifications of the European Higher Education Area (EHEA). New regulations are in force on the use of the credit system (2003), on the Diploma Supplement to be issued by universities (2003), on recognition and accreditation of degree courses and qualifications (2004), on the organisation of university education and the regulation of graduate and postgraduate study (2005), on a tripartite tertiary education structure: First degree, Masters degree, and Doctorate (2007). Universities are responsible for the design and planning of studies in accord with their resources and interests. It is expected that universities will become more specialised and more aligned

with the needs and demands of the economy and society. The new courses/career plans have been evaluated by ANECA prior to their being applied. The degrees need to be evaluated every six years in order to renew accreditation of their quality. The three tier structure and the use of European credits will allow the universities to offer new degrees and which will be comparable to those of the other countries of the EHEA.

18. Until late 2007, the Spanish government was responsible for establishing the guidelines and conditions for granting of official degrees. To be able to provide official instruction and issue the appropriate title, the university had to have the authorisation of the autonomous region and study plans that are in accordance with the guidelines and set out by the government. In late 2007, the official catalogue of university titles had 140 different official degrees (titulaciones oficiales) registered at the undergraduate level: 60 short cycle, 56 long cycle and 24 second cycle, distributed in five branches of teaching: Humanities, Experimental Sciences, Technology (Engineering), Health Sciences, and Social Sciences and Law. However, not all the autonomous communities and universities offer the same official degrees.

19. For a presentation of the evolution of the system since 1975 see: Mora, J.G. (2007), "Two Decades of Change in Spanish Universities: Learning the Hard Way", in Å. Gornitzka, M. Kogan and A. Amaral (eds.), Reform and Change in Higher Education – Analysing Policy Implementation, Springer, Dordrecht.

20. Mission ensured by ANECA (Agencia Nacional de Evaluación de la Calidad y Acreditación) and the regional Accreditation and Quality Control Agencies, such as AGAE in Andalusia. The agency, since the latest university reform law (2007) is also in charge of examining ex ante new study programmes proposed by universities.

21. This body plays an important role as it also approves the university budget and its pluri-annual programming as proposed by the governing council.

22. There is no private university in the region.

23. The universities that did not go further than pre-selection in the first round were allowed to re-submit in 2010. During the first call, funding was available to both selected and pre-selected projects (over EUR 190 000 in the first case and EUR 30 000-90 000 in the second). The total national programme budget was of EUR 53 million for subsidies and EUR 150 million disbursed as loans.

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Chapter 2: Human capital development

This chapter examines how effectively universities in Andalusia contribute to meeting the social and economic needs of the population in terms of opportunities to study and relevance of the skills and competencies offered. It identifies the main strengths and areas for improvement of the regional higher education system. The chapter closes with a series of recommendations on how to improve the effectiveness of the higher education system in order to increase the role of the Andalusian universities in regional development.

Significant progress has been made in improving geographical access to higher education through establishing universities in each province in Andalusia. But there is a need for stronger collaboration between regional government, universities and other tertiary education institutions and schools to improve preparation for tertiary education, and to address the quality and equity gaps and the needs of the migrant population. Greater efforts are needed to widen access to tertiary education and ensure that the first generation students complete their studies and learn the skills and competencies required in the knowledge-based economy.

Unemployment levels among the young, including university graduates, are alarmingly high and the current economic crisis is exacerbating the situation. Universities in Andalusia need to strengthen the learning outcomes and entrepreneurial attitudes among their students and focus on improving the quality and relevance of their educational programmes so that they are better aligned with regional needs. Joint efforts are needed in lifelong learning activities and re-skilling and up-skilling the population.

Introduction

Universities and other tertiary education institutions can contribute to the human capital development in their regions basically in four different ways by: *i*) widening access to and success in tertiary education of the existing youth and adult population of the region, *ii*) attracting talent to the region, including students and highly qualified faculty and researchers, *iii*) producing graduates with knowledge/skills relevant to the region's economy and *iv*) contributing to developing an economy that will employ graduates and retain and attract educated population. Human capital is critical to regional development also because individuals with higher level skills are more productive. Furthermore, individual workers are more productive in regions where their peers have high levels of educational attainment.

In this context, this chapter examines the following three dimensions to assess the effectiveness and coherence of human capital development policies in Andalusia:

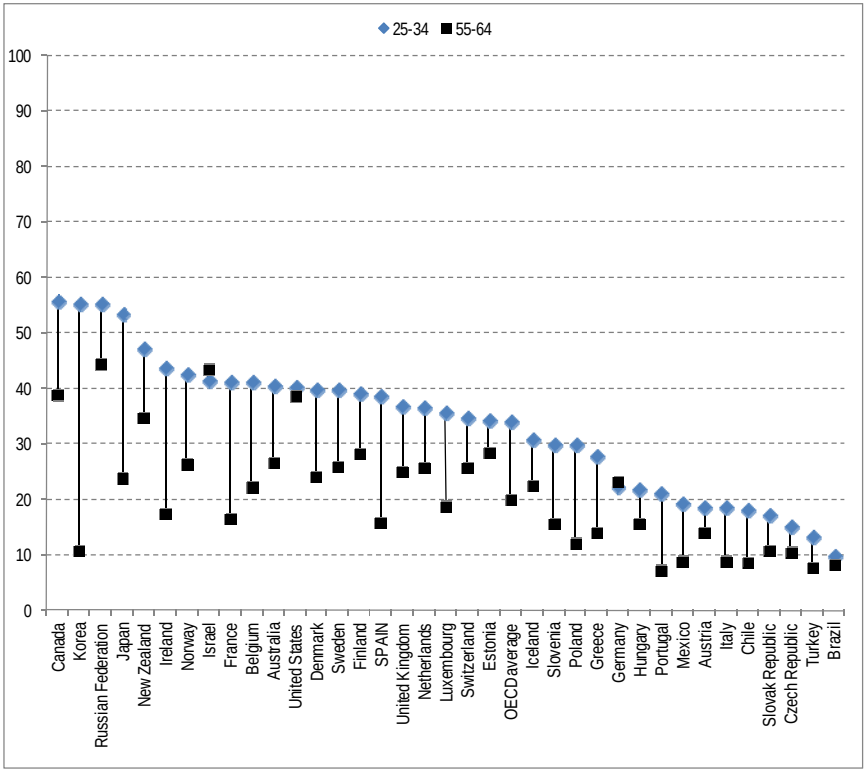
- Do the existing tertiary education providers offer adequate learning and training opportunities to the local population in terms of age, gender, and socio-economic and ethnic backgrounds?
- Are existing universities and programmes adequately aligned with the skill needs of the local economy and do they support entrepreneurship in the region? Is full advantage taken of the Bologna process to improve learning outcomes and employability?
- Is tertiary education in Andalusia co-ordinated and governed in an appropriate way for the needs of the region?
- What lessons can be learned from international experience?

2.1 Key features of tertiary education

The OECD data (*Education at a Glance*, 2010a) show that in Spain, the proportion of people aged 25 to 34 that have attained tertiary qualifications is more than twice the number in the 55 to 64-year-olds cohort (39% and 16% in Spain compared to 35% and 20% of the OECD average respectively). The proportion of people attaining tertiary education has increased substantially and was, in 2008, somewhat above the OECD average for younger age groups (see Figure 2.1.).

Figure 2.1. Population that has attained at least tertiary education (2008)

Percentage, by age group



Note 1: Countries are ranked in descending order of the percentage of 25-34 year-olds who have attained at least tertiary education. The year of reference for Chile is 2002 and for the Russian Federation is 2004.

Note 2: For technical reasons, these figures use Israel's official statistics, which include data relating to the Golan Heights, East Jerusalem and Israeli settlements in the West Bank.

Source: OECD (2010a), *Education at a Glance*, OECD, Paris.

StatLink: http://dx.doi.org/10.1787/888932310092

Spanish tertiary education system has experienced a significant growth and transformation over last 20-25 years. In Andalusia, five new public universities have been established since 1990. The universities of Huelva, Jaen and Almeria were established in provincial capitals in 1993, followed by International University of Andalusia (UNIA) in 1994, today operating in four different cities, and the University Pablo de Olavide in 1996 which is

located in Seville. The Andalusian University system is a public system: there are currently no private universities.

The geographical extension of universities across Andalusia has improved access to higher education.[1] Today, each of the eight provinces is a home to a university. The establishment of universities in the more remote and smaller provinces was a response to social demand supported by local authorities and these institutions remain more strongly aligned with the needs of their local.

As elsewhere in Spain, the 18 years-old age cohort has decreased in Andalusia resulting in the reduction of the number of university students. In absolute terms, the number of first year university students dropped from 230 512 in 1998 to 226 772 students in 2008. The demand for university education in Andalusia between 1998 and 2007 measured as the percentage of first year students of the cohort entering universities remained stable at around 38% among the 18 years-old cohort age. However, due to the economic crisis, there is an increasing demand for university education: in 2009, the total student numbers in Andalusia increased by 5 000. In 2010, a further significant increase in enrolments in both Spanish and Andalusian universities have been reported.

The OECD analysis shows that one fifth of the population in Spain aged between 15-19 years are not in education, the eighth highest proportion in the OECD (OECD, 2008a). Furthermore, a significant proportion of the 16-24 age cohort remains outside education and training (see Table 2.2.). This presents a challenging environment in which the widening participation agenda needs to feature more highly on the education and policy agenda in Spain and in Andalusia.

Table 2.2. Education participation/non-participation rates, % of 16-24 yrs (2008)

Participation/non-participation	%
Tertiary 5A (universities)	43
Tertiary 5B (higher vocational schools + specialist Institutions)	21*
Outside of education system/unemployed	36**

Source: OECD (2008a) Technical Note for Education at a Glance. Paris.

* According to the Thematic Review of Tertiary Education in Spain (Santiago *et al., 2009) v*ocational higher education sector enrol 13% of the age cohort, p52.

**OECD (2010a) *Education at a Glance*, Table C3.3. p. 352 shows a significantly smaller number of the 16-24yr cohort outside of education/unemployed; at 6.5% it is below both the EU and OECD average.

While the expenditure per student in public tertiary education in Spain is EUR 11 138 (OECD, 2010a), it varies significantly across Spanish regions with Andalusia at the low end. This is a challenge for the central government which has the task to guarantee equality of opportunities and treatment in tertiary education across autonomous regions.

Spain's unemployment rate has risen steadily from 7.95% in the second quarter of 2007 to 20.09% in the second quarter of 2010 as the global financial crisis hastened the collapse of a labour-intensive property boom that had fuelled growth for over a decade. In Andalusia, the unemployment rates have been persistently higher than in the rest of Spain, a situation which has exacerbated with the current economic crisis with an unemployment rate of 27.78% in the second quarter of 2010[2]. Since the onset of the current economic crises the youth unemployment is running at 40%. The unemployment rates of university graduates are also at a high level. The transformation of Spanish and Andalusian economic model can only happen if the education system adequately trains the work force and the economy is able to absorb this work force. This will require long-term improvements at all levels of education in terms of retention and learning outcomes, stronger alignments of educational programmes with the labour market needs and investments in knowledge-based economy.

The University system in Andalusia demonstrates a degree of inefficiency. In 2006, the total number of university students was 223 501 whereas the total number of graduates was 29 776, only 13% of the total number of students.[3] The drop-out rate is estimated at 30% of students in Spanish and Andalusian universities and students are also taking longer to complete their degrees. "Equity in progress" therefore remains a challenge. Most of the drop-outs, that are particularly high in engineering and architecture, but low in health sciences, take place during the first year of studies. A significant proportion of university graduates in Andalusia are over the age of 30 (25.4% of the university graduates in engineering).[4] The long duration of studies results in high costs to the society, late entry to the labour market and a low level of efficiency of the university system. It is in the public interest that the authorities will take steps to ensure that the current educational reform will change this tendency. There appears to be poor tracking of student progression and achievement as well as graduate employment outcomes.

A significant number of students work while studying, because of poor student support. The OECD noted (Santiago *et al.* 2009) that provision of financial assistance is essential to provide needy students with the means of entering and staying in higher education. It is also the basis of ensuring that the education system expands and diversifies. The current economic circumstances mean that the government is more than ever required to

provide support to students who might, in better economic times, have been able to work while studying. The national government should consider new forms of cost sharing, through means-tested scholarships, income contingent loans or other funding packages to complement the existing grants and loans system. The issue of affordability has to be taken in the agenda in order not to price higher education attainment beyond the reach of most students.

2.2 Widening participation

In Spain, about 40% of tertiary education students come from families where the father has a blue-collar occupation, revealing a degree of inter-generational social mobility (OECD 2008b). However, although student enrolments have increased since 2000, with the greatest expansion at ISCED 5B vocational education, participation remains related to socio-economic background.

Policy attention in Spain has focused on the "expansion of overall access rather than the question of differences in participation rates among groups of students by socio-economic background, region of residence, cultural background or disability" (Santiago et al., 2009). This differential follows through into labour force, with "the proportion of the working population with tertiary–type A or advanced research qualification who are in skilled jobs (78%) [being]… quite low compared to other OECD countries" (OECD, 2008a).

Part of the challenges in tertiary education and economic development in Spain and Andalusia are linked to the problems in the pre-university education system which features high drop-out rates (35% male and 20% female students finished their 16 year without a secondary studies degree) and poor learning outcomes. Nearly one in three Spaniards between the ages of 18 and 24 have not completed high school and are not enrolled in education or training, which represents more than double the EU average (EU-27). Those in school perform poorly in international testing. Fewer than one in 20 of Spain's 15-year-olds reach the top levels of science proficiency. Only 1.5% of 15-year-olds in Spain reach the top performers for reading, the lowest percentage in the OECD countries apart from Mexico. Among ten Spanish regions, Andalusia has the lowest scores in science, reading and mathematics Catalonia holding the second lowest scores.

In Andalusia, a significant proportion of population has only primary studies. Before the economic crisis, the services and construction sectors absorbed large numbers of low-skilled population. The rewards for tertiary education remained relatively low in Spain compared to the OECD average

and there was a marginal decrease in the earnings premia for university graduates over the past ten years. [5]

National authorities have adopted a range of measures to overcome the failures of pre-university education, including a scholarship scheme for school dropouts, a permanent teacher training programme and the development of a more attractive and labour market-oriented vocational education. However, due to the economic crisis, urgent measures are required to reduce the high number of students who drop out of education and training at the age of 16. Educational reform in secondary education is necessary to improve learning outcomes, to improve the preparation of teachers in schools and to establish programmes to ensure that all primary and secondary school students, and their families, get the information they need to prepare for tertiary education.

Overcoming quality and equity gaps in secondary education schools is not the direct responsibility of tertiary education sector, but universities and vocational higher education institutions can support this change. The primary responsibility lies with school authorities at the national and regional level who will need to address the challenges in a comprehensive way and mobilise appropriate levels of financial resources to support education. Universities should, however, actively reach out to local schools to raise aspirations and academic performance of students and to improve the quality of teaching. In Andalusia, there was limited evidence of long-term institution-wide or system-wide collaboration between schools and universities.

The interviews during the OECD review visit to Andalusia (January 2010) revealed limited recognition or understanding of the complex set of human capital development issues, such access, participation and educational attainment, or equity and social inclusion. In many instances, there appeared to be a perception that equity issues in education have been "solved". This has resulted in the lack of robust data about equity issues. There is also a lack of awareness as to how the current global financial crisis was/could impact on young people and prospective students or graduates and employability. At the regional government level, the separation of the regional ministries in charge of universities and other tertiary education and workforce development may enforce this perception.

Widening access in Australia

A comprehensive approach to widening access to education is provided by Victoria University in Australia, whose catchment area is one of the fastest growing but poorest areas of Melbourne. The university serves a student population with a higher than average representation of students

from low socio-economic and non-English speaking backgrounds. Victoria University's work demonstrates a strong commitment to collaboration across sectors. It involves both school and community partners in designing and delivering interventions to increase their relevance to particular contexts. It builds relationships between school students and mentors, such as university students or prominent community figures. It constitutes early, long-term and sustained interventions. Some projects take a cohort-based approach to changing student attitudes and peer culture in relation to education in order to improve achievement and aspirations for future education and employment (OECD, 2010b) (see Box 2.1.)

Box 2.1. Victoria University's Access and Success programme

Victoria University provides both higher education and technical and further education. It has over 50 000 local and international students enrolled at campuses across the city-centre and western suburbs of Melbourne which experience below average educational outcomes. The Access and Success programme works with schools in the west of Melbourne to improve access to, and successful participation in post-compulsory education. It has established collaborative teaching and research partnerships with schools and has implemented programmes across more than 70 different sites. .

It comprises different "arms", which involve university staff and students working in schools (Learning Enrichment), professional development of teachers via participation in post-graduate education (Teacher Leadership), working with senior secondary students to support their aspirations and provide information on pathways to tertiary education and employment (Youth Access), enhancing students' educational engagement through school-based programmes with community partners (Schools Plus) and developing and disseminating research (Access and Success Research).

"Learning Enrichment" involves learning teams of school and university staff and students. Continuous university presence in schools improves student achievement and raises aspirations. Pre-service teachers work with in-service teachers and university researchers to design action research projects that investigate student disengagement and participate as literacy mentors in a whole-school literacy intervention, while also researching the impacts of this intervention on school staff. "Teacher Leadership" aims to engage teachers and principals in professional learning that increases teaching capacity in the schools. This has involved delivering professional development that articulates with the university graduate certificate or masters of education programmes. Research partnerships are based on participatory methodologies, which give teachers and principals control over the research agenda in their schools.

Box 2.1. Victoria University's Access and Success programme (continued)

Schools Plus builds school-community connections and increases the engagement of students and families with education and community life. The Kinda Kinder programme (launched in 2005) seeks to address low levels of pre-school participation by engaging with parents and children. Children attend once a week with a parent or a caregiver for one hour free programme in public libraries, other community settings and schools. Pre-service early childhood teachers provide education through storytelling and other play activities, while supporting parents to develop social networks and familiarisation with formal education and community services. In 2009 Kinda Kinder operated in 19 sites across the western region of Melbourne. A new generation of adult learners including parents and grandparents are learning along with the children, the pre-service teachers and university staff in the Kinda Kinder setting. Kinda College is being developed in conjunction with the vocational higher education part of the university and will offer parents the opportunity to gain further education accreditation for the skills they develop. A range of quantitative and qualitative research methodologies is used to evaluate and inform collaborations with school and community partners and to track the impact of the projects. This investment in research and the emphasis on building of community capacity through cross-sector and cross-agency partnerships has increased the reach and sustainability of the project.

Source: Sellar, S., et al. (2010), Interventions Early in School as a means to Improve Higher Education Outcomes for Disadvantaged (Particularly Low SES) Students: Case Studies of Selected Australian University Outreach Activities, Department of Education, Employment and Workplace Relations, Canberra. OECD (2010b), Higher education in Regional and City Development. State of Victoria, Australia, OECD, Paris

2.3 Migrants, international students and talent attraction

Andalusia, like the rest of Spain has a drop in birth rates that is partly compensated in demographic terms by immigration. This immigration contributes to a population growth in Andalusia (+1 255 639 between 1988 and 2008). The net contribution of immigration to population growth during the last ten years approaches 600 000 inhabitants. 23% of foreign population come from Africa, 19% from South America and 15% for the EU-15. The majority of immigrants are established in coastal areas, either as retirees coming mostly from EU countries (in Malaga in particular) or as agricultural workers, mostly from Africa, more specifically from Morocco (largely in Almeria) (see Table 2.3). Immigrants in the 25-64 year-olds segment are largely employed in agriculture, many in the unofficial economy.

There are challenges associated with a significant portion of the population coming from countries with relatively low levels of human capital development. Because family and socio-economic background are key indicators of education attainment, the children of the migrant families may become segregated in public schools "*where it is difficult to provide quality schooling in an environment where many pupils do not know the official language or languages*" (Calero, 2005).

Table 2.3. Immigrants by country of origin and by destination province in Andalusia in 2008

Country of origin/province	Almeria	Cadiz	Cordoba	Granada	Huelva	Jaen	Malaga	Seville	Total
Africa	8 766	826	752	1 672	989	588	3 986	1887	19466
Central America	132	226	142	187	71	44	469	631	1 902
North America	54	216	32	111	19	16	306	225	979
South America	1 839	985	882	1 614	509	418	5 770	3 947	15 964
Asia	219	152	108	269	86	75	1 139	513	2 561
Europe (EU-15)	2 346	834	204	1 035	596	160	8 031	928	14 134
Europe (rest)	3 810	431	1 004	1 121	1 307	242	2 923	1 620	12 458
Oceania	2	6	0	5	3	0	18	8	42
Unknown origin	3 058	1 798	566	928	1 691	1 460	4 659	1 852	17 012
Total	20 226	5 474	3 690	7 942	5 271	3 003	27 301	11 611	84 518

Source: Laurent, Periáñez and Petit, (2010), "Andalusia, Spain: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE, OECD, Paris. www.oecd.org/dataoecd/32/27/44666367.pdf

No robust data were available about the education participation levels among the new immigrant community either at the regional or institutional level or their training needs and there appears to a need to strengthen the knowledge base about overall training needs and access to higher education. Useful analysis in this area could be carried out with the contribution of all universities to help develop region-wide programmes to raise aspirations among immigrant children. Some promising steps to this direction have already been taken. For example, the University of Almeria, supported by its Mediterranean Foundation (*Fundación Mediterranea*) and the social council, has designed a small scale programme "Join us in your university" programme *(Programa ÚNETE a tu universidad*) to raise aspirations among

secondary school students with migrant backgrounds through close links with the local schools and facilitate retention at university (see Box 2.2.).

Box 2.2. University of Almeria's "Join us in your university" programme

The Province of Almeria has the second largest number of immigrants (116 214 people in 2007) in Andalusia, after Malaga (219 955). However, in 2007, less than 2% of the total number of university students in Almeria came from migrant families.

In 2006-07, the social council of the university sponsored a research on "Young migrants and their access to universities" to map and identify the key constrains that young migrants face in accessing higher education. In 2008, based on the results of this study, the university launched a programme entitled "Join us in your university" (*Programe ÚNETE a tu universidad)* with the help of the university's Social Anthropology and Cultural Laboratory. The project aims to facilitate the access of migrants to the university. It involves close collaboration between the university and local secondary schools. University and school staff provide information to migrant students and their families about access to higher education, availability of financial support and advice how to apply for them. The programme also offers support and tailored services to families with special needs.

By 2010, almost 100 students with migrant backgrounds had benefited from this project. Their progress in university study is closely monitored. Students also benefit from personalised social and academic support.

Source: University of Almeria, Programa "ÚNETE a tu Universidad": *www.ual.es/unete*

National and international student mobility

Student mobility in Spain is generally at a low level and Andalusia is not an exception to this (Santiago *et al*., 2009). 7.2% of students have their family residence outside the region. Taking into account the percentage of students with their family residence in Andalusia but who are studying elsewhere (6.6%), Andalusia has attracted a small "surplus" of students (0.6%), placing it in the fourth place in Spain, in terms of power of attraction, behind Madrid, Catalonia, Navarre and Castile-Leon (Laurent, Periáñez and Petit, 2010).

At the same time, the Spanish university system is characterised by very low percentages of foreign students in undergraduate courses (2.3%), while

foreign students in postgraduate and PhD programmes are ten times higher, mainly drawing students from Latin American countries (respectively 22.7% and 21.9%).

While international student mobility remains in international comparison low and the knowledge of foreign languages among Andalusian students is often poor, Andalusia is the leading Spanish region in terms of the number of incoming ERASMUS students and the second after Madrid in terms of outgoing students (see Table 2.4.) The total number of undergraduate foreign students in Andalusia amounted to 5 000 (Africa 49.7%, South America 20.9% and EU-15 15.7%). For 2009-10, figures show an increase in foreign students enrolled in Andalusian universities, going up to 5 910, representing approximately 2.56% of the total number of students, particularly in University of Malaga (4.6% of total students enrolment in the university) and University of Granada (3.3%). By comparison, the total number of foreign students enrolled in Spanish universities in 2007-08 was a little over 84 000 (MICINN, 2009).

Table 2.4. Foreign and Erasmus students in Spain

2007-08 academic year	Students	% of total	Total
Foreign graduate students	32 138	2.30	1 389 394
Outgoing Erasmus students	23 107	1.66	1 389 394
Incoming Erasmus students*	27 464	1.97	1 389 394
Foreign postgraduate students*	7 496	22.70	33 021
Foreign PhD students	16 996	21.90	77 654

Source: Laurent, Periáñez and Petit, (2010), "Andalusia, Spain: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE, OECD, Paris. www.oecd.org/dataoecd/32/27/44666367.pdf

The number of international students is increasing in Andalusia. In 2008-09, the total number of foreign undergraduate students was over 5 000 students in Andalusia. Most of the non-Spanish undergraduate students came from Africa (49.7%), South America (20.9%) and EU-15 (15.7%) (see Table 2.5. and Table 2.6.). In 2009-10, the number of foreign students increased to 5 859, which represented approximately 2.5% of the total number of students in the Andalusian University System. The biggest receivers of foreign students were the University of Malaga (4.8%) and the University of Granada (3.3%). For 2010-11, it is estimated that there are 6 158 international students making up 2.6% of the Andalusian student population with the universities of Malaga and Granada again leading (4.8% and 3.2% of their total student enrolment respectively).

Table 2.5. Students registered by nationality and university (undergraduate) in Andalusia 2008-09

Nationality/ University	Almeria	Cadiz	Cordoba	Granada	Huelva	Jaen	Malaga	P. Olavide	Sevilla	Andalusia (Total)
Spain	10 915	19 051	15 200	51 338	10 089	14 811	30 708	9 022	56 147	**217 281**
África	35	94	62	974	44	92	575	15	630	**2 521**
Central America	3	7	4	22	3	1	14	1	15	**70**
North America	2	8	4	75	2	4	12	5	22	**134**
South America	61	65	49	183	31	35	255	12	171	**862**
Asia	1	11	8	34	3	21	77	2	30	**187**
Oceanía	-	-	-	4	-	-	3	-	1	**8**
European Union	53	79	39	419	24	11	324	22	166	**1 137**
Rest of Europe	88	15	14	125	35	18	113	13	47	**468**
Unknown	-	-	-	-	-	-	-	-	4	**4**
TOTAL	**11 158**	**19 330**	**15 380**	**53 174**	**10 231**	**14 993**	**32 081**	**9 092**	**57 233**	**222 672**

Source: Ministry of Economy, Innovation and Science. Government of Andalusia. Data from 2008-09 academic year.

Table 2.6. Students registered by nationality and university (postgraduate) in Andalusia 2008-09

Nationality/ University	Almeria	Cadiz	Cordoba	Granada	Huelva	Jaen	Malaga	P. Olavide	Seville	Andalusia (Total)
Spain	497	760	1 363	2 089	344	291	785	66	2 262	**8 457**
África	13	24	20	87	3	2	22	2	30	**203**
Central America	6	5	14	167	1	-	3	-	9	**205**
North America	22	3	31	110	7	4	6	31	44	**258**
South America	27	29	200	286	14	2	38	9	147	**752**
Asia	2	-	4	126	-	4	1	-	16	**153**
European Union	10	54	17	129	48	3	11	-	85	**357**
Rest of Europe	4	1	5	34	3	-	5	-	3	**55**
Unknown	2	3	2	1	-	-	1	-	-	**9**
TOTAL	**583**	**879**	**1 656**	**3 029**	**420**	**306**	**872**	**108**	**2 596**	**10 449**

Source: Ministry of Economy, Innovation and Science. Government of Andalusia. Year 2008-09 Data from 2006-2007 academic year.

There is under-utilised potential for on-campus internationalisation in Andalusian universities, for example through stronger integration of international students in the academic and student life and language learning efforts. There is also a lack of initiatives to link international students with

the employers in Andalusia or to mobilise them as ambassadors for Andalusia. Promising steps have been taken by the University of Granada that has profiled itself as the leading Spanish university in international student mobility. Its international activities include not only mobility, but also projects that link with local employers and permanent presence in Couta and Melilla in North Africa. Poor language competencies have a negative impact on regional development in Andalusia and the internationalisation of local businesses. The University of Granada has a strategy to improve the language competencies of students, graduates and teaching and administrative staff. Furthermore, it actively participates in language learning efforts sponsored by the Regional Government of Andalusia. (see Box 2.3.).

Box 2.3. University of Granada and focus on internationalisation

The University of Granada is the leading university at Spanish and European level in student mobility, in terms of both incoming and outgoing students. In Spain, it also the leading university in terms of number of students in international work placements (57), financed by the Erasmus Programme. It is a founding member of the Coimbra Group of universities which pride themselves of their historical strong impact on locally and regional development.

Outgoing student mobility is considered important for students, as it provides them capacity-building opportunity to acquire language, intercultural and interpersonal competencies as well as initiative and personal autonomy. The strong international activity has contributed to the University of Granada having the highest percentage of any university in Spain of graduates working abroad: 3.6% of graduates (in 2006). Incoming mobility is seen as vital for the internationalisation of the university impacting the entire institution. International students are integrated in the university and also local activities, such as voluntary work programmes organised by the Science Museum and the Development Co-operation Centre (Cicode). During the welcome week at the beginning of each semester for all incoming international students, they are appointed as "Ambassadors of Granada" by the City Mayor, recognising the importance the impact of their stay in Granada may have for the image of the city in their institutions, cities and countries of origin.

The University of Granada participates in 40 European projects on different programmes. It runs four Erasmus Mundus Master's programmes that have regional impact, for example EuroPublicHealth, which is co-ordinated jointly by the university and the Andalusian School for Public Health, a regional institution devoted to continuing training programme for health professionals and administrators.

Box 2.3. University of Granada and focus on internationalisation (continued)

Two projects with Latin America involve local and regional stakeholders and have potential for business development. The GERM project aims to compare university-business links and knowledge transfer in Europe and Latin America, identify good practice and finally strengthen these links. It involves local companies and Chambers of Commerce in the participating countries. The VertebrALCUE Project (Alfa III 2008-11) aims to contribute to the development of regional integration of Latin American Higher Education Systems and the implementation of the EU-LAC Common Area of Higher Education by exploring and strengthening academic co-operation through the design and implementation of liaison structures and supporting closer co-operation among universities, enterprises, local government and society, thus contributing to local development and social cohesion.

The university has also pioneered initiatives related to language learning. It participates in the Plurilingualism Plan of the Regional Government of Andalusia which has introduced bilingual streams in an increasing number of primary and secondary schools in the region over the past ten years. The university sends both final year language students and international students to local schools in Granada and also smaller towns. The university has also developed a syllabus and pilot scheme for the teaching of Arabic as a foreign language in secondary schools in co-operation with the Regional Ministry for Education. The scheme, currently piloted in four schools in Andalusia, is of interest both to the large Arabic-speaking immigrant community and to other students interested in widening their language options. Finally, the Confucius Institute was opened by the university in co-operation with the University of Beijing and Hanban, the Chinese language institute, in 2008. Apart from offering numerous classes and other cultural activities to the population of Granada in general, this institute is about to set up classes in Motril, on the coast of the province and possibly also in other towns in the province. Initial contact has been made with the regional ministry to study the possibility of setting up a pilot scheme similar to that for Arabic for Chinese.

Talentia programme

The authorities in the Regional Government of Andalusia are aware of the need for targeted efforts to build capacity in internationalisation. The government has for example launched a programme called Talentia to train globally-minded talent for the region. While commendable in its own right, the programme fails to nurture and draw on the skills and competencies of the current migrant population in the region. Furthermore, to ensure return on public investment, the programme would benefit from closer alignment with the regional development needs. This could be achieved for example through facilitated networking between employers in the public and private

sector and Talentia grant holders to help them direct their research projects and contacts with the grant holders before, during and after the foreign stay. The recently established association for Talentia students, which is sponsored by the regional government, aims to strengthen regional, national and international networks and promote entrepreneurship. It could also provide useful ideas on how to improve Talentia in future (see Box 2.5.).

Box 2.4. Talentia Grant Programme

In 2007, the Regional Government of Andalusia launched the Talentia Grants Programme to improve the quality of the human capital through international experience. Talentia Grants provide a generous sponsorship for young Andalusian university graduates to carry out postgraduate studies in universities outside of Spain, on condition that they will return to Andalusia after the completion of their studies. The grants cover tuition fees, which depending on the university can be very high, living costs, travel and insurance costs.

The grants are targeted at the Andalusian graduates or EU graduates from Andalusian universities who will contribute to the future development of Andalusia by having a professional career with an international experience. Since its inception in 2007, and until end August 2010, around 500 young Andalusians have benefited from the programme. The Regional Government of Andalusia seeks to promote a generation of bilingual Andalusians with higher education degrees and top-level international training in different areas of the knowledge society.

In January 2010, five Talentia awardees founded the Association of Talentia Grant Holders (Asociación de Becarios Talentia). The aim of the association is to strengthen the professional connections among awardees, support their career development and foster their contribution to the growth and competitivity of Andalusía's economy. Over 100 Talentia awardees have joined the association aThe Regional Government of Andalusía supports the association.

Source: TALENTIA Fellowship Program, *www.becastalentia.es,* TALENTIA Student Association, *www.asociaciontalentia.es*

Mobilising and attracting foreign talent

The existing diverse migrant community in Andalusia includes a highly qualified segment of immigrant retirees that represents “inactive human capital” whose competencies could be mobilised on a voluntary basis to

contribute to teaching (for instance language training), research and entrepreneurship education and Andalusia's export efforts, for example through collaboration with the Trade Promotion Agency in Andalusia (EXTENDA). This agency has a network of 21 promotion offices in 19 countries, 5 of which are also business centres.

There is no effective joint marketing for the Andalusian University System, for example in the form of a joint website that would attract talent or FDI to the region. The Andalusian University System has no corporate image or logo as in most cases universities want to have ten different logos featured side by side. A stronger corporate response would enhance the visibility and impact of the Andalusian University System. In this respect, Andalusia's universities would benefit from the highly visibly university collaboration in Catalonia.

In 2008, the Regional Government of Andalusia launched a talent attraction programme called "Knowledge Attraction to Andalusia" (*Captación del Conocimiento para Andalucía*). The programme has had a slow start possibly due to limited marketing; since its launch, the regional government has signed contracts with three internationally renowned researchers in the fields of biology, health and technology. These researchers will be based in the Doñana Biological Research Station, a Spanish national research centre (belonging to CSIC), a health-related foundation (*Fundación Progreso y Salud*) and the National Centre of Accelerators of the University of Seville. Given the limitations in the entrepreneurial mindset among university students and graduates, Andalusia could gear this programme to target talent who has a proven track record in spinning knowledge-based companies or creating long-term university-industry linkages and university-SME collaboration.

The ICREA programme provides an example for talent attraction that has helped to build the biotech research capacity in Catalonia and has been emulated in many other regions. It has been successful in building knowledge generation capacity in the region to gain competitive national and EU research funding (see Box 2.5.).

Box 2.5. The Catalan Institution for Research and Advanced Studies (ICREA)

Catalonia is focused on recruiting international talent to fuel its knowledge and innovation intensive strategy. The strategy is most visible in the number of science parks that have been developed throughout the region, attached to universities or as part of a broader industry/city/university consortium.

The Catalan Institution for Research and Advanced Studies (ICREA) is a dedicated head-hunting and recruitment agency to identify high quality people to come to work in Catalonia – whether of Catalan/Spanish origin or not. Established in 2001 to recruit top scientists for the Catalan R&D system in order to boost Catalonia's competitive position Successful candidates must be capable of leading new research groups, strengthening existing groups, and setting new lines of research on the right track. The programme brings to the Catalan innovation system top researchers who play an active role in the university in terms of research and teaching (either direct classes or at a minimum oversight of student research).

ICREA has hired a total of 249 researchers in different areas of research: 31% in life and medical sciences, 28% in experimental sciences and mathematics, 11% in social sciences, 15% in humanities and 15% in technology. ICREA researchers have collectively attracted more than their costs in research funds from outside the region. They have higher average publication rates than researchers in the region generally. ICREA researchers have also applied for 42 patents since 2004 and launched three start-up firms.

Unlike similar schemes in other countries, the positions are for permanent full-time positions funded from the public purse. In addition to the region attracting highly-skilled talent and investment, ICREA scholars have a responsibility to develop human capital potential through education and training. There is a strong correlation between ICREA scholars and successful European Research Council grants. ICREA is a foundation supported by the Catalan Government and guided by a Board of Trustees.

Source: OECD (2010c), Higher Education in Regional and City Development. Catalonia, Spain, *www.icrea.cat/web/home.aspx.*

International experiences in integrating immigrants: Sweden

Integrating immigrants into education and labour market systems and attracting talent to the region remain challenges in Andalusia. International experience in integrating migrants – both highly skilled as well as those with low skills – into education and labour market can be found for example in

Sweden, where the City of Malmö is transforming itself into a magnet for talent and investments. The City of Malmö draws on the skills of the immigrant population to sustain its economic transformation into a centre for service, trade and finance-related industries. The strategy is implemented by a partnership that includes the city government, educational institutions, employers and employment services and civil society organisations. In addition to attracting new residents, a "portfolio approach" is employed to record an immigrant's skills and competencies (see Box 2.6. and Box 2.7.).

Box 2.6. City of Malmö

The City of Malmö in Southern Sweden with more than 270 000 inhabitants (2006) has the highest share of foreign-born individuals in the country, with nationals from around 171 countries and 36% of the population with a foreign background. The city government has recognised that the future development depends on the ability to attract investments, firms and finance, production and people. Considerable investments in infrastructure were made during 1995-2005, including a bridge to connect the city with Copenhagen (DK), an underground train system, new up-market residential developments in the harbour and Malmö University.

Malmö has systematically invested in increasing the possibilities of, and access to higher education. Malmö University has made efforts to attract highly-skilled migrants, who are able to upgrade their education and skills without having to start from zero. Its centre for Widening Participation offers two types of programmes: *i*) Introduction Programme in Swedish with English and Social Sciences" and *ii*) The "Aspirant Education Programme".

"The Introduction Programme in Swedish with English and Social Sciences" is a one-year intensive programme which targets immigrants with a completed foreign secondary education, and a partly or fully completed university education. It offers language training in Swedish and English and introductory courses in social sciences, prepare immigrants for a university education in Sweden. Entry exams are language tests in Swedish and English. The programme takes in 60 students a year. Over the period 2000-06, a total of around 400 students participated in the programme.

Box 2.6. City of Malmö (continued)

"The Aspirant Education Programme" is targeted at foreign-trained academics, with a completed academic degree, who want to work in their field of training or related fields. The tailored six-month study programme includes company internships, project work and career advice. There are three lines of study. The first is a general option which involves refresher courses and contacts with future employers. The second prepares students to work in the Swedish public administration, and the third prepares students to become teachers and trainers. Applicants need to have a resident permit and a completed foreign university degree (at least two years) in one of the areas of study taught at Malmö University. Completion of the introduction programme or possession of equivalent levels of language competences in Swedish and English are a requirement. Over the period 2002-06, this programme received a total of 253 applications, of which 154 were accepted.

Source: Adapted from Bevelander P. and P. Broomé (2009), From Crane to Torso: Local Skill Strategies in the City of Malmö, in OECD (2009b), Designing Local Skills Strategy, OECD Publishing, Paris, pp. 219-238.

2.4 Reaching out to working-age adults

The growing economic necessity to complete some form of higher education in order to participate in the economic and social life at the national, regional and local levels applies equally to working age adults as it does to younger students. Due to rapidly changing skill requirements in working life, lifelong learning, skills upgrading and re-skilling are increasingly important. The importance of skills upgrading is felt most urgently at the local and regional level. Upgrading the skills of the adult population is likely to have a more direct effect on the region's economic performance since adult learners are generally less mobile than younger students due to family commitments. For non-traditional learners, who often combine work and study, and their employers, flexible ways of provision need to be in place through work-based, e-learning and distance education. In addition, attendance on the basis of non-formal and informal learning should be allowed OECD (2007a, 2008b).

Vocational training and education (VET) in Andalusia is supported by the regional government which funds a number of vocational higher education schools offering 110 different degrees and diploma education. Support is given notably to courses in ICT, entrepreneurship, languages, health care and regional heritage. These different courses and validated

curriculum are important in a region like Andalusia to help repair the educational deficit resulting from brain drain, dropouts and low education participation.

In 2007-08 there were 50 590 students enrolled in short cycle vocational training programmes (72.3% in private institutions and 27.6% in public institutions) whereas in long cycle vocational training programmes there were 38 882 students enrolled in long cycle (82.4% in public institutions and 31.3% in private institutions) and 18 014 students enrolled in short cycle (79.6% in public institutions and 20.4% in private institutions). In the same year, 18 014 students completed their short cycle programmes and 12 656 their long cycle programmes (see Table 2.7.).

Table 2.7. Student enrolment and completed studies in vocational training in Andalusia 2007-08

	Enrolled students				Completion rate			
	Short cycle		Long cycle		Short cycle		Long cycle	
	Total students	%	Total students	%	Total students	%	Total students	%
Public	36	72.3	32 035	82.4	12 370	68.7	10 075	79.6
Private	13	27.7	6 913	17.6	5 644	31.3	2 581	20.4
Total	50	100	38 882	100	18 014	100	12 656	100

Source: Statistic Unit, Ministry of Education, Regional Government of Andalusia

The Andalusian University System tends to operate as a self-contained sector, with limited interaction either with vocational higher education institutions or secondary education system. The system creates barriers for students to move across or into the system and for re-training or up-skilling. Like many educational systems in Europe, students enrol on a particular programme and can then find it difficult to transfer to another programme or field of study or institution whatever the reasons for the change of mind. One way of overcoming institutional barriers to educational attainment would be accreditation and recognition of prior learning, whether obtained in the workplace or through other types of learning.

The Spanish government has introduced a series of initiatives for lifelong learning and recognition of non-formal and informal learning, permitting "access to various studies of the educational system without the necessary academic requirements" making it "possible to assess and totally or partially accredit the learning required for various diplomas: general academic diplomas, those for vocational education and training and art education." In 2003, an experimental project for the Assessment, Recognition and Accreditation of Professional Competences (Project ERA)

was developed with funding from the European Social Fund (OECD, 2008b). Despite these initiatives, mobility in the education system remains limited.

In Andalusia, some of the difficulty lies with the individual universities, which interpret accreditation/recognition of prior learning differently. While the recently finalised National Qualifications Framework has aimed to provide a mechanism for accreditation and recognition of prior learning through a flexible system by which learners can take up different learning opportunities at different stages of their life, the lack of recognition of prior learning appears to be more related to the bureaucratic culture in the field of education. Furthermore, the new degree structure limits the number of feasible ECTS credits from prior learning to 15% of the total ECTS credits of the study programme.

International examples of recognition of prior learning

There are many examples of how an accreditation and recognition of prior learning system can operate. One relevant model to Andalusia comes from Sweden were the City of Malmö has created a validation Centre that targets migrants with secondary level foreign education. Another example that embraces also higher education skills is the National Qualifications Authority in Ireland (see Box 2.8.).

Box 2.7. Validation Centre in Malmö

The City of Malmö has established the Validation Centre that helps recognition of prior learning based on foreign formal education and work experience, which are validated against an industrial upper secondary curriculum for different occupations (*e.g.* childcare worker, electrician, industrial mechanic, carpenter, builder, chef, assistant nurse and car mechanic). The validation activity is restricted to secondary level education, whereas the validation of higher education and medical professions can be done only by central state institutions.

The portfolio is a structured, comprehensive summary of work experience, education, training and other merits, facilitating the job search and career planning of the immigrant. It is the key document for job applications and the ba The centre evaluates the individual's general education. The results of the validation of general and core subjects in the secondary and upper-secondary school curriculum provides the individual with suggestions of which further education and training offers are most suitable. Local upper-secondary vocational and technical schools in Malmö collaborate in the evaluation of the acquired work competencies and experiences against the Swedish vocational education curricula in the respective profession. Immigrants receive a "competencies portfolio" that makes their skills and competencies transparent and understandable in the Swedish labour market context.sis for job counselling and further education planning.

The competencies portfolio concept has spread to the entire Skåne county, and is being carried out annually for at least 3 000 immigrants (2007), of which at least half are in Malmö. The validation exercise is an effective approach to recognition of prior formal and informal learning and provides the immigrant, the training institution or the future employer clarity about acquired and needed skills.

Source: Adapted from Bevelander P. and P. Broomé (2009), From Crane to Torso: Local Skill Strategies in the City of Malmö, in OECD (2009b), Designing Local Skills Strategy, OECD, Paris, pp. 219-238

Box 2.8. National Qualifications Agency of Ireland

The National Qualifications Agency of Ireland (NQAI) was established in 2001 to:

- Establish and maintain a framework of qualifications for the development, recognition and award of qualifications based on standards of knowledge, skill or competence to be acquired by learners.
- Establish and promote the maintenance and improvement of the standards of awards of the further and higher education and training sector, other than in the existing universities.
- Promote and facilitate access, transfer and progression throughout the span of education and training provision.

As part of this remit, a National Framework of Qualifications was developed to enable comparison of qualifications, and to ensure that they are quality-assured and recognised in Ireland and other countries. A major objective is to recognise all learning achievements, by supporting the development of alternative pathways to qualifications (or awards) and by promoting the recognition of prior learning. Recognition is a process by which prior learning is given a value. The term "prior learning" is learning that has taken place, but not necessarily been assessed or measured, prior to entering a programme or seeking an award. This may have been acquired through formal, non-formal or informal routes.

Source: National Qualifications Agency of Ireland, http://www.nqai.ie/index.html; Anne Murphy (2010), RPL Matters in the DIT. Policy and Practice Guide for DIT Staff, Dublin Institute of Technology.

Lifelong learning offer in Andalusian University System

All Andalusian universities offer complementary studies – complementary master, expert and specialist diplomas – as well as a wide range of different types of non-degree programmes, such as continuing education, extended university studies, diploma certificates, summer and autumn courses. Complementary studies are often carried out in collaboration of regional or local stakeholders. No robust data is available on the full offer of lifelong learning provision in Andalusia. Table 2.7 shows the enrolment in non-official study programmes in Andalusia in 2008 (9 761), which is third highest in Spain after Catalonia (26 645) and Madrid (15 434). Each university is free to determine the admission requirements, duration, credits and fee levels of their non-degree programmes. There is an

abundance of providers in continuing education, with limited co-ordination resulting in overlapping provision and difficulties in monitoring the quality of the courses. There is limited hard data available to understand the needs of the adult population or the efficacy of higher education in meeting them.

Table 2.8. Enrolment in non-official postgraduate studies in Andalusia, 2008

Study fields	Enrolment (Number of students)	Enrolment (%)
Health sciences	2 932	30.0
Experimental sciences	430	4.4
Social & legal sciences	3 220	33.0
Technical studies	1 776	18.2
Humanities	1 403	14.4
Total	9 761	100.0

Source: Spanish Universities in figures, 2008. La Conferencia de Rectores de las Universidades Españolas (Spanish Rectors Conference) (CRUE).

A majority of universities have created a dedicated office that reports to the deputy vice-chancellor in order to manage and supervise complementary studies. A different type of corporate response to lifelong learning has been adopted by the University of Cordoba which has established a number of companies that are part of the University of Cordoba Business Corporation (CEUCOSA). These include UCOidiomas (foreign language studies) which is a public limited liability company established in Cordoba and has two other centres in the region (Montilla and Baena), UCOaviacion which provides continuing education in aeronautical pilot studies, and Clinical Hospital for the Veterinary Sciences which has a well-established reputation in Spain and is the only one of its kind in Andalusia. Its teaching activities are designed both for veterinary science students and for continuing education and continuing professional development.

New modes of learning

The Regional Government of Andalusia has actively sponsored new modes of learning. The innovations that are transforming the Andalusian University System are based on modern technology, such as Open Course Ware (OCW) and virtual learning platforms.[6] However, the fact that some universities within the Andalusian university system use Moodle and others use WebCT does not facilitate joint virtual teaching initiatives.

Programmes sponsored by the regional government include: the Virtual Learning Space (EVA) that provides continuing education to professionals

in the labour market through virtual learning platforms organised by Andalusian Network of Technological Spaces (RETA) in collaboration with universities. EVA is co-ordinated by RETA who designs the programme and liaises with universities to identify teaching staff. It provides a response to the growing demand for e-learning in the labour market which appears to be not well covered by individual universities.

The regional government also supports other innovative initiatives, such as the Andalusian Virtual Campus which was one of the spin-offs of the long-term and well-financed Digital University. The Digital University Project carries out technological updating, such as wifi, electronic services in libraries, computer classrooms and virtual campuses. This project facilitates distance and lifelong learning (see Box 2.9.).

Box 2.9. New modes of learning in Andalusian universities

The Regional Government of Andalusia launched Digital University Project in 2005 to provide the University of Andalusia System the means, resources and infrastructure for the knowledge economy. With an investment of EUR 20 million the programme has supported the development of*: i*) wifi network accessible to university community, *ii)* electronic library services, *iii*) classrooms for virtual computing, *iv)* facilities for content digitalisation and the Andalusian Virtual Campus.

The Andalusian Virtual Campus (CVA), created in 2006, is designed to offer inter-university, virtual and distance studies to students within the Andalusian university system. It enables students to enrol in any of the 90 individual courses that are provided by the ten universities in Andalusia and are subject to annual review, mainly based on the student demand. Each university is required to provide a minimum of six courses. The enrolment process and updating of students' records is automatic and transparent for students. About 4 500 every year take advantage of this academic offer.

International examples: combining work and study in Germany

Other approaches that have demonstrated effectiveness with adults, such as work-based programmes targeted at adults appear to be of limited evidence in Andalusia. The German system of dual study programmes for adults who combine work and study would be a useful model for Andalusia to follow (see Box 2.10.).

Box 2.10. Integrated and dual study programmes

The FHK model (Fachhochshule Koln) of study programmes was initiated in the mid-1990s by the University of Applied Sciences in Cologne to tie their curricula and applied research activities more closely to the regional economic needs. Tailormade study programmes were established, first for a bank group (Sparkasse), and later extended to bachelor's and master's programmes, for example in rail engineering.

The bachelors programmes facilitate study parallel to work and are designed to prepare for specialised tasks. Initial professional training on an advance level is provided in a lifelong learning setting. The required period of study is three years (six semesters). The weekly schedule of the first year is two days study and three days work and in the second and third year three days of study and two days of work. Study is comprised of 20% class-room teaching, 60% individual study and 20% mentoring and occasional tele-tutoring. Students also undertake projects. In some bachelor programmes, students are awarded two credentials: a vocational certificate from the local chamber of commerce after 2.5 years and a bachelor of the FHK after three years. In additional, a full-time master programme was established tailor-made for management of contruction. The partnerships help the universities to enlarge and qualify its personnel capacities for teaching and research.

The university and the enterprises co-operate in curriculum development. The university is in charge of quality control and teaching with part-time teachers from the enterprises. A university professor serves as programme director, and each programme has a board with representatives of the partners; the co-ordination is rearranged when the initial funding model is terminated. The stakeholders include: FHK Institute of Insurance, Zurich Group, German Academy for Insurance, FHK Institute of Econmics, Sparkasse (local bank), FHK Institute of Civil Engineering, German Rail, Economic Univon Building Industry, German Association of Medium-Sized Building Companies – Working group Rail, Training Centre of the Building Industry in Kerpen.

Source: Mora, J.G., A Detmer, and M.-J. Vieira, (2010), Good Practices in University-Enterprise Partnerships GOODUEP, *www.gooduep.eu*

International examples: reintegrating foreign workers in the labour market

Immigrants have been key drivers for economic growth and actions need to be taken to keep them in the workforce during the economic crisis. Immigrants almost everywhere are affected by the deteriorating job market. While unemployment among the foreign-born labour force has increased in

all OECD countries, Spain has reached 28.3% which is over 11 percentage points higher than the unemployment rate of the native-born labour force in the country.

Immigrants are vulnerable during extended economic downturns and the current crisis has pushed many immigrant workers out of work at a higher rate than for native-born workers. Immigrants tend to work in sectors which are sensitive to changes in the economic climate, where the demand for workers increases rapidly in good times and drops fast during bad. Furthermore, Immigrant youths have suffered disproportionately during the crisis and the comparison with native-born youth, who suffered more than prime-age adults, is significant. Short-term work schemes often do not apply to temporary workers, a category in which immigrants are over-represented. While most countries have relied on mainstream labour market policies, Japan has taken special measures to reintegrate immigrants back into the workforce (OECD, 2010d; OECD, 2010f).

Box 2.11. Integrating unemployed foreign workers back into the workforce

The economic crisis hit Japanese manufacturing and construction – both major employers of foreign workers. From November 2008 to January 2009, about 9 300 new foreign jobseekers turned up in Japanese employment offices in regions with high density of foreign residents. That was about 11 times higher than it was in the same three months a year earlier. Numbers peaked over the following three months at 14 800, before dropping back down to more normal levels.

Several measures were taken by the Japanese ministry of Health, Labour and Welfare to reintegrate foreigners who had lost their jobs back into the labour market. The counselling and assistance capacity at public employment Security offices – so called "Hello work" offices – were reinforced. The number of Hello Work offices with interpreters was almost doubled, to 126, and 31 one-stop service centres in co-operation with regional municipalities were newly established. Extra full-time consultants were hired in such offices, and weekly hours of consultations increased six-fold from the fiscal year 2008 to the fiscal year 2009.

Vocational up-skilling, language learning, advanced training and further support by employment counsellors were also

Source: OECD Observer, No 280, July 2010.

2.5 Relevance of education

Employability of university graduates

One of the major challenges facing Andalusia is the high level of unemployment. Youth unemployment is high at 40%. While unemployment hits harder those without a tertiary education degree, the labour market outcomes of the university graduates are very poor and have deteriorated under the current economic crisis.

The labour market situation of graduates is monitored by the Argos Observatory which is operated and funded by the Regional Government of Andalusia. The Study of the Labour Situation of University and Official Studies Graduates in Andalusia was first carried out in years 2006-07. Data from this survey show that 12 months (at least) after graduation, 42% of the graduates have not yet found a job. At the end of September 2008, 58% of the graduates from the two and three previous academic years were registered in the Social Security as workers. Furthermore, 67.29% of graduates are over-qualified for their jobs (compared to the 44% of university graduates in Spain between the ages of 25 and 29) and 87.59% are employed in temporary and 38.86% in part-time jobs. There was great diversity among employment outcomes between different disciplines: while 79% of graduates in health science had found a job, whereas in humanities only 38% were in employment.

Why the Andalusian economy is not able to absorb the number of graduates that universities produce should be a main concern of public authorities and university leaders. However, this challenge did not appear to feature high on the agenda of the universities during the OECD review visit in January 2010. To some extent, high employment has been accepted as an inherent element of the economic and university systems in Andalusia.

All Andalusian universities have career offices to provide labour market assessment and support to university students and graduates regarding their integration in the labour market. Their services include: *i)* professional guidance: tutorials, workshops or courses on self-knowledge and professional skills, self-employment and company management, *ii)* mechanisms matching supply and demand, such as job fairs, bilateral meetings between students and companies and *iii)* internships services. Andalusian universities use an online system *Programa Ícaro,* where job offers are posted. This system was designed by the regional government.

The Andalusian Regional Government has developed activities to improve university and labour market connections and to boost employment

in general. There is a broad range of programmes, managed by different ministries, including Andalucía Orienta, EPES (Work Experience for Employment), Experimental Action Programme, PRAEM (grants to carry out work experiences), Universem (targeted at women), International Employment Fair and the Virtual Employment Fair. Limited information was available on the outcomes of these programmes (see Box 2.12.).

Box 2.12. Regional Government's employment-oriented programmes

Andalucía Orienta is a career orientation service including job seeking techniques, self-knowledge and positioning in the market, professional guidance and self-employment to different target groups, such as university students. Students can access the service in the offices of the Andalusian Labour Service and the university career services. By September 2009, a total of 20 910 university students had used this service (7.62% of all participants): 3 917 university students had found a job.

Work Experience for Employment (EPES) Programme provides recent university graduates an opportunity to gain professional experience in enterprises for a period of two to six months. EPES and Experimental Action Programme are targeted at integrating special groups into the labour market, such as graduates, women with problems for finding a job, people with disabilities and the long-term unemployed.

Work experience programme (PRAEM) was created by the regional government in 1989, but is managed by the university career offices. It provides grants to university students to carry out work-based learning to facilitate entry to the labour market. In 2007, EUR 2 million was allocated to grants and EUR 1 495 million to job training activities in centres.

Universem programme was developed by the Andalusian Institute for Women (part of the Regional Ministry of Equality and Social Welfare) and managed by the university career offices to improve the employment opportunities of female university students who are about to commence their professional career. Tailored plans are designed for students in collaboration with the universities, including training and internships.

Box 2.12. Regional Government's employment-oriented programmes (continued)

International Employment Fair involves meetings organised with the participation of the regional government, universities and private sector to improve university graduates' employability and knowledge on the labour market skills demands. Virtual Employment Fair brings together universities and the public and private sector to match job offers and job seekers in a user-friendly 3D multimedia environment.

Doctoral Symposiums are promoted by the regional government to improve the labour market integration of PhD graduates. The organisation of the events is rotated between different universities. Participants improve their job seeking skills and employabitly outside outside academia.

Source: Laurent, Periáñez and Petit, (2010), *"Andalusia, Spain: Self-Evaluation Report"*, OECD Reviews of Higher Education in Regional and City Development, OECD, *Paris. www.oecd.org/dataoecd/32/27/44666367.pdf*

The wide range of programmes and initiatives in place show the commitment of the Regional Government of Andalusia to fight unemployment. However, better co-ordination and evaluation of the efficiency and outcomes of the various programmes is necessary to reduce possible overlaps and to ensure sustainability in the face of decreasing public funding. There is also a need to systematically monitor the labour market trends and communicate them to the Andalusian Universities Council in order to establish better alignment of university education and the labour market needs. Discussions on these topics should be regularly organised in meetings with private sector representatives.

There is a poor tracking of student progress and achievement and labour market outcomes. Follow-up of graduate employment by each university should be organised on the basis of a homogenous set of indicators at the regional level indication *e.g.* sector of employment, province and, if applicable, other region or foreign country. This would permit to identify the level of the brain drain from the region and if it affects particularly one or several sectors, allowing for future adjustments in course offerings to focus on areas where there is labour market demand in the region. Salary differentials are another factor to take into consideration so wage levels in different regions should also be analysed.

Aligning educational programmes and skill development with regional needs

Universities which contribute effectively to building the skill base in a regional economy: *i*) participate in efforts to analyse trends, and strengths and weaknesses in the economy, *ii*) implement formal and informal strategies to foster the development of educational programmes that are aligned with the existing and evolving labour market needs and *iii*) provide students with labour information that can guide their educational choices. This does not mean that university academic programmes are designed to meet short-term labour force needs in the region. However, there should be a stronger effort to obtain and provide knowledge about the regional economy, to use that knowledge to help make academic programme investments, to provide work-based learning opportunities for students, and to inform students of job and career options.

With respect to knowledge about trends in the regional economy, Andalusian universities appear to have limited capacity to assess the relevance of educational programmes based on their own capacity to analyse the regional economy. Nor do they appear to have knowledge creation and sharing relationships with organisations that do have that kind of analysis as their mandate. Some of the newer universities have taken steps to build capacity in this area. The University of Huelva has established the Local Labour Observatory (OLE) (see Box 2.13.)

Box 2.13. Local Employment Observatory (OLE)

In 1996, the University of Huelva created the Local Labour Observatory (OLE). OLE is a research centre that evaluates and monitors the local labour market development to support public and private institutions and non-governmental organisations. Its work is based on action research and participatory assessment, and helps stakeholders to develop policies for socio-economic integration and sustainable local development. OLE is linked with the General Economical and Statistics Department of HUELVA University. OLE has a team of 35 researchers including 12 PhDs, and a technical staff of 1 technician and 1 trainee that support the researchers. Its staff members belong to the group entitled "Research Techniques and Economic Development". OLE works closely with the centre ThéMA-MTI of the University of Franche-Comté (France). Horizontal and permanent collaboration between both teams allows the development of a joint working system and the tools and methodologies to apply research results.

Source: Local Employment Observatory (OLE), *www.ole.uhu.es*, Neurona Project *www.uhu.es/neurona*

Andalusia has a poorly integrated system for forecasting demand and determining ways to raise labour productivity. Labour market systems are almost solely supply-oriented. There are data-based labour observatories but no on-going mechanisms for determining changing skills needs in regional firms and industry groups. This challenge is particularly acute with small and medium-sized enterprises (SMEs), where productivity increases could substantially change the regional labour productivity profile.

With respect to providing citizens and students with timely and useful information about labour market opportunities, Andalusia has significant resources in the ARGOS programme which currently monitors the labour market situation of graduates and is funded and managed by the Regional Government of Andalusia. The programme should build its capacity for research on labour market trends and to provide extensive outreach services to schools and individuals to assist them in assessing job opportunities. The challenge is to develop a more systematic role as an intermediary between industries and the universities in the region. A move towards closer integration among industry and universities could also be supported by better inter-connections among the universities and between universities and vocational higher education institutions.

In line with the Spanish higher education regulations and to improve the alignment between study programmes with the labour market in Andalusia, each university has established committees of professionals, employers and graduates, who contribute to the design of the university-specific curricula which represents 25% of the total curricula. It would be advisable to give such committees a more permanent role in the future in order to review and develop the curricula. However, there is evidence that the role played by these committees has so far not been very effective in all universities. There is a need evaluate the role and impact of these committees and improve their relevance.

Traditionally, the design of study programmes in most Andalusian universities has been based on the supply-side, i.e. the desires and capacities of academics rather than on the demand-side, i.e. the needs of the labour market or students. An analysis of the labour market demand in Andalusia and also in individual provinces has not yet been carried out. As a result, there is a high degree of duplication of programmes which are not well-aligned with the the social and economic needs of Andalusia.

Overall, there is considerable variation among the Andalusian universities in making an effective linkage with the skill needs of the region. Some universities are systematically engaged in making connections between the university and the labour market and the dominant clusters; for

others, the connection is more tenuous. There is also considerable diversity among different study fields. For, example the University of Huelva's Neurona Project has been specifically designed to provide a bridge between the university and enterprises. It engages students in knowledge transfer activities and provides services to the enterprises, including: *i*) in-house training, *ii*) trainees for job placements and *iii*) access to university facilities and services (infrastructure, laboratories and so on).

A number of work-based learning projects are ongoing, but in general only a small proportion of students benefit from them. There is a need to expand the number of students who benefit from work-based learning opportunities such as internships.

Arenas in which regional productivity increases are achievable are specialised business services related to manufacturing, agri-food and tourism. These services may be in sales and marketing, in intellectual property development, in logistics and supply chain management and other consulting services. The growing share of skilled services associated with the these industries suggests an opportunity to develop educational programmes aimed at high-skilled services, which are not yet an important aspect of the Andalusian economy, but could drive productivity.

International examples: aligning education with regional needs

There are international examples that the Andalusian universities could use in embedding employability and transferable skills in their core curriculum, for example through experiential and problem-based learning approaches.

Among a wide variety of problem-based learning initiatives (PBL) in different higher education institutions, Aalborg University in Denmark stands out because of its long term commitment and institution-wide approach to PBL. In fact, 50% of study programmes in Aalborg are organised around interdisciplinary project work in groups of students who solve real life problems which are often defined by the labour market partners in the rpviate and public sector (see Box 2.14.).

Box 2.14. Problem-based learning at Aalborg University

Aalborg University was established in 1974 after years of popular campaign in the region to establish a university in northern Jutland in Denmark. The campaign formed the basis for a close dialogue with the surrounding society relying on cooperation with the business sector, trade unions and cultural life. An important early decision was to base research and educational activities on interdisciplinary integration, problem orientation and group work.

In project oriented problem-based learning, study programmes are organised around interdisciplinary project work in groups. Up to 50% of the study is problem-oriented project work: student work in multidisciplinary teams to solve real-life problems which have been defined in collaboration with firms, organisations and public institutions. At any one time, there are 2 000 to 3 000 ongoing projects to ensure a high degree of collaboration with society and the private sector.

The Aalborg model is based on a win-win situation: It provides students with transferable skills and authentic work experience while enterprises benefit from a clearer picture of what the university stands for and how students might fit in as prospective employees. Finally, the university gains feedback from the world of work and also benefits from access to instructive cases and ideas for research and teaching.

Source: OECD (2007b), Higher Education and Regions. Globally Competitive, Locally Engaged, Paris.

The University of Waterloo in Canada has the largest co-operative education programme in the world, with over 11 000 students (60% of the student body) and 3 000 employers involved in the programme each year. Collaboration with industry encourages students to have a strong connection between their education and the area of employment that they would like to work in (see Box 2.15.).

Box 2.15. The Co-op Education at the University of Waterloo, Canada

The Waterloo Region in Ontario, located about 100 km west of Toronto, has a rich local labour pool largely as a result of a strategic decision made at the inception of the University of Waterloo. The founding document for this university in the 1950s (the Waterloo Plan), called for a new type of education to be offered on a co-operative basis with industry. The rotation of students to industry and back to the classroom has strengthened the university's relations with local industry.

Extensive co-op programme offerings are available in all faculties and departments and in over 100 different programmes. Many local and global firms have strong links with the co-op programme. For example, Sybase, an enterprise software company, a spun-off from the original WATCOM Corporation, has over 250 employees in its Waterloo campus alone, and15% of its current employees are Waterloo co-op students, and more than half of their Waterloo staff is former co-op students.

The co-op programme brings a number of benefits to the local economy: *i)* it acts as a steady source of new hires, because firms know that the students have work experience, and they get an opportunity to evaluate their performance in the work place before hiring them; *ii)* students transfer tacit knowledge and know-how; they also act as a critical source of knowledge circulation within the local high-technology cluster, transferring knowledge between different firms as they undertake different placements over the course of their integrated work-study programme and *iii) t*he relationship between the university and local industry allows the curriculum to keep up-to-date with the changing technological frontiers of industry while industry support of the programme funds the acquisition of technology to enhance classroom learning.

The Enterprise co-op programme also enables students to start their own venture instead of doing a co-op placement with an established firm and focuses on creating a local network of contacts and mentors to support it.

The key obstacle to the success of the co-op programme is the high cost of finding and maintaining the placement positions for the student body. The university invests a considerable amount of its own resources in financing and managing the programme. However, it now benefits from the high reputation that both the programme and the university's students enjoy, which makes it easier to find firms willing to take the students on work placement. Investment of resources in this type of programme can pay dividends to the local economy over a long period of time.

Source: OECD (2010f), Entrepreneurship, SMEs and Local Development in Andalusia, Spain, OECD, Paris, forthcoming.

The presence of specialisations and clusters indicates an opportunity for knowledge-based value contributions to regional industries with a national or European comparative advantage. Value-added in manufacturing goods has risen, reaching 25-30% of total output in some countries by the mid-1990s (OECD 2007a). Catalonia is specialised in the chemical industry in Spain as well as in Europe provides a strong rationale for encouraging research-based human capital development in that sector. The University of Rovira i Virgili in Tarragona engages in joint research and development and human capital development initiatives in the chemical industry to increase productivity in this industry that demonstrates regional comparative advantage. The extensive integrated R&D and human capital development activities related to industry by this university are a model for effective application of university resources to increase the productivity of a key regional industry.

Box 2.16. University of Rovira i Virgili: university-industry–region collaboration

The University of Rovira i Virgili has established a long-term collaboration with the chemical industry in Tarragona that incorporates both research and human capital development programmes that are relevant to the industry needs. University faculty are allowed to spend time working in local firms during their leaves and have on-going relationships with the firms. There are strong alumni connections and students participate in internships and co-op programmes within the local firms. Both advanced technical vocational skills and higher degree based skills such as in engineering are designed in co-operation with the local industry representatives. To better serve the SMEs, a public sector intermediary is being developed along the lines of those operating through regional development agencies in the UK. Most important to the success of this integrated initiative is the strong support from the university leadership, including the Rector.

Source: OECD (2010), Review of Higher Education in Regional and City Development. Catalonia, Spain, OECD, Paris.

2.6 The reform of teaching and learning

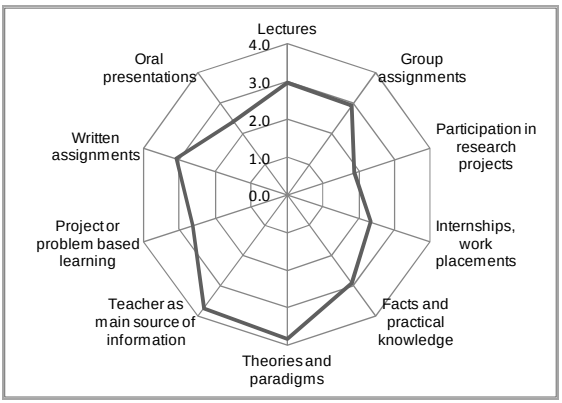
The 2009-10 academic year was the first year that Andalusian universities implemented new bachelor programmes. All Andalusian universities are in the process of developing reforms. While some master programmes, with a relatively low attendance, have been launched earlier, it is too early to evaluate the success of the Bologna process in preparing graduates for the socio-economic needs in Andalusia. Based on the

interviews during the OECD review it was, however, clear that considerable efforts and development programmes are needed to assist faculty to learn skills and tools relevant for more learner-centred modes of teaching.

The traditional modes of teaching and learning dominate in Spanish and Andalusian universities: education is teacher-centred and focused on disciplinary knowledge with a basic theoretical approach. In light of the results of the REFLEX survey carried out on 5 500 graduates in Spain, the capacity of the Spanish university system to provide the competencies required by the labour market appears limited. The results show that active learning modes such as project-based learning, research projects, work-based learning through work placements and internships or oral participation are not widely implemented in Spanish universities (Figure 2.2.). There is a significant deference between competencies required by the labour market and those provided by universities.[7] The competencies related to work behaviour (efficient use of time, performance under pressure), social skills (negotiation, asserting one's authority, co-ordination of activities) and entrepreneurialism (coming up with new ideas, alertness to new opportunities) have the highest deficits (see Figure 2.3.).

There is also a considerable mismatch in competencies associated with entrepreneurialism that is one of the weaknesses in Andalusia. Figure 2.4 shows the views of Andalusian graduates on the most important benefits of their studies in relation to the labour market. While graduates value their studies for their personal development and for learning skills for gaining employment, they have a very poor opinion about the value of their studies in promoting entrepreneurialism.

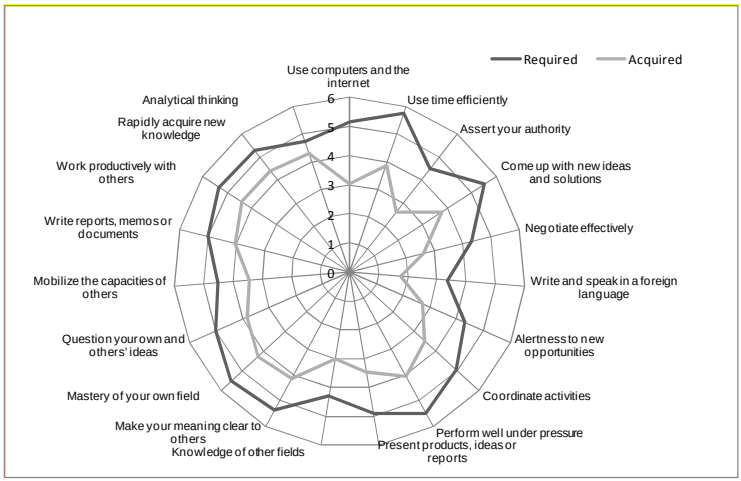
Figure 2.2. Modes of teaching and learning most used by universities



Source: Mora, J.G. (*Forthcoming*)

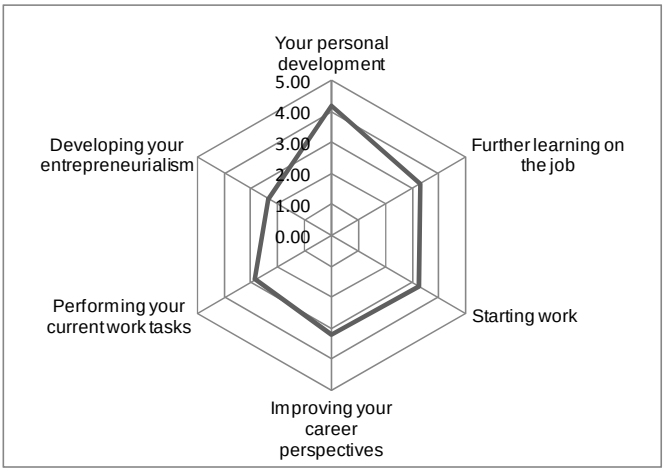
Figure 2.3. Required competences in jobs and acquired competences in the universities

The opinion of Andalusian graduates (Scale 1-7)



Source: Mora, J.G. (*Forthcoming*)

Figure 2.4. Benefits of studies - opinion of Andalusian graduates



Source: Mora, J.G. (*Forthcoming*)

A recent study (Vila *et al.*, 2010) analyses the relations between innovative competences of the Spanish university graduates and modes of teaching and learning. This study selected four competencies that graduates

declare that they acquired in the university: "Alertness to new opportunities", "Ability to come up with new ideas and solutions", "Willingness to question your own and others' ideas" and "Ability to mobilise the capacities of others". Using a sophisticated methodology these competencies were related to the different modes of teaching and learning that those graduates had experienced during their studies (see Table 2.6.). The conclusions are relevant to the situation in Andalusia.

The most traditional modes of learning based on a professor as the main source of information, attending lectures or writing assignments do not significantly increase in the "innovative competences of graduates". In order to develop these competencies, models based on problem-based learning, group assignments, participation in research projects, work placements or practical knowledge would be useful. The Spanish universities in general and the Andalusian universities in particular are not using the best techniques to develop an entrepreneurial and innovative mindset among graduates. Improving a better match between qualifications and jobs is one of the challenges of Spain and Andalusia to minimise the economic costs of the current downturn. According to OECD (2009): "The challenges facing the Spanish economy are [..] to raise sustainable productivity growth including by steps to unlock the potential inherent in young highly qualified workers… Improve the matching of workers to jobs."

Table 2.9. Relation between "innovative competences" of graduates and predominant modes of teaching and learning in Spanish universities

(VS: very significant; S: significant)

	Alertness to new opportunities	Ability to come up with new ideas and solutions	Willingness to question your own and others' ideas	Ability to mobilise the capacities of others
Project and/or problem-based learning	VS	VS	VS	VS
Group assignments		VS	VS	VS
Participation in research projects	VS	S		VS
Internships, work placement	VS		S	VS
Facts and practical knowledge		VS	VS	S
Oral presentations by students	S		VS	VS
Theories and paradigms		S	VS	
Lectures	S			
Written assignments				
Multiple choice exams				
Teacher as the main source				

Source: Vila, L., D. Davila and J.G. Mora. (2010), The development of competences at Spanish universities: A multi-level production function approach. Research report. University of Valensia.

The Regional Government of Andalusia has recognised the need to reform the educational model in the universities. The Andalusian Plan for Innovation refers to the programme "Teach to Learn" (*Enseñar a aprender*) as a strategic project for educational innovation by redefining the learning process. This project has introduced commendable elements, such as: *i)* analysing the higher education teaching process, *ii)* providing students with efficient studying techniques, *iii)* restructuring the academic organisation and teaching functions to match the new teaching process and student needs and *iv)* adapting teaching methodologies with special emphasis on new technologies. It is important to evaluate to what extent these elements have been implemented in practice and to disseminate good practices throughout the tertiary education sector.

2.7 Entrepreneurialism in the Andalusian universities

The Regional Government of Andalusia sees the promotion of entrepreneurship as critical for the sustainable socio-economic development and has recognised the role of the universities in developing a strong entrepreneurship culture among graduates. The Andalusia Innovation and Modernisation Plan (PIMA, 2005) and the Research, Development and Innovation Plan of Andalusia (2007-13) and PAIDI include a set of actions designed to encourage entrepreneurship in universities. PIMA promotes entrepreneurship training in university studies, curriculum development, entrepreneur workshops (for final year students. PAIDI develops entrepreneurship training programmes in research and technological centres, universities and technology parks.

At the moment, entrepreneurs in Andalusia tend to be male, somewhat younger than in the rest of Spain (32-43 years) and often with low skills. Their income levels are also low (EUR 1 200-1 800 per month). Changing this pattern into highly skilled growth-oriented entrepreneurship requires the mobilisation on universities.

Entrepreneurial potential

Andalusia's entrepreneurship dynamism was assessed by the Global Entrepreneurship Monitor (GEM) in 2006, carried out by the University of Cadiz. According to this study, the weakest element is the absence of entrepreneurialism in universities and primary and secondary education while key obstacles to start-ups are social and cultural issues, lack of financial support and limited enterprising capacity. At the same time, however, Andalusia featured important assets including the access to physical infrastructure, government programmes and commercial / services

infrastructure, strong public programmes and support for growth and policy to support start ups and financial support.

A key issue addressed in the in GEM was the entrepreneurship potential (whether the adult population plans to establish a firm in the next three years). Andalusia ranked Number 14 out of 17 regions by the GEM, with 5.5%, compared to the national average of 6.4%. These results confirm the widely-held perception that Andalusians are not particularly entrepreneurial. At the same time, however, GEM (2006) concludes that around 270 000 Andalusians hope or plan to become entrepreneurs.

The entrepreneurship attitudes in Andalusia are generally low and the interviews during the OECD review visit (January 2010) confirmed that university students are more interested in becoming civil servants or professors rather than entrepreneurs. Furthermore, a recent study by the University of Huelva shows that 56% of students aim to become civil servants, 26% salaried employees and 21% self-employed. The university has taken steps to identify and target the group of students that are potentially interested in entrepreneurship (see Box 2.16)

Entrepreneurship in Andalusian universities

There are a large number of activities, initiatives and projects developed by universities and the regional government to support graduate entrepreneurship. Measures have been designed to promote entrepreneurialism in universities, such as organising workshops on entrepreneurialism for the final year students, supporting potential entrepreneurs to start up a project or providing funding to encourage entrepreneurialism. Universities offer support for self-employment and enterprise formation, training activities, workshops, fairs, competitions and awards that stimulate the entrepreneurial spirit (see Box 2.17.).

Box 2.17. Andalusian university entrepreneurial initiatives

The Chair of entrepreneurship at the University of Cadiz was established in 2009 to boost entrepreneurship among the university community. Activities include projects (e.g. in the field of cultural and creative enterprises), information and advice to students on how to become an entrepreneur and where to get assistance as well as research activities through the international network (Global Entrepreneurship Monitor). Between 2009 and February 2010, five enterprises have been developed and 37 business projects have received orientation. In 2009, more than 2 200 people participated in the various activities.

Box 2.17. Andalusian university entrepreneurial initiatives (continued)

Ideas Fair was launched in 2008 by the University of Almeria in collaboration with the public and private sector This annual fair brings together young entrepreneurial students to showcase their ideas to experienced entrepreneurs and development agencies.

The UCO21 project was launched by the Social Council of the University of Cordoba in 2008 to match the needs of public and private labour market with the university graduates. The programme fosters the development of students' skills and improves their competencies in taking initiative and entrepreneurship, creativity and innovation and communication skills (both oral and written)

The Social Council of the university has had a strong labour orientation programme since 1998 with a labour orientation office in each of the eleven centres of the University of Cordoba.

"Self-employed Today" (*Autónomos Hoy*) is a research project launched by the University of Huelva in 2009 to analyse the skills of the self-employed population and the needs of the labour market of the province. Its purpose is to allow students to identify the best ways to create their own companies. The project identifies entrepreneurial students and new potential fields in the market and how university students and graduates can access the labour market. The University of Huelva also provides prizes, awards or competitions (*Concurso de Inventos, Premio al Mejor Proyecto Innovadoc*) to foster the entrepreneurial culture among the university community.

Source: Laurent, Periáñez and Petit, (2010), "Andalusia, Spain: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE, OECD, Paris. *www.oecd.org/dataoecd/32/27/44666367.pdf*

The strong commitment to entrepreneurship and these initiatives provide a foundation for future success. Andalusia is one of the leading Spanish regions in terms of the number of university spin-offs and much of the entrepreneurship support is channelled through university incubation centres. However, while the universities have a good track record in spinning out companies, in general these are not growth-oriented or successful in the real job market, but continue to be supported by public funding. The number of jobs created and the turnover remain low.

While entrepreneurialism is an attitude that individuals can develop in any type of enterprises and public sector employment, in Andalusian universities, the concept is often understood in narrow terms as self-

employment and creating a new company. While formal requirements for establishing a company can be taught within a few hours, learning an entrepreneurial and innovative attitude is a long process that would require a specific educational model that it is incompatible with the traditional paradigm of the Andalusian (and Spanish) universities. Promoting entrepreneurialism requires new modes of teaching and learning that are largely absent from the daily activity of most universities. The current process of education reform, the Bologna process, does not only provide an opportunity to adapt the curricula of the Andalusian universities to the European Higher Education Area (EHEA), but it also entails an opportunity to change the modes of teaching and learning in order to adapt them to the demands of the knowledge society, including the entrepreneurial and innovative mindset.

There is also a need to develop a stronger culture of entrepreneurship in a region which has traditionally had limited interest in engaging in business activity. There is a need for better policy integration, focusing on all educational levels: primary school, secondary school, VET institutions and universities. This should not be restricted to a technologically-oriented view of innovation and entrepreneurship. The high and rising levels of general and youth unemployment necessitate the harnessing of all ideas, talents and sectors for the future of the region (see also OECD, 2010f).

The Regional Government of Andalusia has taken steps to integrate entrepreneurship at all levels of education. In September 2010 it launched a plan to foster the entrepreneurship culture throughout the educational system in the region. Three ministries – the Regional Ministry of Education, Regional Ministry of Economy, Innovation and Science, and the Regional Ministry of Employment – are working in close collaboration with economic and social stakeholders in the region to provide students with technical and interpersonal entrepreneur skills to identify markets opportunities and to set up their own businesses. Actions will be integrated in primary, secondary and vocational education.

The large number of people entering the unemployment register will require rapid re-training and start-up support to engage in new forms of activity. The focus on entrepreneurship should not be restricted to future labour market entrants. The region could promote the establishment of dedicated (re)training programmes for business people (in employment or unemployed) focusing on new business models and approaches, combining elements of local skills and strengths and generally equipping those already in the labour market with new business concepts, tools and techniques for the modern era. Dedicated training and re-training programmes could be established using existing institutions, such as university faculties, research centres, training centres rather than establishing new ones.

International examples to promote entrepreneurship

Currently there are limited platforms for the Andalusian universities to share good practice in developing entrepreneurship and transferable skills among students. Examples of higher education institutions collaborating with each other to boost graduate employment can be found, *e.g.* in Brandenburg in Germany where all higher education institutions and the regional development agency have joint forces to establish a centre for entrepreneurship and SME development in order to pool resources and gain critical mass (see Box 2.18.).

Box 2.18. BIEM - building critical mass in entrepreneurship education

The Brandenburg Institute for Entrepreneurship and SMEs (BIEM) is the entrepreneurship institute of the regional development agency and nine public higher education institutions including universities and universities of applied sciences. BIEM was founded in 2006 as a registered non-profit organisation. One of its main objectives is to reinforce, complement and co-ordinate the entrepreneurship support activities offered by Brandenburg's higher education institutions by pooling resources and enhancing collaboration and exchange. BIEM helps to achieve the "critical mass" needed to realise projects with wide ranging impact.

The annual budget of EUR 100 000 is financed by the European Structural Funds, the Ministry of Economics of Brandenburg and other project-related revenues (*e.g.* fees for services). BIEM has eight employees. Each partner organisation runs additional projects and employs additional personnel.

The BIEM activities include entrepreneurship education, start-up support, entrepreneurship research and networking with business support organisations and other universities. It focuses on the expansion and better integration of entrepreneurship education into curricula, including innovative teaching methods, broad communication of activities, and an expansion of co-operation beyond BIEM's core partners (*e.g.* by involvement of university staff and external experts, agencies and companies). Partnering higher education institutions benefit from rising numbers of students participating in entrepreneurship education activities and an increase in the number and variety of courses available for their students.

Higher education institutions have established "entrepreneurship location managers/animators" (*Standortmanager*), who act as "one-stop-interlocutors" for would-be entrepreneurs. This structure contributes to building stronger linkages between the university's internal and external support services and to integrating entrepreneurship education and start-up support services.

Box 2.18. BIEM - building critical mass in entrepreneurship education (continued)

Other projects include "Entrepreneurship ACs", that evaluate entrepreneurial potentials and learning needs before start-up and match them with adequate mentoring during start-up, "Team Competency Lab" that focuses on team building and coaching at the BTU Cottbus or "GO:Incubator" at the University of Potsdam.

In 2009, BIEM generated 370 initial consultations to would-be entrepreneurs. In addition, 203 were referred to external business support structures and 86 business start-ups were supported. The key elements for the institute's success is the multidimensional co-operation between all higher education institutions and their external partners, the involvement of higher education institutions in regional leadership and a phase approach to entrepreneurship.

Source: OECD (2009a), Universities, innovation and entrepreneurship: Criteria and Examples of Good Practice, OECD, Paris; *www.biem-brandenburg.de.*

The Regional Government of Andalusia could also consider steering universities to develop entrepreneurship programmes with stronger alignment with the regional needs. There is a need to provide retraining opportunities to existing entrepreneurs. In view of demographic change and the ageing of the company leaders, one programme worth considering is the FINPIN SME succession programme in Finland improved the succession planning and management of the local small and medium-sized enterprises by matching the university students with the business leaders who are close to retiring but do not have a successor for their companies (see Box 2.19.).

Box 2.19. SME succession planning in Finland

In 2004, FINPIN, the organisation sponsoring entrepreneurship among students of universities of applied sciences in Finland, launched a programme to improve succession planning in small and medium-sized enterprises. It was estimated that 60 000 to 70 000 firms out of the total stock of 240 000 firms in Finland would close their doors within ten years due to uncertainties in succession. Business ownership in Finland is estimated to last an average of 25 years, which is twice the Swedish average (12-14 years) and more than three times the US average (7 years).

Box 2.19. SME succession planning in Finland (continued)

The basic idea of the scheme is to match university students with business owners who are close to retirement but lack a successor. Taking over existing small and medium-sized businesses, whose management is about to retire, provides an opportunity to a student to incubate their own ideas in an existing production structure and client network.

Today, all 26 universities of applied sciences participating in FINPIN have business succession support programmes. The programmes have regional specificities but follow an overall structure with three components: *i)* education to business successors (project work, business succession plan as thesis project), *ii*) practical experience (work in enterprises, entry/take-over strategy) and *iii)* assistance with business succession (ownership transfer process, competences transfer process, management transfer process). Graduates are awarded a nationally recognised certificate issued by FINPIN, the respective university and the Finnish Ministry of Employment and Economics (15 ECTS).

Source: OECD (2009b), Universities, innovation and entrepreneurship: Criteria and Examples of Good Practice, OECD, Paris

In light of the improved knowledge generation capacity of the Andalusian universities it would also be useful to consider an example of the University of Illinois in Chicago where graduate students help identify technologies developed by the university that can successfully be put on the market and lead to new business formation (see Box 2.20).

Box 2.20. The Technology Ventures programme at the University of Illinois at Chicago

The Technology Ventures programme at the University of Illinois at Chicago (UIC TVP) makes use of graduate students to launch businesses that commercialise promising technologies. Chicago lacks a vibrant community of technology SMEs looking for new technologies and serial entrepreneurs. Although the Chicago investment community has shown keen interest in high tech spin-offs from the HE system, few have been established. At the same time, investors are often not able to see the potential in raw technologies. UIC TVP was established to provide a mechanism to bring high-potential technologies to the attention of investors. Teams of graduate students (including MBA, MD, pharmacy and engineering) select technologies from amongst the hundreds owned by the university. They conduct market research, draft business plans on how to commercialise those technologies, negotiate with the faculty inventor to join their team and approach investors.

Box 2.20. The Technology Ventures programme at the University of Illinois at Chicago (continued)

In its first year (2005-06), UIC TVP launched two start-ups. One was a biotechnology firm launched to commercialise a revolutionary cancer treatment. The other firm was seeking to bring to market an orthodontic device that reduced

the time required for correcting orthodontic malocclusion (crooked teeth). During its second year, UIC TVP launched four more high-potential, high-tech firms, including a medical device for non-invasive cornea reshaping, an umbilical cord stem cell technology, a vascular imaging technology and a micro-fluidic device. Without UIC TVP, these technologies would have remained "on the shelf", out of sight of potential investors. UIC TVP has received national attention from the media, HEIs and investment groups.

Reasons for the success of UIC TVP include: *i*) hundreds of technologies owned by the university, *ii*) university's expertise, resources and a solid reputation in life sciences, *iii*) university's inventions, links to established biotech firms and recognition by potential investors, *iv*) support from university administration, *v*) student teams, that had an option to license the technology, giving them an incentive to ensure a successful venture and *vi*) requirement to involve the faculty inventor in return for an equity stake in the business, providing incentives for the inventor to help the company to succeed.

The UIC TVP has faced obstacles such as: *i)* lack of capacity of local investors to evaluate business plans and risk aversion and reluctancy to invest in businesses launched through the UIC, *ii*) lack of perceived legitimacy of student-owned businesses in the media and business/investment communities, *iii)* challenge to convince stakeholders that students were prepared to step aside when professional managers were successfully recruited, and *iv*) heavy work load on students.

Source: OECD (2007b), Entrepreneurship Environment and Policies: Exploiting the Science and Technology Base in the Region of Halle, LEED Discussion Paper, OECD, Paris.

2.8 Steering and co-ordinating the system

Tertiary education in Andalusia is under the national government regulation. However in 2003, the Andalusian Regional Government issued the Andalusian Universities Act which defined a set of principles underpinning the university system in Andalusia and created a multilateral and institutional decision-making process. As a result, the Andalusian Universities Council was established. This body is made up of those responsible for university policy in the regional government, university

rectors, presidents of the university social councils and members appointed by the Andalusian Parliament, but no representatives of students.

The Regional Government of Andalusia has created a regional university system which is strongly co-ordinated and characterised by collaboration. The university policy is developed with the consensus of the Andalusian Universities Council. The relationship between the Andalusian universities is based on co-operation which is stimulated by the regional government.

Collaboration manifests itself in many areas. There is for example : *i*) a "Single University Area" where students can apply to Andalusian universities through an on-line application system managed by the regional government, *ii*) common curricula for 75% of undergraduate education, *iii*) a wide portfolio of inter-university master programmes, jointly run by several universities (between two and five institutions), *iv)* Andalusian Agency for Quality Assurance in Higher Education and Research (AGAE) and *v*) a funding model where 30% of the university funding is based on results.

The driving force of the university collaboration is the Regional Government of Andalusia which co-ordinates, facilitates, funds and incentivises the inter-university collaboration, and creates a supporting framework for it. The regional government expects that joint masters and the common curricula would generate student mobility, institutional co-operation and joint teaching and research efforts between the universities. So far, mobility in the university system remains at a low level while mobility between the different sectors of the tertiary education system is almost non-existent. While it is expected that there will be a change with the full implementation of the Bologna system, this would require stronger differentiation of universities in their study offer.

A high proportion of common curricula may prevent a university to set up a specific and original study programme adapted to the local needs and therefore reduce the responsiveness of the higher education system. While co-operation is an obvious strength in the Andalusian University System, care should be taken in future to ensure that the strong element of co-ordination does not stifle institutional initiatives aiming for specific niches or for a better alignment with the local needs. However, in the case of Andalusia it appears that the regional government would like to see greater mobility and stronger specialisation of universities, whereas the universities themselves prefer to provide a full spectrum of programmes and research specialisations, leading to overlap and reduced capacity and alignment with regional needs.

Both the OECD and European Commission stress the need for greater autonomy for universities to develop the most appropriate curricula to the

local needs, taking account of the diverse capacities of each institution. Reducing bureaucratic regulation and complexity of the university decision making system in Spain is necessary and needs to be supported by national level decisions. The parallel review of Catalonia has addressed these issues extensively and the universities and the Regional Government of Andalusia should refer to the forthcoming OECD report on Higher Education in Regional and City Development in Catalonia, Spain for more details.

However, the strengthening of the university autonomy is not a sufficient precondition to guarantee greater engagement of universities with the labour market and regional development if the right incentives and accountability schemes are not in place to support this activity. Mechanisms need to be put in place to monitor the return on investment and the results achieved by various activities. International experience for example from the United States shows that in regions with low entrepreneurial tradition and limited faculty engagement with industry, there is a need for strong top-down leadership (PACEC, 2010). The continuing strong leadership role of the Regional Government of Andalusia in steering, incentivising and monitoring the university system is necessary also in future.

Funding

One of the most effective mechanisms in Andalusia for co-ordinating the higher education system is the funding model. The current funding plan for 2007-11 has fixed the criteria for funding universities and established strategic objectives related to human capital development. These include: *i)* support for educational innovation, *ii)* increase in the employability of graduates, *iii)* development of entrepreneurship among students and academic staff and *iv)* integration of ICT in all areas of academic life. In order to support these objectives, some funds have been allocated on the basis of outcomes such as: *i)* innovation in education (measured by the percentage of students enrolled in course that have implemented a programme of innovation and introduction of ICT), *ii)* efficiency (based on the average duration of studies and employability of graduates), *iii)* bilingualism (based on percentage of students with a high score in TOEFL and percentage of students in mobility programmes).

In total, 30% of the funding for higher education in Andalusia is based on results, which constitutes a larger proportion than in any other Spanish funding model for higher education and is also probably one of the highest in Europe for public funding.

The performance-based allocation model is useful for Andalusia. It has introduced a mix of performance-based allocation element linked to both policy objectives and to institutional performance as a lever to increase

efficiency and improve accountability. Performance-based funding also encourages greater transparency in how resources are utilised by directly relating inputs to outputs. For example, output-based funding provides the regional government with the means to ensure that the required institutional behaviour is encouraged: *e.g.* courses and programmes aligned with regional needs or the education of an appropriate number of graduates in a particular discipline. However, the success of the system requires more detailed and transparent data on costs of the university operations which will enhance the accountability of Andalusian universities. The funding mechanism can also encourage a greater degree of institutional innovation and specialisation.

The Andalusian funding model provides a tool for the regional government to steer the university system in Andalusia and to improve its accountability. It will be important to ensure that a process is in place to analyse the impacts of the funding system and that information about the individual universities' performance is made more transparent public. It would also be useful to consider whether stronger incentives are needed to mobilise universities for regional engagement. This element could be integrated in the funding system through the launch of competitive funding model for programmes that are needed in the region and its labour market. Competitive funds can fulfil many objectives including the improvement of quality, relevance and efficiency of the universities. Experience in OECD countries shows that a variety of funding mechanisms can be used to provide incentives for regional engagement of higher education institutions, for example:

- Formulae for block grant funding could include higher weights for enrolment from special populations such as students from LSE and/or immigrant backgrounds or for enrolments in academic programmes related to regional labour market needs.
- Policies governing financial aid to students can provide higher amounts for in-region students and special populations.
- Eligibility for special or "categorical" funding could be contingent on evidence of regional engagement and focus.
- Requirements that institutions collaborate in order to obtain funding. This could provide incentives for higher education institutions to facilitate mobility of students (credit transfer within the region) and share programmes and other resources in efforts to serve the region.
- Special funding to provide matched funding obtained by higher education institutions from contracts with regional employers for education and training services.

Quality assurance

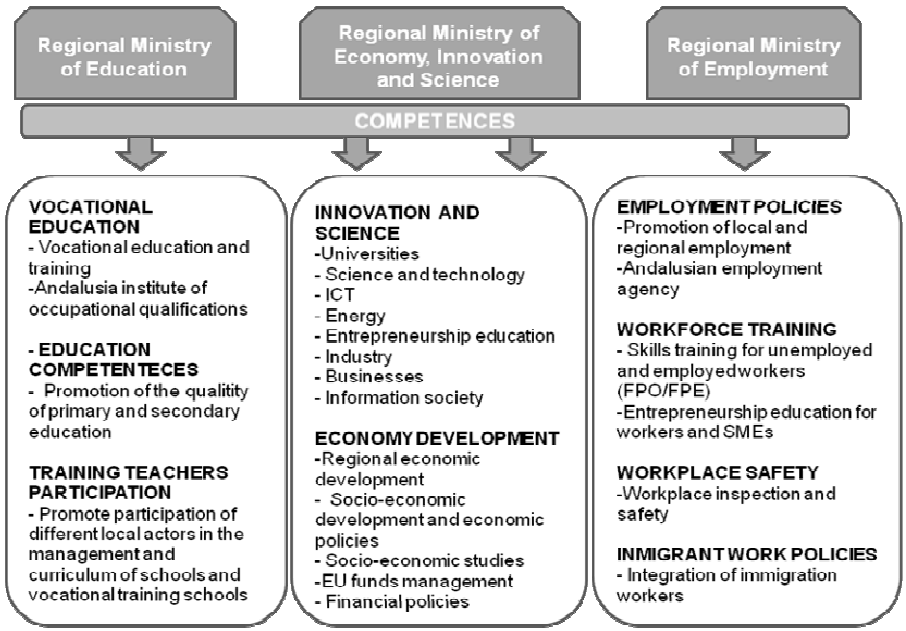
The Andalusian Agency for Quality Assurance in Higher Education and Research (AGAE) will in future be replaced by the Andalusian Knowledge Agency which will have the capacity to assess also research policy. With this change the agency could also consider integrating criteria emphasising regional engagement and responsiveness in the programme review and approval. These regional criteria could include:

- Data documenting the specific gaps in access and opportunity for the population and important sub-groups.
- Data documenting relevant regional labour market needs and potential future needs arising from regional economic development plans.
- Evidence of the engagement of regional stakeholders (employers, community representatives and representatives of under-served population groups) in programme planning and design.
- Emphasis on regional engagement (*e.g.* internships, community service, student research on regional issues) within the curricula and student experience.

System governance in the region and links with higher vocational education

The separation between the regional ministries concerned with basic and vocational education; university education and science and innovation; and employment as well as the lack of links to cluster strategy and the lack of a workforce strategy has led to an organisational disconnect that can have a negative impact on regional development in Andalusia. There is a need to improve inter-ministerial collaboration within the regional government.

Figure 2.5. Regional ministries involved in human capital development in Andalusia



Source: Own elaboration based on the competences of the three regional ministries as listed in www.juntadeandalucia.es (July 2010)

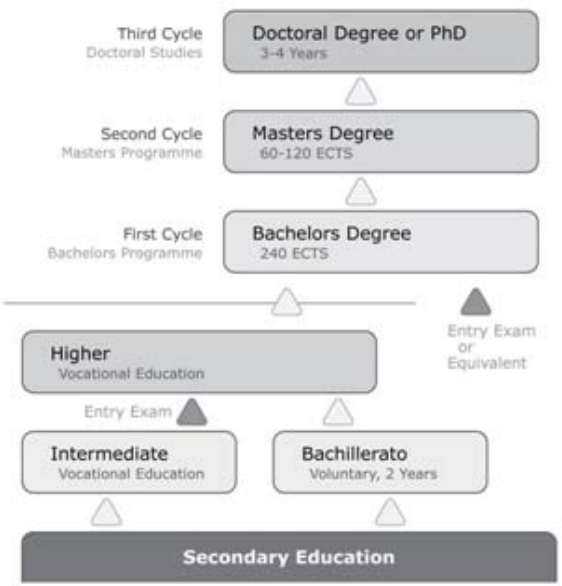
The university sector in Andalusia operates at a distance from the rest of the tertiary education sector, the higher vocational schools, and pre-university education. In Spain, approximately 13% of the age cohort is enrolled on higher vocational education programmes (2004-05), primarily concentrated in the services sector (Santiago *et al*, 2008). No corresponding data was provided by Andalusia where the vocational higher education sector is steered by Department of Education, while university education is the responsibility of the Department of Economics, Innovation and Sciences.

Disadvantaged students are more likely to attend vocational higher education institutions. If transfers between different types of institutions were enhanced, more disadvantaged students would have a better chance of earning higher level degrees. In Andalusia, there is little collaboration between the universities and the vocational higher education sector. Formal arrangements for inter-institutional transfer across tertiary education sector remain limited.

There are increasing international examples of multi-level educational campuses which bring together secondary, post-secondary and university facilities to enhance efficiency, create sustainable education and research environments and facilitate pathways between institutions.[8]

Andalusia would benefit from establishing a comprehensive human capital development system stretching from secondary education to tertiary education and lifelong learning. This would provide a stronger focus and direction for the higher vocational sector and other institutions with Tertiary 5-B programming. The Regional Government of Andalusia should build stronger relationships among the different components of the education sector: universities, higher vocational institutions and secondary education, so that they operate as an integrated developer of human capital potential. This would require more intense collaboration between the different ministries in the regional government.

Figure 2.6. Spanish Higher Education System



Source: Qrossroads, from *www.qrossroads.eu/higher-education-in-europe/spain-66/qualifications-framework-105*, Accessed 24 April 2010.

Conclusions and recommendations

The Andalusian University System has a number of strengths. The regional distribution of universities ensures that geographic barriers to access university education have been removed. Equity in access to higher education has improved over the years and the university system benefits from the full support of the regional government that funds, co-ordinates, incentivises and steers the universities to move towards entrepreneurial university models. A number of innovative initiatives have been launched by individual universities to reform education, enhance learning and employment outcomes and improve alignment with labour market needs.

The tertiary education sector in Andalusia is principally a university system; there are limited pathways and collaboration with the vocational higher education and secondary education. There is also limited diversity of mission with focus on academic provision, leading to overlap and repetition among the universities which is exacerbated by the fact that 75% of the undergraduate curricula is shared among different universities.

Equity policies have improved, but the students' financial, academic and social support system remains underdeveloped. There is also a lack of attention to the broad issues of widening participation, social inclusion or issues around completion rates, retention or graduate employment. There is poor tracking of student progression and achievement and employment outcomes. Graduate unemployment is at an alarmingly high level.

Furthermore, there is limited interdisciplinary activity, little practice-based pedagogy and research, fragmented offer of entrepreneurship training and few opportunities for student internships or work-based learning. The ongoing pedagogical reform has been organised largely without full involvement of academic staff, students and employers and in most cases remains a formal structural change. To change the economic fabric of Andalusia it is necessary to develop new types of programmes and learning modes and to integrate employability, industry linkages and entrepreneurialism in all the new study programmes and reforms.

Due to the lack of adequate student support, there is limited mobility by Andalusian students and a significant number of students work while studying. As a consequence, there is also a high level of educational failure and students take longer than necessary to complete their degree programmes. Unemployment in general and graduate employment in particular is a serious challenge that the regional government and the university system need to address.

The current extent of widening participation activities, industry collaboration and entrepreneurship activities in Andalusia are not fully

reflected in institutional or region-wide set-up. There are gaps in important areas, such as pathways between universities and vocational higher education institutions, lifelong learning activities, addressing the needs of first generation students and migrant populations and aligning the study programmes with the needs of the labour market industry and small and medium-sized enterprises to improve employability of graduates.

There is a need for a stronger regional policy for human capital development. This requires *i*) robust data about status of region's human capital, *ii*) a policy audit to identify barriers to meeting needs, *iii*) regional/national policy to foster tertiary education institutions with multiple, complementary missions aligned with regional needs and *iv*) revision of student selection, finance policy (institutional, regional and national student support), and governance/regulation. Specific data needs include: *i*) educational attainment benchmarked to country-level achievement and OECD average, *ii*) migration by educational level and age, *iii*) regional higher education participation rates (*e.g.* youth, adults, socio-economic status), *iv*) robust information which HEIs serve region's population, *v*) labour market needs, *vi*) degrees awarded by regional tertiary education institutions and vii) functioning pathways between and among tertiary education institutions as well as other levels of education.

The OECD review team recommends that the following measures be taken to improve the human capital development outcomes in Andalusia:

- A wider portfolio of robust data related to the regional context and the situation of individual higher education institutions – universities and vocational higher education institutions – should be developed in Andalusia to support evidence-based decision making at the regional and institutional levels. The most effective region-wide graduate labour market systems are based on the collection of comprehensive labour market intelligence, on-line publication of the data in a single place to improve students' ability to make rational choices about their studies and to help graduates and employers come together and increase students' chances of finding employment. Finally, the data should be used strategically to identify regional priorities and to respond to the data in terms of course offerings and the provision of employer/cluster-specified skills by educational institutions.

- The regional government should develop the existing funding model of the Andalusian University System to improve accountability, specialisation and efficiency of the universities. The funding system could provide greater incentives for regional engagement of universities by introducing competitive funds and for example

through the following measures: *i)* formulae for block grant funding could include higher weights for enrolment of students from special populations (students from lower socio-economic and/or migrant backgrounds) or for enrolments in academic programmes related to regional labour market needs, *ii)* eligibility for special or "categorical" funding could be contingent on evidence of regional engagement and focus, *iii)* requirements that institutions collaborate in order to obtain funding and *iv)* special funding could be established to provide matching of funding obtained by universities from contracts with regional employers for education and training services. The Regional Government of Andalusia could establish a special regional investment fund (funded from public and private resources) support for building university capacity for regional engagement and provide incentive funds to institutions and individual faculty members for regional initiatives. These could emphasise increasing tertiary education access for the region's target populations, engaging faculty members and students in teaching/learning and applied research projects related to regional priorities. To ensure return on public investment and stronger accountability, higher education institutions and regional government should improve their mechanisms for following-up and monitoring the success of their programmes.

- The regional government, tertiary education institutions, other educational institutions and key stakeholders of the economy and society should work together to establish a Regional Human Capital Development System embracing the education pathway from secondary (or even primary) to higher education and lifelong learning in order to define region-wide goals, policies and priorities. Pathways between universities and vocational higher educational institutions and different levels of education should be strengthened. Measures should be put in place to accommodate and encourage mobility within and between educational institutions at different levels to enable students to move from one institution to another by co-ordinating and formulating formal agreements and a mechanism for recognition and accreditation of prior learning and experience.

- The regional government should strengthen efforts to develop general competencies among the population to help adjustments to rapid changes in the labour market and to facilitate lifelong learning. Systematic joint efforts should be made by the authorities, educational institutions and key stakeholders to raise the levels of education attainment and res-killing and up-skilling activities. Technical and vocational education should be strengthened for the

benefit of the regional industry. The regional government and tertiary education institutions should prioritise lifelong learning and responding to regional demand. These steps should create clear and transparent pathways to advanced education for adults, including the ability to attend multiple institutions, obtain short-term education and training that can later be applied to degrees, and re-skilling and up-skilling courses and programmes designed around the particular needs and interests of adults who often combine work and study. Due to the high unemployment rates, it is important to develop a tailored curriculum for lifelong learning, to reinforce VET flexibility and improve ICT and entrepreneurship skills. Special emphasis should be given to the co-ordination between the programmes provided by vocational higher education institutions and those provided by the universities.

- The regional government, higher education institutions, schools and the business sector should develop long-term efforts to increase the access and success of the first generation students including those from socio-economic and/or migrant background. These efforts should build upon successful models of effective academic, social and financial support services for students, and moving away from teacher-centred learning models by taking advantage of the ongoing Bologna reform.

- The issue of affordability should be taken up in the national agenda in order not to price higher education attainment beyond the reach of students from low socio-economic backgrounds. The national government should develop the forms of cost sharing in higher education through means-tested scholarships, income contingent loans or other funding packages to complement the existing loan and grant schemes. Both universities and the regional government should consider financial assistance to low income students.

- The regional government and universities should work together to increase their efforts to provide a stronger corporate brand for the Andalusian University System through joint marketing with the regional government. Stronger efforts should be made in internationalising the region, through enhanced language learning schemes, more focused talent attraction and development programmes, integration of international students in the academic and social life of their universities and cities by training them to become "ambassadors for Andalusia". Inactive highly-skilled human capital of the immigrant retirees could be mobilised for the benefit of university research and teaching for example in

languages, entrepreneurship and for the internationalisation efforts of the region.

- Universities and the regional government should work together to strengthen the labour market relevance of university education and alignment with the regional needs in a systematic way. Universities need to focus on the employability and entrepreneurial skills of graduates, providing them with the skills and competencies needed in the globalised knowledge economy through new modes of learning, including work- and problem-based learning methods and programmes that build entrepreneurial and innovative mindset.

Notes

1 . Student registered for the 2008-09 course by university: University of Almeria (11 158), University of Cadiz (19 330), University of Cordoba (15 380), University of Granada (53 174), University of Huelva (10 231), University of Jaen (14 993), University of Malaga (32 081), University of Pablo de Olavide (9 092) and University of Sevilla (57 233).

2. Data from National Statistics Institute of Spain, accessed 8 September 2010.

3. The largest concentration of university students is in the field of social sciences and law (50% in 2006), sciences and technology (31%), health sciences (10%) and humanities (9%). Figures for graduates are slightly different: social sciences and law account for 52% of graduates, sciences and technology for 26%, health sciences for 12% and humanities for 10%.

4. A large proportion of students spend more time than necessary in finishing their studies. It has been estimated that on average students need around two extra years to finalising their studies.

5. In Spain, the earnings advantage for tertiary education graduates over persons with an upper secondary qualification is 32% (compared to 52% on average). Individuals aged 25 to 64 with a level of education below the upper secondary level have an earnings disadvantage as they earn only 85% of the earnings of persons holding an upper secondary qualification. Before the economic crisis, the number of skilled jobs to be filled in the labour market was close to the current supply of tertiary educated

individuals. The difference between the proportion of 25-to-64-year-olds in skilled jobs and the proportion of 25-to-64-year-olds with tertiary education was only 5 percentage points, indicating a fairly close match between the supply and demand for high end skills.

6. The Open Course Ware is a platform, created at the MIT, which, with the financial support of the Universia network, that has been extended to the Spanish and Latin American universities. It enables publication of teaching materials for the subjects imparted in each university. It is based on the "open content" concept, which gives free access to the published content so that it may be used in different types of educational processes. Virtual Learning Platforms are common access points via which the entire university community has at its disposal useful tools for e-teaching, which makes it possible to complement classroom teaching and provide distance learning.

7. In the REFLEX survey, 5 500 Spanish graduates answered two questions: *i)* to what extent these competences are required in their current jobs and *ii*) to what extent they were acquired in the university. The highest deficiency was perceived in terms of use of computers, whereas graduates felt confident with analytical thinking.

8. Examples in Spain include the Catalonian provinces of Tarragona, Girona and Lleida where higher vocational schools are located immediately adjacent to the local university campuses of the University Rovira i Virgili, the University of Girona and the University of Lleida.

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Chapter 3: Regional innovation

The regional dimension of innovation is crucial to promote long-term economic growth and competitiveness. All regions can improve their capacity to adapt and transfer knowledge to regional needs. This chapter examines the effectiveness of current innovation policies and practices in Andalusia and the role of research and knowledge transfer conducted by the universities. It considers the efforts made by the Regional Government of Andalusia and universities. It examines the current knowledge transfer and exchange mechanisms and highlights good practice from other regions. Finally, the chapter concludes with specific recommendations to improve the regional innovation in Andalusia.

The Regional Government of Andalusia has developed a full portfolio of policies and instruments to boost research, development, innovation and entrepreneurship. Universities have benefited from the strong science push model of innovation. But the regional innovation system is at risk of fragmentation due to the proliferation of instruments and support mechanisms. There is a need to focus public funding on the most promising sectors while enhancing the existing strengths in the regional economy. Greater efforts are needed to ensure that the strong public presence in the regional innovation system does not undercut its own goals of developing entrepreneurship.

Furthermore, universities should be encouraged to go beyond their traditional role of knowledge producers and embrace a more robust and diverse role in the regional innovation system by engaging in long-term industry collaboration and creating a well-co-ordinated system for students' work-based learning.

Introduction

In 1986 when Spain joined the European Union (EU), Andalusia was designated a status of an Objective 1 (convergence) region.[1] While considerable progress has been made, today, after more than 20 years of EU membership, the region retains this status and is still far from the European average in GDP per capita: in 2006, Andalusia had achieved 81% of the European Union-27 GDP per capita, compared with the Spanish average of 104%. For the 2007-13 period, Andalusia receives an important amount (EUR 12 327.01 million) of European structural funds to help bridge this gap.[2] As of 2013 Andalusia will face an important reduction in the structural funds. This constitutes a real challenge and opportunity for the region which needs to move towards a more market-driven situation.

To boost and diversify the regional economy, the Regional Government of Andalusia has designed a strategy to strengthen the innovative capacities of the private and public sectors, to stimulate entrepreneurship and to modernise industrial activities. This strategy aims to remedy three key weaknesses of the regional economy. First, Andalusia is lagging in labour productivity which stems from specialisation in labour-intensive and low value-added activities as well inefficient use of capital and labour. This is aggravated by the weight of the construction sector including real estate activities. Second, Andalusia is characterised by low competitiveness of the productive sector due to the lack of entrepreneurial tradition and the low degree of internationalisation of Andalusian firms. Third, the Andalusian industrial sector lacks strong supply chains and marketing channels.

The Regional Government of Andalusia aims to make R&D-based innovation a pillar of Andalusia's development and place universities in the centre of regional innovation system. In the context of weak industrial fabric and a lack of competition in the service sector and dominant public sector, this chapter examines the following three dimensions to assess the effectiveness and coherence of innovation and R&D policies and practices in Andalusia and the role that the universities' play in regional innovation system:

- Is the innovation system well connected and responsive to the needs of the region and its industrial structure?
- Do the universities support the regional innovation system in an optimal way? Are there gaps in delivery where performance could be improved?
- What lessons can be learnt from international experience?

3.1 Regional achievements and university research

In the last 15 years, considerable progress has been made in the increase of human and material resources devoted to the Andalusian research, development and innovation (RDI) system.

As a result of the seminal decision by the Government of Andalusia to create at least one university in every province and to bring research to the provinces, the Andalusian university system has undergone a period of massification and regional expansion. Since the beginning of the 1990s, four new universities have been created in Andalusia and more than 100 000 new students have enrolled in universities. Currently, there are 237 000 undergraduate students at nine public universities in Andalusia, representing about 4% of the regional population and 21% of all Spanish students.[3] In the medium to long term, the increase in student population represents a considerable source for innovation and entrepreneurship.

The RDI expenditure in Andalusia has increased 70.5% from 2003 to 2008, exceeding the national growth by nearly 50%. Despite the rapid growth, the Andalusian spending on R&D (1.03% of the GRP in 2008) remains below the national average (1.35% in 2008) and closer to the Eastern European levels. Andalusia accounts for about 11% of the total R&D expenditure in Spain, and its R&D performance is significantly below its academic performance. Higher education accounts for more than 42% (in 2008) of the regional expenditure on research, development and innovation (RDI). There is a relatively weak average R&D expenditure per researcher in Spanish universities (Germany's level is 80% higher in 2004 and France 65% higher) (COTEC, 2006).

Table 3.1. Trends in higher education R&D spending and BERD (regional share)

Region	Higher education R&D, HERD (%)		Business R&D, BERD (%)	
	1997	2004	1997	2004
Andalusia	17.27	14.27	4.77	6.41
Catalonia	16.14	19.35	28.09	28.43
Madrid	19.07	15.17	34.48	28.43
Valencia	11.73	14.95	3.67	5.20

Source: ERAWATCH, RIP-Watch, Analysis of the Regional Dimensions of Investment in Research, Case study regional report: Catalonia (Spain), Matt Staton, The Bigger Splash Ltd, December 2006, pages 35 and 36.

Universities in Andalusia have made considerable progress in knowledge generation and R&D capabilities in the last two decades. The

number of research groups in universities has more than doubled from 800 in 1989 to 1 746 in 2008 leading to an increasing number of academic publications. According to the Science Creation Index, the number of scientific documents published by Andalusian higher education institutions between 1996 and 2001 increased by 32% and from 2001 to 2008 increased again by 49.6%, compared with the Spanish average of 24%. The share of bio-medicine, agriculture, biology and environment is 51%, significantly higher than the figure for Spain as a whole (43%). Mathematics and chemistry are also relatively more dominant than in the rest of the country.

In national comparison, Andalusian universities perform relatively well in terms of scientific production and are ranked after the main universities in Madrid, Catalonia and Valencia (see Table 3.2.). Because of their size, the University of Seville and the University of Granada are well ahead of the other Andalusian universities. In terms of the quality of scientific production measured by the citation index, the University of Cordoba and Pablo de Olavide in Seville score highest. Pablo de Olavide University, the University of Seville and the University of Granada are the top performers in Andalusia in co-publication with counterparts outside Spain. However, in international comparison, the publication intensity of Andalusia is relatively weak with around 600 scientific articles per million of population (COTEC, 2009) and below the average for Spain (830), which in turn is lagging behind the most advanced European countries and regions (ERAWATCH, 2009).

Table 3.2. Selected universities in the Scimago classification

Rank	Name	Publication index	Cx	Co-operation	A	B
127	U. of Barcelona	12 584	8.18	43.18	1.06	1.35
187	U. Complutense	9 993	5.76	36.97	1.03	1.07
337	U. of Granada	6 519	5.09	37.9	1.02	1.10
359	U. of Seville	6 061	5.12	38.44	1.01	1.07
743	U. of Malaga	2 931	4.21	29.82	0.98	0.99
901	U. of Cordoba	2 318	6.75	30.2	1.05	1.07
1 182	U. of Jaen	1 495	4.39	35.65	1.01	0.91
1 193	U. of Cadiz	1 479	4.34	34.96	1.00	0.94
1 233	U. of Almeria	1 376	4.49	33.72	1.02	0.93
1 651	U. of Huelva	739	4.65	32.61	1.01	1.02
1 702	Pablo de Olavide	685	5.39	40.00	1.05	1.02

Source: SCImago Research Group (2009), "SCImago Institutions Rankings: World Report", Granada, Spain, *www.scimagoir.com/pdf/sir_2009_world_report.pdf.*

Note: * Universities are ranked according to their publication output (Column 3). Cx (column 4) is an indicator showing the average scientific impact of an institution's publication output in terms of citations per document. Column 5 shows the institution's output ratio that has been

produced in collaboration with foreign institutions. Column A shows the journal average importance where an institution output is published. Column B reveals the ratio between the average scientific impact of an institution and the world average impact of publications of the same time frame and subject area.

Universities in Andalusia have modernised their R&D capabilities and established research centres that are endowed with sophisticated and costly equipments. The University of Seville (550 research groups) has created the CITIUS centre (see Box 3.1.). The University of Cordoba, who is leading the successful Campus of International Excellence (see Box 4.7.) project, is currently bringing together a number of centres: the Rabanales campus, mostly focused on engineering, and home to the Higher Polytechnic School; the Higher Technical School of Agronomists, and Forest Engineering (ETSIAM) and the Faculty of Veterinary Science and the Science Faculty. The University of Cordoba is in the process of establishing a biomedical institute. The University of Granada (346 research groups) operates a number of research institutes notably in the fields of earth science, environment, neurosciences, biotech, water and food technology. Its scientific instrumentation centre offers various services focussing on experimental subjects.

Box 3.1. The University of Seville Centre for Research, Technology and Innovation (CITIUS)

In 2004 the Centre of Investigation, Technology and Innovation (CITIUS) brought together the university's research infrastructure and equipment in one large-scale facility. Research instruments have an estimated value of EUR 24 million. CITIUS aims to promote multi-disciplinary research and to encourage knowledge transference between academic groups and businesses in Andalusia. CITIUS's services are used by three groups: *i)* Technology-based businesses housed within the CITIUS building, *ii)* External businesses which use CITIUS resources either by contracting its services or by working in collaboration with CITIUS's research groups, and *iii)* more than 80 university research groups. In 2007, CITIUS's revenues surpassed EUR 300 000, of which 30% came from more than 30 external enterprises.

Box 3.1. The University of Seville Center for Research, Technology and Innovation (CITIUS) (continued)

CITIUS undertakes research and provides R&D services to firms. It aims at maximising synergy effects and favouring management centralisation through the concentration of services and equipment of the University of Seville within a single 5 000 m^2 facility in Seville. The equipment on site is worth more than EUR 15 million. CITIUS allows access to services such as microanalysis, microscopy, nuclear magnetic resonance, spectrometry, radioisotopes and X-ray techniques. It targets a large spectrum of activities including aeronautics, metal machining, materials, environmental protection, biomedical, pharmaceutical, agriculture, food processing and construction. It is 51% self-financed.

In 2009, 16 agreements were concluded with firms to access CITIUS service and research equipment.

Source: University of Seville Centre for Research, Innovation and Technology (CITIUS) www.*investigacion.us.es/sgi*

Despite the good progress, there is room for improvement to enhance scientific activity in all Andalusian universities. So far, policy efforts have focused on increasing the quantity and quality of scientific production and the performance-based funding of the University of Andalusia System. While focusing on knowledge generation is necessary, there are, however, no guarantees that R&D is translated into innovation and new products and processes that are tested in the market and eventually contribute to new jobs and /or reduced costs. Stronger focus is now needed on knowledge exchange and transfer.

There is also need to see the crucial role of students and graduates in research and knowledge transfer (see Box 3.8. on Knowledge Transfer Partnerships). More students should be involved in research and in science and technology fields. Throughout the OECD area there is a growing concern about the global decline in enrolment in engineering programmes in universities and Andalusia is no exception: only 23% of university students are trained in science and engineering in the region (in 2007-08). Unemployment statistics confirm the need to put more focus on these areas and to focus on regional comparative advantages. Less than 5% of graduates with health science, short cycle experimental science and technical studies diploma are unemployed. For social science graduates (nearly 60% of enrolments) unemployment rates are more than double, reaching 17% for graduates in humanities. A better balance is required among areas of study,

and more students need to be encouraged to study the engineering and natural sciences.

National and regional policy makers are confronted with the need to make universities more entrepreneurial and innovative but also to render them more responsive to regional needs. When setting up new programmes, they could find inspiration in analysing the Korean experience and its flagship programme NURI (New University for Regional Innovation programme). This programme was a government-funded initiative to strengthen the capability of higher education institutions outside the capital area to not only promote curricula alignment with the needs of the regional economy, but also to establish close collaboration between higher education institutions and other knowledge providers, local government, and business and industry (see Box 3.2.).

Box 3.2. The NURI programme in Korea

Universities are one of the core actors in the establishment of regional innovation systems and the industry-university-government networks. They perform this function through nurturing talent, conducting R&D activities and retraining manpower. In South Korea, talent and R&D assets are concentrated in the capital region while provincial regions are lagging behind due to the weak competitiveness and lack of job opportunities in provincial universities. The national government has supported projects to promote universities in the provinces to nurture talents and to assume a central role in the co-operation networks industry, research organisations and local government.

The NURI project was planned to strengthen the innovation capacity of provincial universities in South Korea. It supported the nurturing of human resources teams in provincial universities. Major strategies of NURI included: *i)* attracting good students and retain talent in the regions, *ii)* improving educational conditions and develop workforce education and development programmes to help students to acquire occupational skills that are critical for job security, *iii)* building productive partnerships with local authorities, research institutions and business and to provide skilled workers and advanced technologies to the industrial clusters in the regions and *iv)* playing a leadership role in developing and maintaining effective regional innovation systems.

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Box 3.2. The NURI programme in Korea (continued)

The Korean Ministry of Education and Human Resource Development (MOEHR) provided USD 1.0 billion to 113 HEIs during the period 2004-08. The NURI HEIs implemented more than 140 programmes aligned to the characteristics of the regional economies. The programmes involved 181 333 students (about 10% of the total number of students) and 8 605 professors. 8 820 revisions were introduced into the curricula within the NURI framework. Local and regional firms supplied 21 721 traineeships to NURI students.

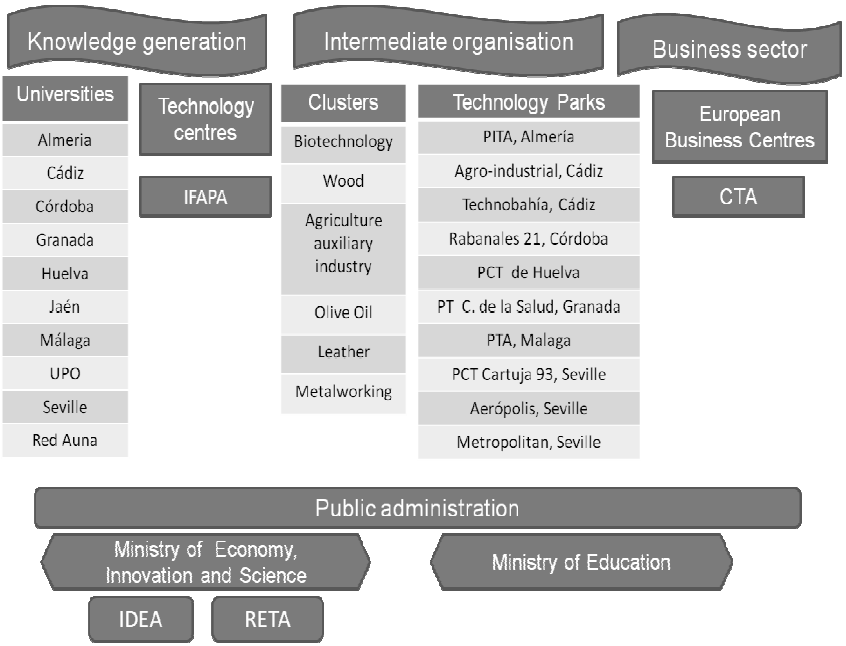
Universities were the key players in the NURI programme which also enhanced regional innovation capabilities through industry-university networks. 37 strategic industries were selected, many of them identified in regions.

Source: Park, S. (2007) "Regional Innovation Policies for Maximizing Endogenous Regional Development Capabilities". Balanced National Development Policy in Korea. Theory and Practice, *www.region.go.uk*

3.2 Higher education and the regional innovation system (RIS)

In the OECD area, governments encourage collaborative R&D among firms, universities and national laboratories to improve national and regional competitiveness. New networks within regions, established by means of concerted tripartite interactions ("triple helix" collaboration) allow the emergence or renewal of high-tech complexes and the creation and organisation of new industrial sectors. University-industry-government co-operation requires new learning, communication and service routines that produce, diffuse, capitalise, and regulate processes of generation and application of useful knowledge. The "triple helix" structures – the spiral model of innovation that captures multiple reciprocal relationships at different points in the process of knowledge capitalisation – underpin and govern the regional innovation system (Etzkowitz, Gullbrandsen and Levitt, 2000).[4]

Figure 3.1. Regional system of innovation in Andalusia



Source: Adapted from OECD (2010a), "Entrepreneurship, SMEs, and Local Development in Andalusia, Spain", LEED Programme report, Paris.

In Andalusia this type of "triple helix" university-industry-government co-operation structures show a number of dysfunctions or gaps. Collaboration is weakly developed due to disconnect between universities and companies. Furthermore, the fragmentation of the public research institutions constrains the generation of critical mass effect. A large number of heterogeneous intermediary organisations are not well co-ordinated. The result is a loose industrial fabric which has insufficient relationships with universities and other knowledge institutions.

Limited private sector involvement in R&D

In many of the most innovative regions of the world, economic dynamism is based on the agility of private sector actors operating in highly competitive environments. Innovation is necessary for firm survival, success is rewarded in monetary terms and firms that cannot compete do not survive. In this environment, governments fund knowledge creation/basic research and provide a strong judicial system to ensure fair adjudication of property rights.

In the absence of private sector partners, the Regional Government of Andalusia has taken a leadership role in innovation. Beyond setting goals, funding basic research, and ensuring a competitive environment with a level playing field, the public sector in the region determines the priorities for innovation and is a key funder of innovation. There is also a high degree of dependency on public funding and European Union programmes.

Business involvement in R&D is at a low level in Andalusia. Although the private sector share of R&D spending in Andalusia has grown from 29.3% in 1999 to 33.6% in 2008, the proportion remains low compared to the Spanish and OECD averages (45.5% and 64.2% respectively). The low degree of private sector involvement in R&D is due to the predominance of SMEs in low-technology sectors (see also Table 3.1.). Regional statistics show the relatively low level of private research spending in Andalusia, compared to the more technologically advanced and innovative regions, such as Madrid, Catalonia and the Basque country, and the higher degree of reliance on the public sector as the primary focus of R&D in the region (Granados-Cabezas, 2010a) (see Box 3.3.).

Box 3.3. Business involvement in the Andalusian regional innovation system

In Spain, industry's participation in R&D expenditure is low in comparison to OECD and EU standards. Industry accounts for 45.5% of the total R&D expenditure in Spain whereas the European average is ten percentage points higher and the OECD average is 64.2%, nearly 20 percentage points higher. In Japan industry is responsible for almost 80% and new China above 70% of the total R&D expenditure.

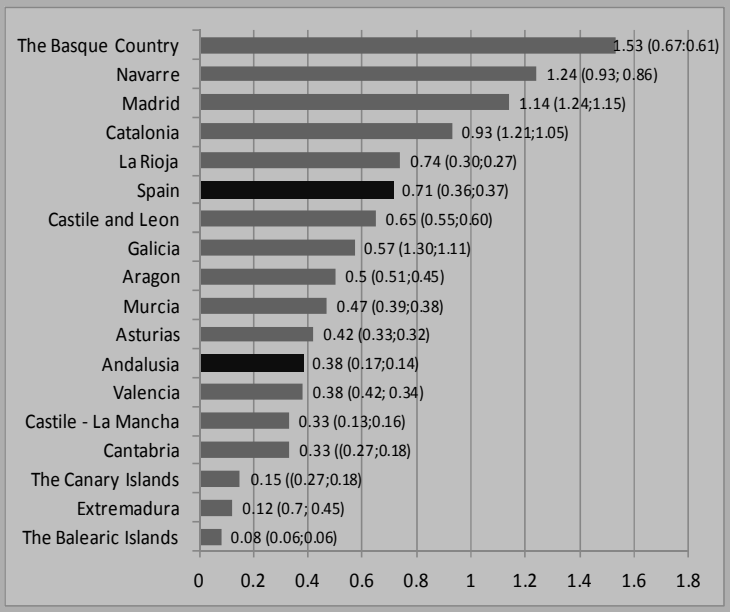
In the case of Andalusia, the weight of the private sector in R&D is 33.6%, considerably lower than the Spanish average, although the proportion has increased since 1999 (29.3%). Structural factors prevent a faster and deeper business involvement in applied research. One of the constraints is the limited number of researchers involved in innovation practices. Only 50% of the research personnel in universities and other public organisations are involved in innovation activities and collaborative and applied research. There is a clear disparity between Andalusia and the best performing Spanish regions in terms of business involvement in the R&D effort

Box 3.3. Business involvement in the Andalusian regional innovation system (continued).

The difference with the regions at the top is four-fold: in Andalusia R&D expenditure carried out by private sector is only 0.38% of the regional GDP, compared with the 1.5% in the Basque Country 1.53%.

Source: Granados-Cabeza V., (2010b) "A diagnostic of the Andalusian Economy", in SMEs, Entrepreneurship and Local Development in Andalusia, OECD, Paris

R&D expenditure carried out by enterprises as a percentage of regional GDP (2000=100).



Source: INE (2009) http://www.ine.es/ Figures for 2005 and 2006 are marked in parenthesis.

However, the comparison with "non-convergence" Spanish regions shows the relative improvement of business attitude towards innovation Andalusia. The Institute of Statistic of Andalusia (IEA) estimates that there were 6 207 innovative companies in Andalusia in the period 2006-08. 13.4% belong to the agricultural sector, 20.3% to industrial sector; 28.5% to the construction sector and the rest, 37.8%, to services. .

Box 3.3. Business involvement in the Andalusian regional innovation system (continued)

Andalusia features a special weakness in the lack of industry involvement in R&D: the productive environment is dominated by small and medium-sized enterprises or traditional manufacturing firms. There is a lack of large firms, including multinational enterprises which according to OECD data are responsible for the bulk of business R&D investments, owing to the high costs and scale economies of R&D activities. As a result, the industrial sector in Andalusia has low absorptive capacities and limited capacity for investment in R&D. This is also reflected in the low number of patents generated in Andalusia: 7.5% of the Spanish total of which 28% were produced by the public university system.

In light of the underrepresentation of business sector in the innovation system, the regional government is encouraged to ensure that: *i)* the various possibilities opened to the business sector and in particular to SMEs are sufficiently well known, *ii)* application procedures are fast and simple, *iii)* costs are reasonable or free of charge, *iv)* training possibilities are sufficiently diversified and flexible, *v)* internships are organised with the firms, *vi)* adequate entrepreneurship education courses are provided and *vii)* adequate vocational training pathways and lifelong learning opportunities are provided.

Caveats of the public sector dominated innovation system and how to manage them

In the absence of private sector partners, the Regional Innovation System in Andalusia has a strong public focus. Given the limitations in the business involvement in R&D and in entrepreneurship attitudes in Andalusia, this is both justifiable and necessary. While public and private support for RDI may be complementary in the long term, the regional government should foster a sense of responsibility to show an overall positive return to the public investment. Andalusia receives millions of euros per year for RDI as transfers from the EU and the national government. It is expected that these investments will pay back the public investment through the generation of increased private sector activity and valuable publicly-provided advances that would not have come to be without the initial government investments. At the time of the review, there was limited evidence of a payback mentality among public officials, clients and university representatives.

Furthermore, the large public role in the regional innovation system may lead to the funding of initiatives and innovations which are not commercially viable without subsidies. This may distort the idea of innovation away from its core as "commercially useful knowledge" toward a broader definition of "new knowledge." Universities should therefore be encouraged to go beyond their traditional role of knowledge producers and embrace a more robust conception of innovation. No benefits are gained by funding uneconomic innovations, unless the innovation has a value as a public good that justifies its subsidisation.

There is evidence that the strong government presence and publicly-driven innovation system in Andalusia is undercutting its own goals of developing entrepreneurship. The risk is that the ability to attract public funding for an idea becomes the measure of success, rather than the success in the market as a product people want to purchase and the amount of commercial return generated. Universities and the many public agencies supporting RDI in the region tend to measure their success in terms of acquisition of external funding.

Finally, the substitution of public for private financing deprives faculty innovators of specific expertise of the venture capitalists and may delay the emergence of private sources of capital for innovation. As long as the government is providing equal or better financing conditions, private funders of innovation will have no incentive to enter the market.

Despite these caveats, the public model is appropriate for Andalusia as it is unrealistic to expect the rapid emergence of private sector financing entities and other players in the short- and medium-term. It is, however, important that the regional government are aware of its inherent disadvantages and take active steps to mitigate or eliminate these. First, there is a need to find out whether a full range of available instruments in the normal public sector portfolio are used, including tax subsidies for R&D, people-based knowledge transfer programmes such as research in industry programmes, provision of technical services, vouchers for consulting and low interest loans. Second, there is a need to construct efficiency/performance indicators for public agencies including universities involved in innovation. These indicators could include: *i)* time to process project applications, *ii)* cost to the proponent (in time and resources) of applying to various public programmes and *iii)* administrative costs for the programmes. The indicators should be measured and benchmarked against a set of credible comparators that include good private sector actors as well as top public sector agencies. When regional government creates programmes and instruments to substitute for the absent private sector, these should seek the highest levels of efficiency.

3.3 Research infrastructure

Apart from the ten universities, the public research infrastructure in Andalusia encompasses a number of public research organisations (PROs). These PROs represent more than 20% of the public R&D and innovation effort in the region, although size and performance of each of them vary widely. Some of the PROs belong to the regional government such as the Institute for Research and Training in Agriculture, the Fisheries, Food and Ecological Production (IFAPA) or the Experimental Health Centre (CEASA). In addition, Spanish National Research Council (CSIC) operates 39 research institutes in Andalusia, some of them jointly with the universities. The scientific IT Centre of Andalusia (CICA) provides IT support for public sector actors, including universities.

During the last decade, several new technology centres were established in Andalusia with the specific task of promoting traditional industrial clusters. Around 25 clusters have been identified with the aim to create technology centres in each, which may imply spreading decreasing funding too thinly instead of focusing on the most promising fields. Currently there are 20 centres, accredited by the Regional Ministry of Economy, Innovation and Science (until spring 2010, the Regional Ministry of Innovation, Science and Enterprise). The centres focus on the wood and furniture industry (CITMA) in Lucena, Cordoba, the textiles (CITTA) in Priego de Cordoba, Cordoba, the ceramic industry (INNOVARCILLA) in Bailen, Jaen, the advanced aerospace technology (CATEC) and the metalworking and transport (CETEMET) in Linares, Jaen, and the plastic industry (ANDALTEC) in Martos, Jaen. Also to be noted are in the Province of Almeria the Technology Centre for Agriculture (TECNOVA), the Advanced renewable energy centre (CTAER) and the Stone technology Centre (CTAP) in Macael. These technology centres provide employment to almost 500 people and represent a combined turnover of EUR 27.4 million. Seven of these centres are linked with the agro-food and fisheries sector (TECNOVA, CTAQUA, CICAP, ADESVA, TEICA, CIT GARUM, CITOLIVA). These centres are part of the Network of Andalusian Technology Centres (RETA). The mission of the new technology centres is to promote and carry out value-added projects and to develop innovation capacity in companies. The technology centres are often set up as a foundation or non-profit making organisation with the regional government and have local universities and enterprises as stakeholders. These foundations aim to provide services, promote RDI between firms and knowledge providers such as universities and encourage companies to work together.

The technology centres were created recently, for the most part after 2006, and have collaboration with 2 300 companies. This is a relatively

important share of the innovative companies in the region, but a very small proportion of the total number of industrial companies in Andalusia (around 37 000 firms). Links established with the universities remain modest, usually limited to a few industry fields (see Box 3.3.).

There is limited articulation of demand for university R&D in the SME-based economy. Incentives have been created to integrate more small and medium-sized enterprises in the centre-based networks and to connect them with universities and other firms. Currently, the Regional Government of Andalusia is running a EUR 40 million project *Cheque Innovation* to encourage SMEs to engage in innovation activities. Innovation vouchers were launched by the Regional Ministry of Economy, Innovation and Science to integrate innovative elements into business activity to improve SMEs' and micro enterprises' products and processes and to increase their competitiveness. The programme provides consultancy services to boost: *i)* innovation to transform the business process and identify better practices among target companies, which have limited ICT capacity and less than 20 employees, to increase productivity (EUR 2 000 max), *ii)* innovation as a commercialisation strategy (EUR 3000 max) and *iii)* innovation to redesign or generate new products or services (EUR 6 000-9 000 max). The application process involves on-line applications that are addressed to the Regional Development Agency (IDEA) which approves the applications within one month of the submission of the application. IDEA pays for the consultant for the services provided and RETA provides a list of accredited consultants.

The Andalusian innovation vouchers are similar to the Dutch Knowledge Vouchers to SMEs (see Box 3.4.) which deserve attention due to their strong emphasis on knowledge transfer from a higher education institution.

Box 3.4. Knowledge Voucher Programme in the Netherlands

The aim of the Knowledge Voucher Programme is to encourage knowledge transfer knowledge institutes, such as universities and universities of applied sciences, to small and medium-sized enterprises (SMEs) and to help SMEs to access and use the knowledge produced by knowledge institutes for the development of new products, processes and services. SMEs can use innovation vouchers to commission knowledge institutes to address appropriate research issues.

Vouchers are available in two sizes: small and large. A small voucher is worth EUR 2 500 and a large voucher is worth up to EUR 7 500. To use a large voucher, an SME must make a contribution of at least one third of the total project cost; the government will then contribute up to EUR 5 000.

Box 3.4. Knowledge Voucher Programme in the Netherlands (continued)

Vouchers are available for two types of projects: knowledge transfer projects and patent applications. Large knowledge transfer vouchers may be bundled: up to ten enterprises may collectively use vouchers which have been awarded to them individually to cover the cost of a major knowledge transfer project.

Vouchers may be used for projects involving the transfer of knowledge from public knowledge institutes and various private knowledge institutes. A knowledge transfer project involves the transfer of knowledge that is new to the receiving SME. The knowledge is used by the enterprise to modernise a product, production process or service. All projects must benefit the Dutch economy. No individual enterprise is entitled to receive more than one small voucher for a knowledge transfer project at any time and more than one large voucher per year. The bundling of patent application vouchers is not permitted.

Source: Agentschap NL, Ministry of the Dutch Ministry of the Economy.

Intermediary organisations

As a result of the low demand for scientific and technological work by universities, the Regional Government of Andalusia has engaged in the establishment of new interface bodies. These organisations have been created to help bridging the gap between the knowledge suppliers and firms' needs. They include the Offices for the Transfer of Research Results (OTRI), the Southern Europe Innovation Relay Centre (CESEAND). Furthermore, there are also 20 technology centres and 11 science parks. In addition, private sector has established a foundation Andalusian Technological Corporation CTA to help bridge the gap between universities and enterprises.

The Offices for the Transfer of Research Results (OTRI) are the main tool to bridge the gap between knowledge suppliers and the private sector. OTRIs operate on the initiative of university professors who require their services. There are 18 OTRIs, 9 in universities with a staff of 71 researchers, and 11 in other research organisations. The most developed activities are patent licensing, the establishment of exploitation and collaboration contracts and support for participation in the EU Framework Programme projects. This is particularly important because the department and research teams normally lack the administrative infrastructures necessary to handle

the bureaucratic burden associated with the European projects (see Box 3.5.).

Box 3.5. OTRIs in Andalusia and factors limiting OTRI performance

The university-based OTRIs are responsible for channelling external research demands to the appropriate research groups within their own universities and promoting knowledge transfer to the private sector through patenting, licensing and spin-offs. However, the performance of this role is constrained by the lack of adequate staff to maintain contacts with local businesses and national policies governing intellectual property rights (IPR) and release time for university research to participate in start-up firms. Interaction with and the knowledge of the Andalusian firms remains at a low level, with the possible exception of the OTRI in the University of Malaga.

All Andalusian universities, apart from UNIA, have established dedicated offices for technology transfer. The OTRIs have created their own regional network Red OTRI Andalusia and are also part of the national OTRINet. Organisational solutions in universities vary. For example, the University of Almeria has created a Vice Chancellor Office for University/Industry Relations. The University of Seville has a similar Office for Technology Transfer, separated from the research office, which raises questions of potential duplication of services.

The investment in OTRIs has produced positive results. The number of technology-based companies created per year as spin-offs from university research has grown significantly in the beginning of a decade, although it seems to have stabilised around 30. The University of Malaga, the University of Seville and the University of Almeria appear to be most entrepreneurial universities and jointly account for nearly two-thirds of the spin-offs. Many OTRIs have invested in better communication and issue newsletters and journals for the publication of research results. However, patents application and patents granted to the Andalusian university system remain limited in number (below 100) and many of the spinoffs remain dependent on public funding, lack growth orientation and employ only a small number of staff.

Box 3.5. OTRIs in Andalusia and factors limiting OTRI performance (continued)

The challenge of promoting the commercialisation of intellectual property is complicated by the Spanish regulation. According to the Spanish Patent Act the ownership of discoveries made by university faculty during their period of contract and constituting part of their university duties, belong to the university. Professors have the right to share the benefits that flow to the university from the use of the intellectual property rights (IPR) derived from their inventions, but the precise share that they receive is governed by the statutes of individual universities. The current legal framework governing IPR provides the universities with limited guidance to determine how benefits should be shared in the course of contractual work or other types of relationships with the private sector.

National regulations have traditionally imposed restrictions on the mobility of university researchers between the public sector and private spin-off companies, limiting them from: *i)* holding more than a 10% interest in private companies, *ii)* being a member of a board of directors or *iii)* taking a temporary leave of absence from the university to form a private company. The act governing universities was, however, amended in 2001 to allow university researchers a five-year leave of absence without leaving their university position in order to participate in technology-based spin-offs (EBT). However, according to the universities in Andalusia, the guidelines for implementing the regulations are insufficient to allow the integration of university researchers into the EBTs.

Source: OECD (2010a), "SMEs, Entrepreneurship and Local Development in Andalusia", LEED Programme report, Paris.

Another network, the Southern Europe Innovation Relay Centre or CESEAND is worth mentioning because of its size and its international dimension. It is one of the 71 existing European Innovation Relay Centres (IRCs). The mandate of IRC staff is to facilitate transnational transfer of technology. CEASAND is financed by the European Commission (50%) and by regional funds provided by Andalusian partners including the IDEA Agency, the Andalusian Institute of Technology (IAT) and CITAndalusia.

CITAndalusia is a public organisation, funded by the regional government and based in Sevilla. It organises and promotes transfer technology events, supports researchers and companies at fairs and provides technical assistance and carries out technological studies. CITAndalusia is also a point contact for the participation of research teams to the EU Framework programmes. It has developed tools to systematise partners search and customise support to firms. It has designed a software

programme called MASTRIX that identifies the R&D needs of the regional companies and links them with the information about different technological advances and research results of various European research groups.[5] CITAndalusia, Talentia staff and the Regional Agency for University Evaluation and Quality Control (AGAE) will be brought together in the new Andalusian Knowledge Agency.

Large companies have established a private foundation, Andalusian Technological Corporation CTA, to bring research closer to enterprises (see Box 3.6) and lead the transformation of Andalusia towards knowledge-based economy, to enhance its image as a competitive region in strategic areas and to attract inward investment. It acts as a consultative body within the Andalusian Innovation System facilitating the establishment of priorities and assessing the impact of RDI (see Box 3.6.)

Box 3.6. Technological Corporation of Andalusia (CTA)

Established in 2005 with the support of the Regional Ministry of Economy, Innovation and Science, the Technological Corporation of Andalusia (CTA) is a private foundation and a strategic alliance of companies and research groups or research centres that promote RDI and technology transfer in Andalusia. CTA promotes applied research, generates innovative business projects and links companies with similar technological objectives. The CTA funds company RDI projects in seven strategic sectors: aerospace and production processes, agri-food, biotechnology, building and civil engineering, energy and the environment, leisure and tourism and ICT. At least 15% of the project funding must be invested through a research group in the Andalusian Research, Development and Innovation Plan (*Plan Andaluz de Investigación Desarrollo e Innovación* (PAIDI).

CTA has more than 130 member companies in three membership categories: Within a period of four years, the leading members contribute EUR 1 million, the collaborating members EUR 240 000 and associate members EUR 60 000. The collaborating and associated member categories were created to increase the engagement of small and medium-sized enterprises that today make up more than 60% of the CTA members.

Member companies have access to financing from the CTA and other sources of regional, national and European funding. The companies receive strategic guidance in RDI projects and have access to of research groups. Research groups have the opportunity of upgrading their scientific resources and improve their infrastructure through participation in RDI projects.

Box 3.6. Technological Corporation of Andalusia (CTA) (continued)

They also benefit from the close proximity with the leading companies and can increase their technical and human resources. The technical officers of the CTA provide advice on how to manage and plan RDI activities to obtain strategic benefits in the medium and long term. Companies of all sizes and sectors can participate in the CTA including financial bodies that contribute to the improvement of the competitiveness of companies. Likewise, different groups from universities and research centres are also part of the CTA.

The CTA finances products and service projects in which innovation is a key component. Projects go through an external assessment process undertaken by organisations certified by the National Certification Entity (*Entidad Nacional de Acreditación* (ENAC). The CTA funds projects that are profitable in economic or social terms: the project evaluation, that takes two months, takes into account the degree of innovation, commercial exploitation potential and co-operation between companies.

The CTA plays a key role in the identification, promotion and formulation of business-led RDI projects that will be supported by the European Union's Technology Fund, which has allocated an initial amount of EUR 867 million to Andalusia for the 2007-13. The CTA collaborates with the Regional Ministry for Economy, Innovation and Science in the assessment and selection of projects in the Mixed Commission of the Regional Government Andalusia and CDTI (Comisión Mixta Junta de Andalucía - CDTI) together with the Andalusian Innovation and Development Agency (DEA)) and the Network of Technological Spaces of Andalusia (RETA).

Source: Technological Corporation of Andalusia (CTA) w*ww.corporaciontecnologica.com*

Regional Government of Andalusia has also invested in a dense network of new technology centres and science parks in Andalusia. Most universities maintain a link with the 11 Andalusian science parks and some of their buildings are located in these parks. Universities are shareholders in the capital of the parks, although their share is limited and lower than 5% except in the case of University of Cadiz and the University of Cordoba. Relationships are particularly well established in the field of renewable energy with the Almeria park (PITA) (University of Almeria), the PTA in Malaga (University of Malaga) and the Cartuja 93 in Seville (University of Seville) or in the biotechnology sector with Rabanales (University of Cordoba).

While these intermediary bridging organisations help to consolidate the "institutional thickness" of the regional innovation system, their proliferation also reflects the fragmentation of the science/industry interface in Andalusia. Although some of the intermediary organisations have started the dialogue with the university-based technology transfer offices (OTRI), in general, there is a lack of co-ordination between OTRIs and other intermediary institutions. While intermediary organisations seem to operate well when they play the role of facilitators for acceding regional or national programmes, they are less efficient in their role in linking researchers and industry. There is a need to rationalise – reorganise and reduce – the number of intermediary organisations, agencies and programmes through mergers and improved networking capacities. Models such as the Öresund association structure seem to show the way to follow (see Box 3.7.).

Box 3.7. Öresund region: universities and high-tech clusters

With a total of 20 universities, the Öresund region (composed of the Zealand region in Denmark and the Skania region in Sweden) has many strengths in education and research. Its most remarkable asset is probably the collaborative links that have been developed over time between the higher education institutions. This long-term informal co-operation was formalised in 1997 with the creation of the Öresund University. The Öresund University Association brings together 14 universities (150 000 students) to collaborate to consolidate the cross-border region, create sectoral organisations and organise training and forums for regional cluster development. It encourages student mobility, joint teaching and research programmes and administrative and support services between the university and helps brand the region as a leading knowledge-based region.

The Öresund University has been a leading actor not only in formal scientific research and education (i.e. Öresund Science Region), but also in the creation of institutions to promote informal networking activity and information sharing for economic activities. Working in collaboration with researchers, business leaders and policy makers throughout the region, the Öresund University has helped in identifying critical growth clusters and facilitating the development of networking association in each of these clusters. These organisations – Medicon Valley Academy (MVA), Öresund IT Academy, Öresund Food Network and Öresund Environment – are already playing an important role in promoting integration across the region and are showing a great deal of promise for the future.

Box 3.7. Öresund region and involvement of universities in the high-tech clusters (continued)

The Medicon Valley Academy (MVA), which was initially publicly funded, has become a membership-based organisation. Universities and public hospitals pay for 55 % of membership fees. It aims at strengthening co-operation between public institutions and private companies to boost product development. While catalysed by the Öresund University and significant public sector funding, the organisation has now developed a dynamic of its own and is running a PhD programme. Öresund IT is a co-operative organisation for the development of the IT cluster. In co-ordination with MVA, IT Öresund has developed a cross-border, post-doctoral programme building links between information technology and biotechnology. Öresund Food Network was founded with the goal of creating synergies between public and private research and among companies to establish the Oresund region as one of the world's most dynamic agro-alimentary regions. Öresund Environment is a similar organisation building links in a "triple helix" model and working in the field of traffic and air, optimised environmental system, construction industry and food.

Source: OECD (2007), Higher Education and Regions. Globally Competitive, Locally Engaged, OECD, Paris.

Encouraging steps towards a broader cluster-based development in Andalusia are the International Campuses of Excellence in the agri-food (Ceia3) which brings together the universities of Cordoba, Jaen, Huelva, Cadiz and Almeria and in ICT (Andalusia TECH) which brings together the universities of Seville and Malaga, whereas the Campus of Excellence in Biotechnology (BioTic Granada) is a joint effort by the University of Granada, the Spanish National Research Council and the Health-Science Technology Park. These projects have the potential to overcome the key weaknesses of the Andalusian innovation system: the weak university-industry linkages and the lack of private sector involvement, incipient levels of internationalisation and limited collaboration with vocational education and workforce development.

3.4 University-industry relationship

In Spain, collaboration between universities and industry remains limited. Authorities have recognised the need to enhance stronger collaboration: the university law of 2007 promotes university-enterprises partnerships, enabling academics to participate in, or create, private firms, allowing them to take "technological leaves of absence" and to retain their university tenure for up to five years. The practical consequences of the new law in this area seem still uncertain.

There is considerable scope for improving the knowledge flows between universities and industry in Spain and particularly in Andalusia. The large infrastructure of intermediary organisations shows a low co-ordination capacity and has resulted in relatively low outputs.

Research results highlight the potential to expanding the scope of collaboration and service provision between academia and industry. Based on the survey of 737 businesses in Andalusia, the most innovative firms have a limited interaction with universities. Universities were perceived relevant to innovation but not seen as more important than other sources of innovation such as business networks, government and technology orientated knowledge-intensive business services (KIBS).[6] Only 43% of firms and 57% of research teams take part in some type of university-industry interactions. The majority of firms in Andalusia have no interaction with universities. While universities are an important source of tacit knowledge related to human resources needed for recruitment of skilled workers and enhancing the use of results from collaborative projects and consultancy, collaborative projects are limited in number and scope (for example ten projects per year on average for the Granada OTRI on the 2000-08 period for less than EUR 1 million) even though research contracts are more numerous (about 300 for Granada OTRI for a total of EUR 7.5 million a year on average). Outputs such as patents and spin-offs are at a modest level (Fernandez-Esquinas and Alii, 2009)[7] (see Table 3.3.)

Table 3.3. Participation of research teams in collaborative activities

(% answering yes)

Consultancy work	38.0	Patent exploitation	10.1	Joint ventures with firms	2.4
Commissioned R&D projects with firms	34.8	Training of postgraduates, Internship with a firm	20.4	Creation of spinoffs and start-ups	6.1
Joint R&D projects	30.6	Exchange of personnel	12.4	Informal relationships	45.0
Use of facilities or equipment	8.4	University training of firm employees	24.2	Other types of collaborative activities	2.7
Non-academic dissemination knowledge	30.6				

Source: Fernandez-Esquinas *et al.* (2009), "Unfolding the complexity of interactions between industry and University", IIESA-CSIC

* A research team is defined as a stable group formed by one or more scientific leaders, several researchers, young people on training internships and technical support personnel that share technical scientific goal, resources, infrastructure and equipment with joint participation in R&D and innovation projects in collaboration with firms or public organisations (CICE 2006)

**A total of 765 research teams were chosen among a reference population 1769 registered in 200 and stratified using proportional allocation based on 9 scientific areas. The survey was conducted in 737 firms selected from the RETA registry of firms that comprises 1844 firms that have received some aid for innovation or indicated interest in receiving innovation advice.

The Regional Government of Andalusia has facilitated knowledge exchange schemes and created favourable conditions for thriving university-industry relationships, but there is a need to develop the culture of co-operation among local academic and business circles. Knowledge transfer programmes based on people mobility between higher education institutions and industry in the region could help improve the absorptive capacity of the SME-based economy. An important channel of knowledge exchange is internships and other work-based learning opportunities that provide an entry point into the workforce when students continue working for the industry partner after the internship.

While the Spanish Government is running the Torres Quevedo programme that aims to link PhDs in the private sector (see Box 3.13.), there may be a need to consider adjustments to existing regional level programmes to facilitate the link between the students, graduates and university post-graduates with the local industry. For example, Talentia grants (see Box 2.4) provided by the Regional Government of Andalusia

could be more closely linked with the development of the region. In the United Kingdom, the Knowledge Transfer Partnership Scheme has been running successfully (previously as Teaching Company Schemes) since the 1970s. Knowledge Transfer Partnerships improve the competitiveness of the companies through introduction of some form of innovation or new technology, while an additional benefit is usually the recruitment of the postgraduate associate; around 75% of associates in projects lasting from one to three years are offered jobs in the company (see Box 3.8.).

Box 3.8. UK Knowledge Transfer Partnerships

The Knowledge Transfer Partnership programme in the United Kingdom was launched in the 1970s as the Teaching Company Scheme, and was designed specifically to foster close collaborative partnerships between universities and companies with an explicit focus on the transfer of knowledge into company practice rather than supporting research in universities. The main focus is on improving the competitiveness of the industrial partner, through the work of post-graduate "associate" working in the company with supervision from the academic partner.

The scheme is partly funded by the companies involved and partly by a public organisation such as the Technology Strategy Board or a Research Council, with more advantageous terms available for small and medium-sized enterprises (SMEs). Typically an SME would pay around GBP 20 000 per year for involvement. The projects are usually 2 years in duration and the postgraduate associate is employed to work in the company during this period on a pre-defined project. The associate is paid a salary and in some cases is registered for a higher degree (usually devoting 10% of their working time to professional development), and forms the linkage between the company and the supervising academic in a university or research organisation. The academic partner is compensated for some of the time of the supervisor and for university overheads (KTP, 2010).

The primary outcome of the project is usually the implementation of some form of innovation or technology in the company, although an additional benefit is usually the recruitment of the associate and around 75% of associates in projects lasting 1-3 years are offered jobs in the company. The 2008/09 annual report for the scheme reported 977 active projects and estimated the benefits to UK business would be over 6 500 staff trained, 1 119 new jobs created and an increase in pre-tax profits of GBP 126 million (TSB, 2009).

Source: TSB (Technology Strategy Board) (2010), "Knowledge Transfer Networks", www.innovateuk.org/deliveringinnovation/knowledgetransfernetworks.ashx, accessed 5 April 2010. See also OECD (2010b), *The State of Victoria, Australia*, Reviews of Higher Education in Regional and City Development, OECD, Paris

Knowledge exchange programmes based on people mobility were not in evidence in Andalusia apart from the doctoral symposiums sponsored by the Regional Ministry of Economy, Innovation and Science and organised by universities, and the University of Almeria's Project Exchange. Almeria's small scale programme has helped change mindsets within the academia and business and created a climate conducive to the emergence of joint projects (see Box 3.9.). However, this programme is small in scale and limited to the University of Almeria. There are currently limited mechanisms in place in Andalusia to disseminate good practice among universities and scale up good practice into a system.

Box 3.9. University of Almeria Project Exchange

The Project exchange involves the exchange of university professors and business managers. Presently in its third edition, the Project Interchange is managed by the University of Almeria and its Social Council, as well as the Mediterranean Foundation of the University of Almeria. The objective is to make professor understand the business and institutional sector and to take entrepreneur to the university. Professors go to companies for one to seven month periods to help solve concrete problems in the company. Managers come to the university to give a seminar to undergraduate students. Professors from all disciplines are participating: mathematics, biology, business, agriculture sciences, law *etc*. By early 2010, 57 professors from 15 departments have followed the programme, while 47 directors of 32 organisations (construction, justice, health sector, marble industry, environment industry *etc*.) have participated in the exchange.

The outcomes of the programme are monitored systematically. Following the completion of the exchange programme, each professor has to prepare a report. The outcomes of the exchange have been encouraging, for example companies show high level of satisfaction and are more eager to engage in long-term collaboration with the university.

In order to gain the critical mass, regional and national governments should increase their support for networks, collaboration and mergers of technology transfer centres. This process would facilitate the specialisation of universities and increase their capacity to commercialise research results nationally and internationally. It would also be important to reinforce the regional engagement channels of the universities through the development

of their forum role with local small and medium-sized enterprises and clusters (see Box 3.10.).

Box 3.10. Developing public space in universities

In most cases, the indirect support provided by universities for local innovation processes is likely to be more important than their direct contributions to local industry problem solving. In addition to educating and raising the skills levels of the local population, a university can also play an important role by providing a public space for on-going conversations that involve local industry about the future direction of technologies, markets and local industrial development.

This public space role can take many forms, including meetings, conferences, industrial liaison programmes, standards forums, entrepreneur/investor forums, visiting committee discussions of departmental curricula. The conversations between university and industry people that occur in these spaces seldom focus on solving specific technical or commercial problems, but often generate ideas that can become the focus of problem-solving both in industry and in universities. The importance of the public space role of the university and its contribution to local innovation performance is frequently underestimated and underdeveloped by higher education institutions.

Source: Lester, R.K. (2005), Universities, Innovation and the Competitiveness of local économies, A summary report from the Local Innovation System (LIS) Project: Phase 1, Industrial performance Center, MIT, Cambridge, 2005.

Small business development

Despite the increase in the number of firms in Andalusia in the last decade, the region is still short of innovative and competitive firms and start-ups. Universities are aware of the role they can play in fostering entrepreneurship. A number of initiatives have been introduced such as chairs for young entrepreneurs, entrepreneurs fairs or ideas fairs (*e.g.* at the University of Almeria) and various prizes to foster an entrepreneurship culture among the academic community. Much of the regional government's funding to support new business formation is channelled through the university incubators. (see also Chapter 2).

International experience shows that while the university technology transfer models may lead to saleable intellectual property and start-ups, they seldom produce enterprise that grow in the region and contribute to regional

economic development. The creation of localised supply networks are therefore critical to the process through which innovation is transferred to enterprises and in order to create new innovation that transforms and upgrades existing industries. A well-functioning regional knowledge transfer model is based on ongoing relationship between the university and industry to determine what innovations have the best opportunities for adoption and commercialisation, creating an industry-university learning environment. It supports the human capital development required to adopt and apply process and product innovations and works with SMEs as well as large corporations. It measures success in terms of the sustainability and transformation of regional industry and employment growth. University entrepreneurship programmes should therefore also support the existing industries and SMEs (Christopherson, 2010).

SMEs, particularly the self-employed represent in Andalusia, as in the rest of Spain, a larger part of the business fabric. Reaching out to small enterprises through training, knowledge transfer and by student internships is crucial for dissemination of innovation, whether in terms of management, processes, products or services. The infrastructure on which such activities can rely is already in place: there is an adequate ICT network, that reaches out to rural areas, following the implementation of the Guadalinfo project, and a dense network of specialised technology centres, that cover the major areas of business activity in Andalusia (see Box 4.2. in Chapter 4). Universities need to systematically target SMEs on a long-term basis, in addition to their focus on support for new business formation.

Regional innovation policy and the universities in Andalusia have currently a focus on science-based innovation with limited attention on demand-driven incremental innovation needs of small and medium-sized enterprises in industry and services such as tourism. It is important for universities and regional co-ordinating bodies to recognise that R&D activities, especially the commercialisation and exploitation of intellectual property derived from university research, is only one part of the university-industry interaction. Usually interest in commercialisation emerges when firms have built up their absorptive capacity through long-term interactions with universities. The policy implications of this suggest the need for greater support for less R&D intensive forms of interaction with universities. Andalusia well-developed systems, such as digitalisation should be mobilised for SME development, mobilising university students as trainers and developers and providing them authentic work-based learning experiences.

Small business development in North Carolina brings long-term counselling and training courses for small business owners throughout

the State of North Carolina and uses university business faculty and students as coaches. This innovative programme combines the needs of the small and medium-sized enterprises with the needs of the universities to provide systematic and well tutored work-based learning experience to students (see Box 3.11.).

Box 3.11. Small business development in North Carolina

In North Carolina, US, the federally funded small business assistance programme is a University of North Carolina system-wide programme managed by NC State. Its network of 17 Small Business Development and Technology Centres is based mostly at business schools in other public colleges across the state, providing training courses and counselling for small business owners.

The small business centres are focused on special expertise in technology assistance, in helping small business find local sources of capital and in providing lengthy (20 to 30 hours) and intensive one-on-one counselling programmes for small business owners. The programme is able to offer intensive consulting services because it relies on faculty and business students, about 650 a year. They provide valuable service and the experience adds value to their education. The programme counts 110 000 counselling clients and 85 000 attendees at training programmes since 1984, with the clients creating 25 000 jobs and growing sales and jobs at more than three times the state average. Separate training programmes are in place to help small investors in the state to understand how to set up, operate and succeed with local "angel capital "networks and to train small business owners how to find investors, understand their expectations and meet their needs.

Source: Shaffer, D.F. and D.J. Wright (2010), A New Paradigm for Economic Development, in Higher education, The Nelson A Rockefeller Institute of Government, March 2010.

Andalusia is a logistic hub with well developed transport infrastructure and two major ports in Algeciras and Malaga. Introduction of study and research programmes in logistics could support the development of the region. International experiences include the Hull Logistics Institute (see Box 3.12.).

Box 3.12. Hull Logistics Institute

The Hull Logistics Institute is a teaching, research and consultancy organisation. Its main activities are teaching, research and consultancy in the logistics industry. It offers master and doctoral programmes, as well as short courses. Research and consultancy projects are undertaken involving local firms in the industry. The institute draws on business and engineering expertise from the relevant university departments to provide research and consultancy support to the logistics industry. The institute is managed as a unit of the business school, reporting ultimately to the main university academic and governing body. An advisory group, with external membership, advises its director.

The institute began operations in 2005 with initial capital costs of EUR 7 million. This has led to the development of a master's degree in supply chain management, which is now recruiting internationally; there is also some doctoral work. Graduates of the institute are now in influential positions in industry internationally. There are signs that this is leading to new teaching and consultancy business. The institute provides incubator units for start-ups in the logistics field.

This initiative has been successful for five reasons: *i)* there was a real demand from the regional industry that the university was equipped to support because of its existing areas of academic strength, *ii)* there was a flexible organisational response by the university to creating a new structure to meet these needs, *iii) r*egional development funding was available to start-up costs, *iv)* new activities were developed to extend the partnership's strength and *v)* a realistic business plan was developed to guide development of partnership.

Source: Mora, J.G., Detmer, A. and Vieira, M.-J. (2010), Good Practices in University-Enterprise Partnerships GOODUEP, *www.gooduep.eu*

3.5 Strategic challenges and innovation policies

To address the science and innovation challenges the Spanish government has developed several planning tools in the recent decades. For example, the National Plan for Scientific Research, Development and Technological Innovation had considerable impact at the regional level, with Andalusian participation amounting to 12% of the total aid granted. The most recent plan, the 2008-11National RDI Plan is focussing on knowledge and capacity building, R&D co-operation, sector-based development and strategic actions. This plan introduces a set of instrumental lines, several of

which impact higher education institutions notably the efforts to train researchers, to enhance science and technology infrastructures, to stimulate the use of knowledge and technology transfer and to strengthen governance institutions.

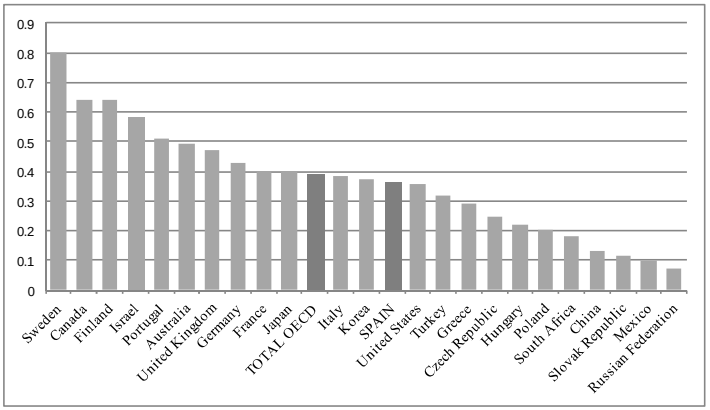
The Regional Government of Andalusia has launched a number of innovation policy initiatives within the framework of the Andalusian Plan for Research, Development and Innovation 2007-10 (PAIDI). The regional government has exclusive competence on Andalusian centres and research structures. It can influence research directions, monitor local public R&D and launch evaluation projects. Andalusia has been allocated a significant share of the structural funds allocated to Spain (30.2% for the 2000-06 period and 39% for 2007-13). The Regional Government of Andalusia has the means to manage grants and allocate financial aid for the training of researchers, the dissemination of science and the transfer of result to firms and start-ups. Acting as consulting bodies universities play an important role in the design and co-ordination of the Andalusian RDTI systems.

A degree of co-ordination with the national policy is realised through the Inter-Ministerial Commission on Science and Technology (CICYT) and is also operating within the Ministry of Education and Science (MEC). Regions and Andalusia are therefore important players at national level in Spain.

National policy

In Spain, 26% of gross expenditure on R&D (GERD) is performed by the higher education sector. In 2008, in terms of the expenditure on higher education R&D (HERD) as a percentage of GDP, Spain is ranked fourteenth in comparison with the OECD countries: its expenditure on higher education R&D as a percentage of its GDP reached 0.36% as compared to OECD average of 0.39%. Business and industry funded 8.3% of the Spanish university R&D in 2007 compared to the OECD average of 6.5% (see Figures 3.1. and 3.2.).

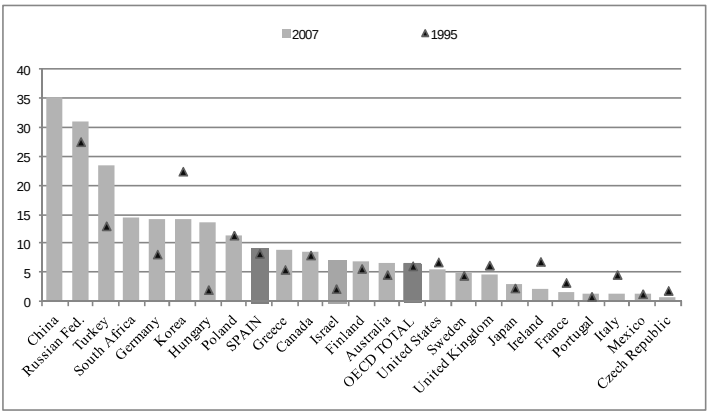
Figure 3.2. HERD as a percentage of GDP in selected countries, 2008



1. Or nearest available year.
2. Note: For technical reasons, these figures use Israel's official statistics, which include data relating to the Golan Heights, East Jerusalem and Israeli Settlements in the West Bank.

Source: OECD (2009), Main Science and Technology Indicators, OECD, Paris.

Figure 3.3. Percentage of HERD financed by industry in selected countries, 1995 and 2007



1. Or nearest available year.
2. Note: For technical reasons, these figures use Israel's official statistics, which include data relating to the Golan Heights, East Jerusalem and Israeli settlements in the West Bank.

Source: OECD (2009), Main Science and Technology Indicators, OECD, Paris.

A key objective of the Spanish RDI policy has been to expand the private sector capability for innovation and a number of instruments has been developed to support this goal. The one with the longest tradition is the Centre for Industrial and Technological Development (CDTI), an agency integrated in the structure of the Ministry of Industry. It has been consolidated as the main engine for encouraging RDTI in Spain. Its main instrument is the co-financing, up to 50% in most cases, of specific projects at the initiative of enterprises.

The share of Andalusia of the number of CDTI projects and the importance of the CDTI grants is about 5%, compared to the 15% for Catalonia and 22% for the Basque country. Given that the projects are presented at the initiative of the firms and that they go through a demanding selection process based on innovation and technology, this statistics confirms the persisting weak performance of Andalusia.

Another important milestone of the Spanish innovation policy was the launch in 2005 of the Strategic Plan INGENIO 2010 that aimed at fulfilling the Lisbon Strategy on innovation by 2010 (see Box 3.13). There is a significant gap between Spain and the EU in the RDI area, both in terms of total R&D spending as a proportion of GDP and in terms of the business contribution to funding this investment. Spain also lags behind in most Information Society indicators. The INGENIO 2010 programme was thus meant to combat the weaknesses, which restrict Spain's economic competitiveness and growth. In order to reach the Lisbon target, the private involvement in R&D was expected to amount to 55% of the total – from a low 48% in 2003. Furthermore, the goal was that the percentage of the GDP related to ICT would improve from 4.8% in 2004 to 7% in 2010. In order to achieve these goals, an annual increase of 25% for the state budget on R&D was decided for the period 2005-08.

Box 3.13. The Spanish government INGENIO 2010 Programme

The INGENIO 2010 programme was launched in 2005, following the reactivation of the EU's commitment under the Lisbon Strategy to set 2010 as deadline to bring the percentage of the European investment in R&D as close as possible to 3% of the GDP. It aims to bring about a gradual focus of resources on strategic actions designed to meet the challenges posed by the Spanish RDI system. To achieve this, it will allocate a significant portion of the annual minimum increase of 25% in the general state budget for RDI to strategic actions which can be grouped into four major instruments CONSOLIDER, CENIT Programme, AVANZA Plan, EUROINGENIO.

CONSOLIDER projects consists of stable financing (5-6 years) of research networks with sufficient capacity to tackle large-scale projects, preferably in areas closet o the knowldege frontier. Funding is EUR 1-2 million and may be acquired as a subsidy or a loan. Permanent reserach bodies may also be created. CONSOLIDER consists of Consolider projects, CIBER projects and 13 Programme.

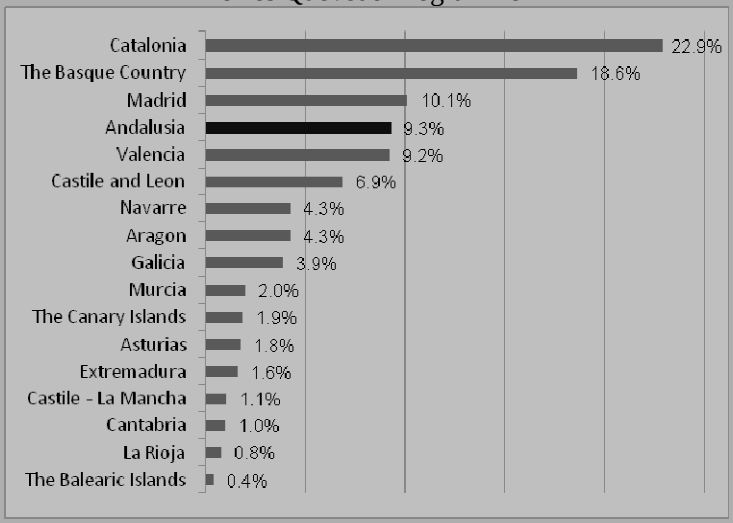
CENIT Programme (National Strategic Consortiums for Technological Research) stimulates RDI co-operation among businesses, universities, public research bodies and centres, science and technology parks and technology centres. The CENIT Programme includes CENIT projects, The Torress Quevado Programme and the NEOTEC programme. The CENIT projects co-finance public-private R&D for a minimum duration of four years and a minimum budget of EUR 5 million per year (50% from the private sector and 50% from the public funding allocated to public research or technology centres The programme is managed by the Centre for Industrial and Technological Development (CDTI). CDTI's total budget for financing projects has grown from EUR 125 million in 1996 to EUR 227 million in 2002. The Torres Quevedo programme promotes the integration of PhD and technologists in the private sector, while the NEOTEC programme is a venture capital fund which aims at co-ordinating different venture capital funds and helps create and strengthen technology-based firms. The fund seeks to create 110 new companies by 2008 and 1300 by 2010.

In 2004, 53 Andalusian firms took part in CENIT, representing 6.5% of the national total participation).[8] In the Torres Quevedo programme, Andalusia ranks the fourth among the Spanish regions with 9.3% of the total funding for Spain. As in the case of competitive CDTI projects, Catalonia and the Basque Country are the top performers among the Spanish regions, accounting for 40% of the total and more than double of their representation in population terms.

Box 3.13. The Spanish government INGENIO 2010 Programme (continued)

Integration of PhD to the private sector by regions (2001-08)

Torres Quevedo Programme



Source: COTEC (2006) COTEC Informe 2006 Tecnologia e Innovacion en Espana, COTEC, Madrid; EC Directorate General Research (2009) ERAWATCH Country Report Spain EC Directorate General Research,Brussels

AVANZA Plan 2006-10 for the development of the information society in Spain is based on five areas of action. In 2006, agreements between regional and central government have made it possible to mobilise regional aid worth EUR 135 million, in addition to the EUR 38 million contributed by the national state administration.

EUROINGENIO 2010 is a plan which aims to improve the share of funding that Spain receives from the EU 7th Framework Programme. The target is 8% of the total budget of over EUR 50 521 billion which is equivalent to Spain's economic weight within the European Union. Under the previous framework programme, Spain obtained the level of 5.9%. EUROINGENIO 2010 will give a considerable boost to Spanish RDI in Europe. This umbrella plan encompasses four programmes – EuroScience, EuroHealth, Tecnoeuropa, Innoeuropa – which had a combined budget of EUR 15.6 million in 2007.

Source: Programmes to Foster Research, Development and Innovation –INGENIO 2010 – Spanish Ministry for Science and Innovation, webpage *www.micinn.es*. See also Granados V., *"A diagnostic of the Andalusian Economy"*, in SMEs, Entrepreneurship and Local Development in Andalusia, OECD, Paris

Another important PROFIT-programme for the Promotion of Technological provides support through interest-free loans for competitive research projects by firms and/or public research institutes. The Ministry of Industry manages the participation when firms are the main beneficiaries and the risk is low, while the Ministry of Science and Innovation manages the participation of public research institutes and firms in the very early phases of R&D. Projects are small-scale (EUR 80 000 per project) and low risk, since they need to reimburse the loans over a short period.

Firms propose specific projects related to the priorities identified by the central government (health sciences and biomedicine, agro-food technology, ICTs, production and design technologies, environment and renewable energy, new material and nanotechnology, sustainable mobility and security objectives) where the selected projects are funded via grants. There are key requirements the projects must include: *i)* at least six members in a consortium which includes at least two large private enterprises and an equal number of SMEs, *ii)* two research centres associated with or sub-contracted by participating firms which make up 25% of the total budget and *iii)* the companies provide half the funding necessary for the project. Projects approved in the first round involve 178 firms (51% SMEs and 49% large firms) and 208 research groups in universities, public research centres and technology centres (representing more than 800 researchers FTE).

Within the CENIT and PROFIT programmes there are several specific actions: *i*) Mezzanine loans to university spin-offs and public and private research organizations, as well as technology centres, enterprise incubators and science and technology parks, *ii*) The INNOEMPRESA programme provides grants for innovation projects (in production organization, marketing and sales management, environmental management, energy efficiency, logistics, distribution and design) and *iii*) Networking of technological centres. This action aims to help business groups or associations explore their technological needs and consider the creation of new technological centres via the CREA programme, to boost support of the PROFIT scheme for technology centres, to foster the creation of consortia among technology centres (at least three technology centres from three regions must participate).

The most important reports on Spanish innovation policy including the last COTEC report and the 2008 OECD DSTI document on the Spanish innovation policy share the view that Spain has to tackle three main challenges in order to strengthen its innovation performance: there is a need to: *i)* increase the industry's expenditure on R&D, *ii)* increase public/private co-operation and *iii)* overcome the lack of qualified RDI human capital. The

Spanish government has embarked on a number of new programmes to provide remedies and help regions like Andalusia to reach the position where they can achieve their innovation potential. It is too early to assess the success of these programmes. However, the INGENIO programme appears to have failed to reach its objectives. Data show that in 2007 the overall R&D weight in the country's GDP was lagging behind 0.23%. For the BERD, the data for 2007 were lower than the 2003 performance (46%), thus a deviation of 4.5%. There is considerable room for improvement, especially in Andalusia.

In Spain, a recent tax reform has reduced the general corporate tax rate by 15% for all companies, in one year for SMEs (from 30 to 25% by 2007) and in two years for the rest of firms (from 35% to 32.5% by 2007 and to 30% by 2008). The reform has also introduced a new discount of 40% in the social charges corresponding to R&D staff for the company that cannot be combined with the use of R&D tax credits on corporate taxes. Finally, the tax reform has established a progressive reduction (8% for 2007, and 15% for 2008) in the level of the R&D tax credit. The current system of R&D tax incentives will not be available until 1 January 2012. However, the central government envisages evaluating the relative effectiveness of the two alternative R&D support measures (reduction in social charges for R&D staff versus R&D corporate tax credits) before the end of 2011 and will decide which one is better adapted to the needs of Spanish firms.

The higher education sector is a main stakeholder for success at least for the challenges of increasing public/private co-operation and overcoming the lack of qualified RDI human capital. What is crucial here is to try to respond to the instability of the university-industry collaboration: a challenge that is common to all Spanish regions but that is exacerbated in Andalusia.

Regional innovation policy in Andalusia

In 2004, the Regional Government of Andalusia made an important step towards a better integration of RDTI policies with the creation of the Regional Ministry of Innovation, Science and Enterprise. This entity merged the former Ministry of Employment and Technological Development with General Directorate for Universities. In spring 2010, as a result of the economic crisis a string of mergers and re-organisations took place in the regional government and a new Regional Ministry of Economy, Innovation and Science was established. The new arrangement is expected to bring along better co-ordination of economic development, university and innovation policies.

The Regional Ministry of Economy, Innovation and Science is in charge of the Plan for Innovation and Modernisation of Andalusia 2005-10 (PIMA).

This plan complements the national policy, addressing the specific regional needs of Andalusia. The 286 actions of PIMA are grouped in 31 strategic areas with 82 objectives. Most significant ones are the promotion of the knowledge industries and the universities (EUR 2.6 billion) and entrepreneurial promotion (EUR 1.6 billion). Other major items relevant to the higher education sector are: the creation of a technological co-operation for quality in research, implementing a plan of incentives for professionals in universities, facilitating the access to internet and digital public services for families and creating the Technological Corporation of Andalusia involving the most innovative companies, research groups, financial entities and the regional government. The current RDTI policy is also outlined in the Andalusian Plan for Research, Development and Innovation 2007-13 (PAIDI). This plan integrates the previous measures and defines a new policy mix.

The central position of the public sector and especially the research universities in the Andalusian innovation system is reinforced by the priority given to them in the strategic plans of Andalusia. A recent review of the evolution of science and innovation policies in the Spanish regions suggests that Andalusia is a case in which a strong academic policy community began to form when national and regional innovation strategies became more important. Universities forged links with the regional government and other public agencies and assumed a key role in the design of regional science and technology policies. Recently, however, there has been a shift of focus towards innovation in industry and fostering university-industry collaboration.

The Regional Government of Andalusia has notably emphasised the need to create more technology-based spin-offs (EBTs) and has designed programmes for that purpose. For example, the ATLANTIS programme identifies the best technological enterprise creation in the country and tries to attract them to Andalusia. The CAMPUS programme is designed to foment the creation of technology-based spin-offs (EBTs) through the creation of a conducive financial environment. The university acts as a coach for the projects. The ATLANTIS and CAMPUS programmes are managed by the IDEA (the Agency for Innovation and Development) and have relatively small budgets. Participative loans are provided by INVERCARIA (the venture capital agency).[9]

Both the national and the regional government have set up a comprehensive spectrum of innovation policy measures and customised instruments. The Spanish government has implemented a succession of RDTI Plan over the two last decades, drawing on the experience accumulated with previous exercises. In the field of technology transfer it has not only conceived initiatives tailored to PRO (INNOCASH) and to the

CSIC (creation of the company CSIC-K2B), but also targeted universities with CENIT and PIIC (Concerted Industry Research projects) programmes. The Andalusian regional government has also pioneered several plan for research and innovation (PAI, PLADIT, PIMA and PAIDI) and regularly improved its methodology. The regional development agency IDEA has developed multiple initiatives and incentives adjusted to underperforming firms, risk-oriented small and medium-sized businesses or clusters[10]. Many of these initiatives involve the participation of the central government through agreements, drawing partially from state budgets and are linked with national programmes such as CDTI or INTEREMPRESAS.

The regional competitiveness approach argues that regional capacity can be nurtured and developed by identifying their competitive advantages. Furthermore, public investments must be aligned with economic niches (Porter, 1998 and 1999). Table 3.4 shows the progress made in Andalusia in terms of the four essential elements for regional competitiveness in the global economy: strategy, governance, innovation and entrepreneurship. While strong progress has been made in developing strategies and governance structures in Andalusia, gaps are visible in terms of entrepreneurship and innovation. Furthermore, the policy instruments have tended to proliferate, leading to a complex network of innovation actors and intermediary organisations and difficulties in co-ordination and monitoring the rate of return of public investment.

The challenge for Andalusia is therefore not to widen the range innovation policy measures and notably those impacting higher education institutions but to improve prioritisation and consolidate the transfer of knowledge to firms. This would entail in particular: i) placing greater emphasis on applied research at universities to increase the chances to turn them into innovation, *ii)* improving the balance between policy packages targeted at firms and universities and *iii)* enhancing collaborative work between universities.

Table 3.4. Andalusia's competitiveness framework and universities' role

Essential ingredient	Target (ideal)	Andalusia (actual)
Strategy	To identify the region's distinct competitive advantage. To align public and private actions necessary to seize it.	• Strong leadership provided by the Regional Government of Andalusia in the absence of private sector involvement. • Significant progress made in achieving a shared vision and engagement among key stakeholders. • Limitations in evaluation culture and evidence base to monitor progress of a large number of small-scale programmes. High degree of dependency on public funding.
Governance	To supply a framework to unite public, private and non-profit leaders as a collective guide and owner of the strategy.	• Organisational disconnect between the regional ministries in charge of workforce development and innovation. • No tertiary education system but separation between universities and vocational higher education. The Andalusian University System is steered at the regional level by the Regional Ministry of Economy, Innovation and Science. Vocational higher education sector is under the responsibility of the Ministry of Education. • The Andalusian University Council draws together regional government, universities and university social council and Andalusian Parliament, but has no student representation.
Innovation	To link the region with new technologies and new ways of working and living that can transform the region's economic and social assets.	• The Andalusian Knowledge System created by the regional government with a dense network of intermediary organisations, technology centres and science parks to boost university RDI and knowledge transfer in the region. • Universities focus on knowledge generation (research publications) rather than on knowledge transfer and have weak links with business and industry. • Limited focus on low-tech SME-based industry and non-technology fields.
Entrepreneurship	To provide a fertile climate in which new ideas can be transferred successfully into the market place.	• Low but developing entrepreneurial culture. • Universities' entrepreneurship activities and support structures are at early stages of development and focus on new business formation in high-tech fields. • Regional government's support to small and medium-sized enterprises is ample but difficult to access.

Source: Adapted from Drabenstott, M. (2008), "Universities, Innovation and Regional Development: A View from the United States", *Higher Education Management and Policy*, Vol. 20, No. 2, OECD, pp 43-55

Conclusions and recommendations

The Regional Government of Andalusia is committed to making innovation a pillar of Andalusia's economic development and placing universities at the heart of the regional innovation system. It has excelled in areas of planning, co-ordination, analysis, goal setting, prioritisation and consensus building. It has a coherent plan with well-articulated long-term goals and has achieved good vertical and horizontal co-ordination of the national and regional plans to stimulate innovation and the knowledge economy through the CICYT (Inter-Ministerial Commission on Science and Technology). It has pioneered new agencies and organisational arrangements and created a dense network of innovation support institutions and intermediary organisations. It has increased mobility and connectivity in the region. It has also made important investments to engage the university system with regional development, which now plays a key role in the knowledge and innovation support system in Andalusia through policy design and being the main beneficiary of the public R&D funds and technology parks since the 1990s and under the PIMA.

The Andalusian University System has made considerable progress in improving the knowledge generation and R&D capabilities. The number of research groups in universities has more than doubled over the last two decades (1 746 in 2007 compared to 800 in 1989) leading to an increasing number of academic publications. A complex machinery of technology transfer institutions has been established to ensure that R&D contributes to innovation, but it remains to be seen whether this dense and relatively recent infrastructure will deliver significant results.

At the same time, however, the organisational disconnect within the Regional Government, the fragmentation of the national and regional innovation system and the necessity to absorb large flows of funding have resulted in many small scale, partly overlapping programmes, agencies and initiatives at the regional level. The regional innovation system remains to be dominated by the public sector while the contribution of business and industry remains limited. As in the rest of Spain, the share of higher education research financed by the private sector has slightly declined compared to the mid-1990s. There are also imbalances between public and private spending in R&D and applied innovation and a relatively strong top-down approach of the government at different levels.

R&D assets are concentrated on the research-intensive universities. The commendable increase in knowledge generation (i.e. academic publication) is no guarantee that R&D is translated into innovation and into new products and processes that are tested in the market and eventually contribute to creation of new jobs and/or reduced costs. Despite significant progress, the

number of patents and spin-offs from the Andalusian universities remains low and the spin-offs do not appear to be able operate independently in market conditions. Since 2006, the number of technology-based companies created by universities has ceased to grow and the number of patents granted to universities remains at a modest level. Furthermore, the lack of funding for early stage firm formation and the insufficient venture capital remain problems.

Andalusia suffers from a lack of dynamic clusters, a low level of applied R&D and innovation due to the predominance small and medium-sized enterprises (SMEs) in traditional sectors. Different types of "lock-ins" are present in the region, including for example narrow orientation of knowledge providers and an over-emphasis on high-tech based development.

There is a low absorptive capacity and nascent innovation culture in the small and medium-sized enterprises (SMEs) and a lack of tradition of collaboration between the SMEs. One consequence of this is a poor articulation of demand for services from the universities for the SME sector. Support for innovation remains limited and fragmented within and among universities. There is currently no effective guidance system for business to identify where best to source support for innovation and limited attempts to connect technologically-oriented centres with business faculties and with other disciplines to provide support for service and industry. While the main emphasis is on science and technology-driven innovation, there is a need to improve incremental demand-led innovation and research in non high tech and traditional industries of relevance to the region, such as construction, tourism, transport, distribution and logistics, new materials and green technologies. Cluster development should be conceptualised across the manufacturing-service divide, to connect for example agribusiness cluster with tourism. Excellent framework conditions in place, such as digitalisation and connectivity, should be mobilised for SME development.

There is a lack of information and data on innovation performance within the private sector and also within universities. There has not been a detailed investigation into the nature of innovation within firms, the barriers and problems and the experiences of collaboration with universities. Entrepreneurship attitudes among university faculty and students remain underdeveloped. There was limited evidence of enterprise support being mainstreamed in degree programmes and through supporting infrastructures. Where such support existed, it was fragmented with limited collaboration across universities in the region.

The OECD review team recommends that the following measures are taken to promote regional innovation:

- In the light of the reduction in funding, the regional government should take steps to rationalise – reorganise and reduce – the number of overlapping intermediary organisations, agencies and initiatives and focus on a few promising fields while continuing to develop, diversify and upgrade the existing industries and SMEs. The regional government should improve inter-ministerial collaboration in order to address the pressing needs for workforce development.

- The regional government should improve internationalisation of the region, its business sector and universities through attraction of talent and foreign direct investment. More attention should be given to the design of policies for attracting high skills and professional technical labour (students, researchers, IT specialists, research scientists etc.). Policy instruments include employee tax incentives, repatriation schemes and improving the attractiveness of academic careers. In Quebec, for example, the government is offering five-year income tax holidays to attract foreign academics in IT, engineering, health science and finance to take employment in the region's universities. In Finland, Nokia has invested in the cultural adaptation of foreign IT workers as a way to improve productivity. Given that these policies need to be customised, talent attraction initiatives may be better designed by regional bodies that have strong industrial connections and a good knowledge of the local labour market. To be more effective, these policies need also to be an integral part of the international co-operation strategy of the region. They can be coupled with initiatives to attract foreign investment, an area where Andalusia is still underperforming (FDI amounted on average to only 1.5% of the Spanish total for the first half of the decade) and where new incentives and policy support is needed.

- The regional government should reduce the bureaucratic burden on companies, new business formation and development, and stimulate entrepreneurship education. It is crucial to better diffuse a risk-taking culture in the academic world and have a detailed entrepreneurship teaching programme rather than impose a compulsory and vague package for each student. Universities should support entrepreneurship throughout the curriculum and build comprehensive support programmes encompassing entrepreneurship training, practical experience of creating new businesses for groups of students and incubation facilities together with seed funds for new graduate ventures. The recognition of the need to promote entrepreneurship training programmes by the regional government is

important, but this commitment will only be able to deliver tangible results if at the same time the bureaucratic burden on companies is significantly reduced.

- The regional government should seek to encourage greater collaboration between universities through programmes, joint investments in R&D facilities and incentives. At the same time, stronger efforts should be made to encourage university specialisation and to promote international, national and regional networking by mobilising virtual and digital systems already in place. Andalusian universities should also develop a practical engagement with business and a collaborative way of referring enquiries from businesses and industry with the help of virtual and face-to-face collaboration. All Andalusian universities have strategic plans. While the youngest universities recognise local and regional engagement as one of their missions, this is less clear for the older institutions; collaboration is in any case not a part of these strategies. More can be achieved by better established and designed university collaboration and enhancing and emulating the International Excellence Campus type collaboration. Reviewing the state of collaboration in the university sector would provide an opportunity for universities to rethink their priorities and to specialise. In that context, the example of Finland can be contemplated. There, the Ministry of Education has requested higher education institutions to jointly devise regional strategies.

- The University of Andalusia System should evaluate the universities' regional engagement. Some universities, mainly through their social councils, have commissioned studies of the socio-economic impact on their environment. There is no formal process for reviewing current regional engagement arrangements of the universities in Andalusia, but evaluation is limited to a few fragmented initiatives. There is a need for higher education institutions to collectively construct an overall monitoring and evaluation system that would cover the wide range of regional development issues with a special focus on innovation-relevant activities. This should be supported by a coherent and informative system of indicators for the measurement of the regional contribution of universities. The system should be able to collect information at the organisational level, the university level and the regional level. Furthermore, the regional government and the Andalusian universities should collaborate to improve evidence basis for regional and institutional decision making through collection, monitoring and analysis of robust data. Common

university indicators should be defined, transparency of results should be guaranteed, monitoring and following up the success of programmes should be strengthened and the public dissemination of results improved.

- To improve productivity and innovation in traditional industry and services, and regional development, the regional government should align the ongoing programmes, such as Talentia, with the region's needs and establish special mobility programmes to link the students, graduates, post-graduates and academic staff with the local business and industry in a more systematic way. Models for linking postgraduate students with the local industry include the Knowledge Transfer Partnership Scheme in the United Kingdom that has improved the competitiveness of the companies through introduction of some form of innovation or new technology and around 75% of postgraduate associates are offered jobs in the companies.
- The universities should see job creation as the focus of innovation activities in Andalusia. Technology Transfer Offices (OTRIs) should assume a wider role in collaboration with industry. In order to ensure that they fully play their role in cementing the value chain, OTRIs will need to be strengthened with professional staff.
- Incentives for universities should be strengthened to increase their capacity to act as technology transfer "agents" to bring non-local knowledge to the region and to create community partnerships.

NOTES

1. The Regional Policy of the European Union is a policy with the stated aim of improving the economic and social cohesion to reduce the gap between the regions in the EU. During the programming period 2000-06, Objective 1 (convergence) regions were (NUTS-2) regions most at need of the regional policy. To qualify for objective one status the GDP per capita for the region had to be below 75% of the EU average; areas with very low populations also qualified for Objective 1 status. The recognition of Objective 1 status was usually accompanied by structural funds support from the European community as part of its regional policy. During the current programming period 2007-13, 81.54% of the funds support the Convergence Objective Regions (those below 75% of the EU-27 GDP per capita average), 15.95% of the funding are concentrated in the Regional Competitiveness and Employment Regions (those with a GDP per capita over 75% of the EU-27 average) and a 2.52% goes for different forms of European Territorial Co-operation.

2. This sum, EUR 12 327.01 million consists of funding from European Regional Development fund (EUR 9 451.16) and European Social Fund (EUR 2 875.85 million). In addition to this, the Spanish government does not seem to have reduced its budgetary support targeted at the Andalusian regional innovation system and has launched a sustainable economy fund of EUR 20 billion. It is too early to evaluate how this investment will affect innovation spending in the region.

3. The University of Seville is the largest university with 57 000 undergraduate students. In Granada, has an enrolment of 54 000 undergraduate students while Malaga has around 33 000 undergraduate students. Students in UNIA are not included in the figures because it only has postgraduate students.

4. The dynamic of society has changed from one of strong boundaries between separate institutional spheres and organisations to a more flexible overlapping system, with each organisation taking the role of the other. The university is now a "firm founder" through incubator facilities; industry is an "educator" through company universities and government is a "venture capitalist" through the Small Business Innovation Research (SBIR) in the United States and other programmes.

5. The operative nucleus of MASTRIX includes the contributions and technological needs of 1300 Innovation and Technology centres, university research groups and collaborating organizations. As well as holding all this information, MASTRIX connects the technology on offer to the demands of 10 000 Andalusian SME.

6. This study developed a typology of businesses characterised by the extent to which they focus their interest on specific groups of participants in the innovation process, based on information gathered from a survey of 737 businesses in the Andalusia region. The features of the largest group in the sample were a high degree of innovation both in product and processes, they also tend to trade mainly in national and international markets as opposite to regional markets. This group tends to be based in science and technology, therefore representing a concentration of the most innovative businesses of the region.

7. According to this study, 32% of firms participate in informal networks. Internships and training of postgraduates are the second most important way of university-industry collaboration (%). For the rest of the collaborative activities, 15 to 25% of the firms have benefited from consulting activities, joint research projects and training of enterprise workers by the university, 5 to 15% of the firms use university facilities and participate in personnel exchange and less than 5% of the firms have been involved in spin-offs or start-up creation, licensing or sales of patents. On the university side, research teams mainly focus on consultancy (38%) and research commissioned by firms (34.8%). There is a notable presence of activities related to human resources that flow both ways: specific training delivered by the research teams in firms (24.2%) and exchange of science and technology personnel (12.4%). In-house R&D projects and the use of university facilities (8.4%) are less common. The least frequent activities include the exploitation of patents, the creation of spin-offs and participation in joint ventures (10.1%, 6.1% and 2.4% respectively).

8. As an example of the participation of Andalusia in this programme, three large-scale projects were approved in 2008 with large companies: Abengoa Solar New Technologies (EUR 24.3 million); Airbus España, S.L., Innovation in advanced composites (EUR 34.8 million) and Puleva Biotech, S.A. Scientific research on new generation of food products to prevent obesity (EUR 27.2 million).

9. 135 projects representing a EUR 13 million investment are operational within the framework of this programme.

10. IDEA provides support and assistance to the elaboration of strategic business plans for the following traditional clusters: marble, ceramics, wood and furniture; manufacturing of metal products, biotechnology,

manufacturing of basic and intermediate tools and machinery products for the agriculture.

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Chapter 4: Rural development

Rural areas in Andalusia represent a sizeable share of the population in spite of the reduction in agricultural employment and migration to urban areas: the municipalities with less than 10 000 inhabitants which are the majority (637 out of 770) account for 23% of the total population of Andalusia, over 1.8 million people (Institute of Statistics of Andalusia). As in most OECD countries, the rural areas have lower levels of educational attainment and GDP per capita than urban centres. Furthermore, ageing is a growing concern.

At the same time, the rural areas of Andalusia possess strong assets: a rich natural and cultural heritage which provides a solid basis for further tourism development, an agricultural sector with fast developing organic food production and a big potential in renewable energies. In rural policy terms, Andalusia has also shown its capacity to engage in innovative bottom-up approaches in order to diversify the local economy and strengthen social cohesion.

This chapter highlights the efforts made by the universities in supporting sustainable development in rural Andalusia. The chapter concludes with recommendations to enhance universities' contribution to rural development.

4.1 Rural features in Spain and Andalusia

Spain's survey of household budgets in 2001 (OECD, 2009)[1] shows that income levels are lower for rural populations. The national average for rural household income was at that time of EUR 12 000, 18% lower than for urban households. An analysis by region shows variations as compared to the urban average: Andalusia is in an intermediate situation, with rural income varying from 80% to 90% of urban household revenue[2].

Educational attainment rates in Spain, as measured by the 2001 census, partly reflect the urban/rural divide. The illiteracy rate within urban centres of over 50 000 inhabitants was of 2.1% as compared to 3.4% in municipalities with less than 5 000 inhabitants. Likewise, 10% of the population in the bigger agglomerations above was without studies and 18% in the case of the smaller municipalities. Urban municipalities had at least 50% of inhabitants with secondary education (38% in rural areas) and 17% with tertiary education (7% for rural areas).

While Spain's PISA results are in general very poor and considerably below the leading countries, the performance of rural students in Spain, as measured by PISA in 2006 is very close to urban averages, whether applying to reading, mathematics or science. However, a breakdown by regions shows that the performance of Andalusia in PISA is below the Spanish average and that of the OECD for rural areas.

Another approach to rural/urban disparities investigates the revenue, employment (number of available jobs per inhabitant) and unemployment rates in rural areas as compared to national or regional averages. This method is used by the Innovation and Development Agency of Andalusia (IDEA) in its twice yearly appraisal of economic activities within the municipalities of the region.[3] The data published in the second part of 2009 show that 541 rural municipalities (out of a total of 770) in Andalusia are in a particularly difficult economic situation: these have 1 446 602 inhabitants corresponding to 16.76% of the population. These municipalities are located in all of the provinces but mostly in the interior part of Andalusia.

The world economic and financial crisis has had a strong impact on Spain and particularly Andalusia, with the second highest unemployment rate among the autonomous regions (see Chapter 1). In the rural areas, the situation is even worse. In future, rural development measures in Andalusia will need to systematically exploit the assets of the countryside while strengthening the innovative approaches already pursued by rural policy in the region.

Universities, well distributed across Andalusia, have an important role to play in contributing to understanding of these major changes and by aligning their teaching, R&D and service resources aligned with rural and agricultural issues. The following examples highlight some approaches mobilising the rural assets of Andalusia and come from the universities located in provinces with a well-defined rural character: Almeria, Jaen, Huelva but also Cadiz that, alongside the industrial agglomeration of the Port of Algeciras, has deeply rural features in some parts. The first three have universities that were created rather recently (1993) whereas the University of Cadiz, opened in 1979, is the only one in Andalusia that has campuses in four different locations (Cadiz, Algeciras, Jerez and Puerto Real). The smallest are Huelva and Almeria (10 000 – 11 000 students in 2007-08) and the largest Cadiz (close to 20 000) with Jaen standing at 14 500 students.

4.2 Community development in rural areas

A major asset for the future development of rural areas in Andalusia is constituted by forward-looking rural development policies, with national level frameworks being well used and completed by the region and its rural actors (farmers, entrepreneurs, NGOs). "*Rural policy in Spain is one of the most decentralised in Europe*" (OECD, 2009a) and it has recently been completed by new measures that will reinforce its multi-sector character, in particular, the new Programmes for Sustainable Development of Rural Areas (2008). Already in 1995, Spain integrated the LEADER bottom-up methodology and cross sector local initiative principles in its PRODER national programme. Spain was also the EU member that made the greatest use of the LEADER methodology within its rural development programmes by dedicating over 10% of its total rural development expenses to the approach (EU minimum: 5%). Within this context, Andalusia was the number one region in Spain for LEADER, which absorbed 12.9% of its total rural development budget (OECD 2009a)[4]. Currently, funding for the development of rural areas is channelled via the rural development policy 2007-13 which is partially based on LEADER initiatives.

Box 4.1. LEADER: bottom-up local development in the European Union

LEADER (*Liaisons entre Actions du Développement de l'Économie Rural*) is an European programme based on an integrated and endogenous approach to local development. Since 1991, the LEADER initiative has had three different editions. The programme was first launched for a five year period in 1991 and applied in 220 rural areas of the former EU 15 countries. LEADER II (1994-99) spread to 1 000 rural areas and to more than 1 500 in the enlarged EU 27 countries. The LEADER+ (2000-06) was the last edition of the LEADER as an EU rural development initiative. It had an emphasis on integrative strategies that connect all aspects of rural life. The last phase of the LEADER focused on the use of knowledge and technologies, improvement of quality of life, added value to local products and the increase of value of natural and cultural resources. This bottom-up programme based on a method for the definition, selection and implementation of small projects (many do not exceed EUR 2 000) in rural areas has met success and is now mainstreamed for the present EU programme period (up to 2013), many member countries having integrated LEADER principles and guidelines into their national rural development policies that are increasingly "place-based".

LEADER is based on eight principles: an area-based approach, a bottom-up approach, local partnerships, innovation, multi-sector integration, inter-territorial co-operation, networking, and decentralised management and financing, Most of these principles can be found today in rural development programmes in the EU countries. LEADER not only pioneered these in local development strategies but devised a methodology combining these different features of processes at grass-roots levels. Implementation of LEADER is voluntary: the public and private actors within a self-defined area based on historical, geographical considerations and/or local assets and know-how get organised as a Local Action Group (LAG) that includes representatives of civil society such as NGOs. A local development strategy is then devised by the LAG on the basis of inputs from workshops and citizen forums. Projects are submitted to board approval within the priorities defined by the strategy. Choice of projects is ensured on the basis of objective criteria and funding is also decided by the board that disposes of an annual budget integrating EU, national and regional contributions. Beneficiaries deliver milestone reports; evaluation is conducted by independent experts and/or specialists and researchers from universities.

Box 4.1. LEADER: bottom-up local development in the European Union (continued)

The participatory democracy approach has given new momentum to rural development: empowering people to think about their own future and how to use local assets amounts to recognising them as the best experts with knowledge of the local context and area. Unleashing the human capital potential requires capacitation and training, which is an integral part of the LEADER programme. Innovation in processes or content, including social innovation, is particularly important. LEADER also seeks to promote mutual learning: projects are interconnected through regional, national and European networks to exchange experiences and promote best practices by on-line access to shared resources and regular events.

Notable LEADER projects include: village renewal, youth clubs, promotion of female entrepreneurship, tourism as a second source of revenue for farming families, environmental protection, support to handicraft production and commercialisation of local products. Among the main outcomes of LEADER are new governance practices with increased co-operation between the national, regional and local levels requiring efficient vertical co-ordination; development of coherent local territorial development strategies promoting fruitful dialogue with regional authorities; a holistic vision of rural spaces going beyond traditional agricultural models, promoting sustainable economic diversification and social integration.

Source: http://ec.europa.eu/agriculture/rur/leaderplus/index_en.htm .

The European Union LEADER programme has provided an innovative example in local development providing tools for bottom-up capacity building and assessment. Tertiary education institutions in Andalusia, in collaboration with local and regional authorities, have played an important role in training community development practitioners, providing lifelong learning and re-skilling and up-skilling opportunities, conducting research into specific issues and best practices and developing co-operation and research opportunities. For example the University of Cordoba has developed a master degree programme in rural development for local action group (LAG) managers and hence helped the success of the LEADER activities.

Another notable example is CEADER, a Research Centre of Studies for the Rural Development, established by the International University of Andalusia (UNIA) in 1996 to carry out study programmes, teaching and research on rural development in Andalusia. It prioritises research on

problems of the regional development within the provinces of Andalusia and promotes social and cultural development of the Andalusia municipalities, with a multidisciplinary focus. CEADER contributes to rural development by: *i)* teaching activities and lifelong learning courses on rural development, *ii)* a library with 5 000 items on rural development, *iii)* research on tourism, agri-food, sustainability, historical and artistic heritage and capacity building and *iv)* collaboration with other universities in the region. No information was available on the impact of the CEADER activities. Also the UNIA centres such as the Baeza and the international co-operation office are active in rural development.

The universities of Andalusia have also engaged in a wide range of rural community development for example by providing further education and open university activities (University of Pablo de Olavide) and organising cultural events in remote communities (University of Huelva, University of Jaen and UNIA). However so far, many of the activities are often driven by individual academics and/or departments without institutional commitment or inter-institutional collaboration between the universities.

4.3 Improved connectivity

Within rural development policies in Andalusia, ICTs have received priority attention, now providing the region's rural areas with adequate infrastructure and services. In 2001, the regional government launched a plan of strategic initiatives for the development of the Information Society. One of the principal milestones of the information society plan was the Guadalinfo programme, started in 2002, aiming to create a network of public broadband internet centres (Box 4.2.)

Box 4.2. Guadalinfo Programme improving connectivity

The Regional Government of Andalusia has systematically improved the physical connectivity and mobility by developing the railroad network and increasing high speed trains. It has also made considerable investments in improving intra-regional connectivity, now providing the region's rural areas with adequate infrastructure and services.

Box 4.2. Guadalinfo Programme improving connectivity (continued)

In 2001, the regional government launched a plan of strategic initiatives for the development of the information society. One of its principal milestones was the Guadalinfo programme, started in 2002, aiming to create a network of public broadband internet centres. By February 2010 Guadalinfo programme counted with the support of the Regional Government of Andalusia, the Provincial Offices in each city and 692 municipalities with less than 20 000 inhabitants with a permanent local facilitator. 63 of these centres are located in disadvantaged areas. The current phase within the Information Society Plan for Andalusia aims to extend the network of centres to the fringe areas in these municipalities. This Information Society Plan for Andalusia (2007-10) is one of the major components of the Andalusian Modernisation and Innovation Plan (PIMA). (see Chapter 1).

Universities are playing a role in the Guadalinfo Programme, for instance the University of Granada has participated in the training of the Guadalinfo facilitators and in the development of the course provision. Various other ICT literacy projects are also being linked to the Guadalinfo Programme. For example the University of Cadiz and the University of Cordoba are developing a T-orientation tool to identity constraints that disabled people have in accessing new technologies. The results will be disseminated by Guadalinfo facilitators to rural areas.

Furthermore, the regional government's investments in broadband networks in the Andalusian University system and the online learning platform that pools the e-learning provision of Andalusian universities have helped widen access to higher education in rural and remote communities.

The authorities have also recognised the importance of the availability of high-speed internet in rural areas for the dissemination of innovation in small and mediums-sized enterprises. The network of technology centres in Andalusia (RETA) provides training and support to promote the use of ICTs by small firms also in rural areas.

Source: www.guadalinfo.es

4.4 Rural assets in Andalusia

Rural tourism

The assets of rural Andalusia include a rich natural and cultural heritage. Two national parks are declared as UNESCO World Heritage Natural Sites: the National Park of Sierra Nevada (Provinces of Granada and Almeria) and the National Park of Donana (Provinces of Huelva and Seville). In the Province of Jaen, there is the Natural Park of Cazorla and Las Villas (Jaen) but also the Renaissance towns of Ubeda and Baeza, the latter on the UNESCO list, alongside the better known urban sites of Seville, Cordoba and Granada.

The majority of tourism flows in Andalusia are domestic (see Chapter 1). Therefore the region is sensitive in the future to international tourism developments and competition, placing it in a favourable position for quality rural tourism.

Limited information was available about the universities' activities to support rural tourism, possibly reflecting the current R&D-focused innovation concept of the regional government and the universities in Andalusia. An interesting initiative that may have positive impact on rural tourism in Jaen is the development of the Andalusia Centre for Iberian Archaeology, that was established by the University of Jaen in 2003.

Since the region also has an important potential in terms of renewable energies (wind and solar energy, bio-mass), an important challenge for this sector will be how to ensure its development without incidence on a well preserved scenery that is part of the tourism attractiveness of Andalusia. It is unclear to what extent the universities are helping this to happen.

Stone and marble industry

While the focus of most RDI efforts in Andalusia are in science-based collaboration, the Regional Government of Andalusia has also taken steps to support the innovation in traditional sectors, such as stone technology. The University of Almeria has supported the Andalusia Stone Technology Centre (CTAP) for example through the joint efforts in the resin laboratory (*Laboratorio de Resinas*) that was established in 2008 and is physically located in the university premises (see Box 4.3.).

Box 4.3. Almeria Stone Technology Centre

Created in 2002 by a non-profit private foundation, the Almeria-based Andalusia Stone Technology Centre (CTAP) was the sector-based innovation and technology centre in Andalusia to develop high value solutions and projects and promote RDI in the Andalusian stone industry.

The stone sector accounts for around 400 companies and employs 9 000 people in the Macael marble region. The SME-based cluster suffers from the low level of specialisation, a lack of well-known brands and knowledge and control of market and distribution channels. Internationalisation is at incipient stages. After a period of decline until the 1990s, there has been evidence of renewed growth in the cluster.

The CTAP is a notable effort, created on the initiative of the industry. Partly funded by the European Union through the ERDF, the centre plays a key role in the development and dissemination of new technologies in the cluster. It has implemented a quality control initiative and international benchmarking programme to learn from good practice in other regions and countries. The centre is pursuing R&D projects in product and design, including diversification initiatives involving new marble furniture projects and the use of international artists and designers. The experimental industrial plant, "*where companies, researchers and technology players can develop innovative and high value projects*" is a EUR 7 million project to transform the region into a world-class leader in stone technology and innovation.

Source: OECD (2010), "Entrepreneurship, SMEs and Local Development in Andalusia, Spain", LEED Programme report, Paris.

Almeria Stone Technology Centre has a strong focus on RDI-based development and less focus on the lower forms of innovation to bring practical benefits to the SME-based industry through process innovation and upgrading the sector's knowledge base by vocational training. More efforts are necessary to understand the needs of the SMEs in order to improve productivity and develop market knowledge. Furthermore, OECD (2010) noted that the centre continues to rely on public support for the majority of its funds. There is a membership fee but (by 2007) private sources accounted for less than 50% of the funds. The majority of SMEs in the industry appear to be marginal to the centres activities: only 55 organisations are members, including regional government agencies. The strong focus on technological innovation may have failed to attract the more traditional SMEs. Finally, similar type of activities have elsewhere been linked with tourism efforts. This does not seem to be the case in the Almeria Stone Technology Centre.

Agriculture and agri-food

Agriculture sector in Andalusia retains an important role: its share in the regional Gross Added Value (4.9%) is greater than the national average (2.9%). Andalusia produced over 80% of olive oil in Spain (with Italy, the leading producer in the world), close to 45% of vegetables and slightly over 20% of citrus fruits in (Andalusia Economic Report, 2008). Denominations of origin and denominations of quality have contributed to regional specialisation, whether for wine (Jerez in the Province of Cadiz) or organic olive oil (Provinces of Jaen and Cordoba).

Because of its climatic assets and know-how in this sector, new niche markets such as organic agriculture are developing well. Since the beginning of the 1990s, Andalusia is the leading autonomous region in Spain for organic agriculture. In 2006, there were 6 195 organic farms in the region, nearly twice as many as in Extremadura, the second region for such production. More than half the organic land cultivated in Spain is in Andalusia (around 540 000 hectares) but it holds fewer processing companies than Catalonia (OECD, 2009, Gonzalez, 2007).

Notable international examples of universities supporting the local production come from California where the University of California, Davis plays a key role in the development of the wine industry (see Box 4.4.)

Box 4.4. University of California, Davis and the wine industry

The economic impact of the wine industry to regional economy of California is considerable: it generates 309 000 jobs in California economy, USD 10.1 billion in personal income and USD 52 billion to California State. The total contribution of the wine industry to the US economy is USD 125 billion.

The University of California, Davis, plays an important role in the wine industry. The Department of Viticulture and Enology at University of California, Davis was founded in 1880 by mandate of the California Legislature to develop California wine industry. Located 45 minutes from Napa Wine Country, the department today offers undergraduate and graduate degrees in the areas of grape growing and wine making and includes a pilot winery and two research vineyards, one located on the main campus, and the other in the Napa valley. The department has strong connections with wine producers and has produced many of the leading winemakers of the California wine industry.

Box 4.4. University of California, Davis and the wine industry (continued)

The Research focus has developed over the decades. In 1919-33, the research centred around viticulture and optimal growing locations and climates. In the 1950s, the focus moved to Malo-lactic fermentation enabled quality control and chemical control of flavours. In the 1970s and 1980s, there was a focus on quantitative sensory evaluation. In 2001, one of the most important vineyard operators in California, whose technical improvements and marketing strategies brought worldwide recognition for the wines of the Napa Valley, donated USD 25 million to the department. With the help of this donation, the Robert Mondavi Institute for Wine and Food Science (RMI) opened in October 2008.

While the universities in Andalusia all play a role oenology, so far the efforts have remained uncoordinated, partly reflecting the fact that Andalusia represents only 5% of the national wine production. Research in this field is conducted at the University of Cadiz, in conjunction with the top producers of Jerez. Particular focus is on market studies to understand the evolution of the international market for spirits as the share of Jerez has been diminishing in prime markets such as the UK. In addition, new products departing from the traditional taste of Jerez are being developed.

Stronger progress in aligning the university research efforts to local needs has been made for example by the University of Almeria which supports the networking of green house producers in one of the largest green house production areas in Europe and facilitates transition from traditional agriculture to modern precision farming, using modern technology and renewable energies. The university has also created a spinout company to market and export its expertise in modern green house production.

In the field of olive oil production where the University of Jaen has taken a leadership role in the attempt to move the industry towards higher value-added products (see Box 4.5.). Andalusia's annual production of olive oil amount to 400 000 tons per year, close to 25% of the world total, but most of this is shipped to Italy where value added operations such as branding and commercialisation take place. A million-and-a-half hectares are devoted to olive groves – one third of cultivated land – in the region, with 550 000 hectares in the province of Jaen, the leading producer, followed by the Province of Cordoba. The olive oil industry provides livelihood to over 250 000 families in Andalusia, with a whole set of related

industries (elaboration and packaging, manufacture of specialised equipment, production of fertilisers) contributing to local employment.

Box 4.5. University of Jaen and the olive oil industry

The University of Jaen has made important steps to become a major player in research and education linked to olive oil. It has developed a master degree programme in olive oil production covering all aspects of the industry from production and commercialisation to applications in the field of health. The graduate programme has been designed to help modernise the industry and introduce innovations in the production processes and final products.

The university is engaged in research on olive oil and its new applications. Major activities are channelled through the Olive Oil Technology Centre (CITOLIVA, established in 2002), of which the university is a trustee. CITOLIVA has focused its activities on technological development, production quality, competitiveness, new marketing techniques and product diversification by disseminating research results, and advising and providing services to olive oil firms. Current fields of investigation include olive oil health applications, for example the impact of olive oil consumption on ageing and the use of bio-mass, such as olive kernel.

The university is a partner to the UNICA project (Shared Research Unit on Olive Oil, *Unidad de Investigacion Compartida del Aceite*) being developed under the aegis of the Regional Government of Andalusia and located in GEOLIT, the Technology Park of Jaen, within the framework of the Agri-food International Campus of Excellence co-ordinated by the University of Cordoba in association with four other universities in Andalusia.

Finally, the university leadership is an active champion of the local olive oil efforts helping the local producers to build strong local brands.

In Huelva, which is the leading producer of strawberries and citrus fruit in Europe, the Institute of Local Development at the University of Huelva works on the commercialisation efforts of the citrus fruit and strawberries, but has also assumed a greater role in helping develop local strategies (see Box 4.6.).

Box 4.6. University of Huelva: The Institute of Local Development (IDL)

The Institute of Local Development (*Instituto de Desarollo Local*, IDL) is a research group created in 1990 by extension of a former research group of the University of Huelva denominated "Andalusian Geographical Studies". IDL's mission is to study the development processes in Andalusia and Latin-America, with a specific focus on analysis and development of local environments and development strategies. IDL is a multi-disciplinary group of 12 members including 4 university professors and counsellor to the Regional Ministry in Economy. The other members of the group are either associate or part time professors or work in the public or private sectors in territorial planning and environmental protection. The Institute has 21 associated researchers in Latin-American countries.

IDL conducts research and studies commissioned by public entities but also firms in the field of territorial development, sector analyses, and the environment, tourism and rural development. It is a non-profit association and draws its funding from grants and collaborative research contracts. The IDL activities are organised along three axes: teaching and international co-operation, applied research and general studies on various topics, usually carried out at the request of regional/local authorities. IDL has developed a master degree programme on "Territorial and Environmental Strategies in Local Environments" and delivers courses on rural development, tourism and other related subjects. International co-operation is carried out with other universities in Latin-America and Portugal, for example through congresses related to regional and local development and cross-border co-operation. In applied research with impact in rural areas, advisory services have been provided in particular to the agri-food sector in the Province of Huelva, to groups of municipalities and to the Doñana National Park.

The IDL research also relates to commercialisation of citrus fruits and strawberries, diversification of employment in rural areas and temporary work contracts in the field of agriculture. For instance IDL is helping to support local producers of strawberries to overcome problems in cultivation, by research on how to improve the appearance and taste of strawberry.

Universities have each developed their own outreach activities to support rural development in Andalusia, with funding from the regional government. Many activities are in place to benefit the rural development but in most cases there is a lack of robust data on the impact on the regional economy. Collaborative efforts between universities remain limited in this field. An encouraging step towards a broader cluster-based development and university collaboration in Andalusia is the Campus of International

Excellence in the agri-food sector between the universities of Cordoba, Granada, Jaen, Huelva, Cadiz and Almeria (see Box 4.7.). This project will be in a good position to address the challenges of the rapidly growing niche areas in agriculture and can help the universities to play a more important role in promoting the development of agricultural production and helping to transform the focus from raw material production to higher value-added products. It can also overcome weaknesses of the Andalusian innovation system, including the weak university-industry linkages, the lack of private sector involvement, the lack of collaboration between universities and with vocational education sector and workforce development and inadequate levels of internationalisation.

Box 4.7. Agri-food Campus of International Excellence: university alliance in Andalusia

The University Strategy 2015 was launched in 2008 by the Ministry of Science and Innovation to modernise the Spanish university system. It aims to enhance knowledge exchange through the strategic clustering. As part of the strategy, the ministry launched a competitive call for campuses on international excellence in 2009 and 2010. The 2009 call attracted 53 applications from universities or universities consortium. The Agri-food Campus of International Excellence (ceiA3) co-ordinated by the University of Cordoba and supported by the universities of Almeria, Cadiz, Cordoba, Huelva and Jaen was one of the nine projects that received national funding. The total funding for the ceiA3 was EUR 7.5 million in 2009. An important feature of the International Campus of Excellence programme is that national funding is provided as loans and not as subsidies.

By 2015, CeiA3 aims to build a national and international reputation in knowledge transfer, innovation and training in food process systems, agri-food safety and the environmental protection so that Andalusia will become one of the leading agri-food regions in the world. The five Andalusian provinces that host these universities are the leading producers and exporters of agricultural products, in particular olives, meat, cured Iberian products, wine, vegetables, fish and strawberries. The agri-food sector is one of the basic pillars of the Andalusian economy.

Specific aims of the CeiA3 include: improving teaching and scientific activity, developing an integrated social model, increasing knowledge transfer, fostering university collaboration with local and regional businesses and boosting the international presence. It brings together 225 research groups and more than 3 000 professors and researchers from across a part of Andalusia with more than 4 million inhabitants within an area of 50 000 km^2. The five universities offer 18 master degrees programmes courses related to the agri-food sector and undergraduate courses on veterinary, agronomist, forestry engineer, and technology and science of the food.

Box 4.7. Agri-food Campus of International Excellence: university alliance in Andalusia (continued)

The CeiA3 is supported by the Regional Ministry of the Economy, Innovation and Science of Andalusia. Formal agreements have been concluded with international, national, regional and local partners, including the Universidade Técnica de Lisboa (in Portugal) and University of Cranfield (in the UK) and the national research centre (CSIC). The CeiA3 aims to facilitate active participation of technology parks, technology centres and the Triptolemos Foundation, whose members include Spain's leading agri-food firms. The aim is also to involve more than 5 000 agri-food companies in knowledge exchange.

By 2010, the CeiA3 had created the Scientific Chair of Gastronomy in Andalusia, which is the first of its kind in Andalusia and the fourth in Spain. It had joined the Southwest European Space Territorial Co-operation Programme in "Agri-Food Network of Southwest of Europe (AGNOSE)" with Portuguese and French partners. The CeiA3 is now selecting eight technical training courses and five spring and summer Courses from the five member universities as part of its networking training initiative. First conference was organised in autumn 2010 for universities, research groups and stakeholders.

Source: Agri-food Campus of International Excellence, *www.ceia3.es*

Conclusions and recommendations

Andalusia has a major asset for the development of rural areas in forward-looking rural development policies, with national frameworks being well used and completed by the region. Andalusia has been the number one region in Spain for the European Union LEADER programme that has provided for bottom-up capacity building in rural areas. Universities in collaboration with local and regional authorities have played an important role in training community development practitioners (University of Cordoba), providing lifelong learning and re-skilling and up-skilling opportunities (University of Pablo de Olavide), conducting research into specific issues and best practices and developing co-operation and research opportunities (UNIA through CEADER, the Baeza site or the international co-operation office). The universities also organise cultural events in remote communities (University of Huelva, University of Jaen and UNIA). However, so far, many of these activities have been driven by individual academics and/or departments without institutional commitment or inter-institutional collaboration between the universities.

The Regional Government of Andalusia has made systematic efforts to improve connectivity in rural areas, providing them with adequate ICT infrastructure and services and a framework to improve productivity of the rural firms through high-speed internet. The Guadalinfo programme has created a network of public broadband internet centres in the rural areas. Furthermore, the regional government's investments in broadband networks in the Andalusian University system and the online university e-learning platform have helped to widen access to higher education in rural and remote communities.

Despite the progress made in the creation of bottom-up capacity building improved ICT infrastructure, full advantage has not yet been taken of the many assets of the rural areas. For example, while Andalusia has a rich natural and cultural heritage in rural areas, including national parks and renaissance towns, quality rural tourism has not yet reached its full potential and universities remain relatively passive players in the fields of hospitality and tourism. Similar situation prevails in agriculture which remains at the low end of production chain: Andalusia is the leading autonomous region in Spain for organic agriculture with more than half the organic land cultivated in Spain, but holds fewer processing companies than Catalonia. Andalusia produced over 80% of olive oil in Spain, but most of it is shipped to Italy for packaging and branding. While the universities in Andalusia play an important role for example in oenology and olive oil production, so far the efforts have remained fragmented.

The new international excellence campus provides an important opportunity to climb up the value chain in Andalusia. However, so far the efforts remain university-centric and stronger efforts are needed to collaborate with the industry and the vocational higher education sector to provide for the new skills needs.

The OECD review team recommends that the following measures are taken to enhance the contribution of the universities to the rural development in Andalusia.

- A systematic exchange of information and experience should be put in place between universities in rural development matters facilitated by the regional government and/or the International campus of excellence in order to bring greater efficiency and more balanced coverage. Such a forum could organise thematic events, with regular information retrieval and exchange facilitated by a dedicated website. Universities' current connections, initiatives and projects involving stakeholder collaboration, community development and/or outreach in rural areas should be mapped and published on the collaboration platform.

- The Agri-food Campus of International Excellence should work systematically to improve the university-industry linkages and private sector involvement in innovation activities in the agri-food sector. It should focus on collaborative efforts between the universities and allow for stronger collaboration with the vocational education sector and workforce development to improve job creation in the region. Strong international links with the leading agri-food regions should be created.
- Universities and higher vocational education institutions should combine their efforts to enhance rural tourism through R&D, innovation, education provision and outreach.

Notes

1. The data on rural areas of Spain and Andalusia and the corresponding analysis are drawn from the OECD Review of Rural Policy in Spain (2009).
2. Rural households in better off regions have income equivalent to over 90% of urban areas (Basque Country, Catalonia…) and the less favoured, from 70% to 80% (Galicia, Extremadura…).
3. Three criteria are used to up-date the list of municipalities with low rates of economic activity, with such a classification opening access to specific regional aid and more favourable conditions for support of development projects: declared revenue by inhabitant, number of jobs in firms by inhabitant, unemployment per inhabitant. If two out of three of these indicators fall below 50% of the regional average, the municipality is automatically placed on this list.
4. In Spain, as in other EU countries, the greater share of EU rural funds are in the form of agricultural subsidies (over 50% in Spain), rather than economic diversification, environmental projects and quality of life (LEADER).

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Chapter 5: Social, cultural and environmental development

Social, cultural and environmental development supports economic growth, improves community health and welfare, social cohesion and contributes to clean, healthy and sustainable environment. It also provides an opportunity to transform the existing challenges into assets for the benefit of the regional and local economy.

This chapter reviews the contribution of the universities to the Andalusia's social, cultural and environmental development. It highlights opportunities created by cultural tourism, creative industries, the public health expertise and green growth development. It highlights the need for collaboration in the initiatives, better monitoring of the impacts and stronger alignment with the regional needs.

Andalusia could capitalise on its experience in the development and implementation of comprehensive training in the Andalusian Health System and benefit from its export potential.

Finally, Andalusia's geographical location, multi-cultural heritage with the co-existence of three cultures, connections with North Africa and the presence of migrants from this area constitute strong assets that the region could capitalise on in developing cultural tourism, attracting foreign direct investment, integrating migrant population and encouraging ethnic entrepreneurship.

Introduction

Andalusia has considerable cultural, historical and natural assets that offer a broad range of opportunities for the development of the region. Culture is a major factor in the attractiveness of the region, not only in terms of tourism, but it could also help attract residents and inward investment. There is a growing recognition within the regional and local governments about the relationship between tourism and culture, and the way in which they can drive regional attractiveness and competitiveness. At the same time the region is faced with social and economic challenges including ageing, high levels of unemployment and social exclusion.

Andalusia and its ten universities are faced with three key opportunities and challenges. Firstly, Andalusian universities can contribute more to the role that tourism and culture play in the socio-economic development of the region in order to develop the region into an attractive place to live, work, invest and study. Secondly, Andalusian universities need to engage with the broader population of the region to address the major challenges linked to health and social cohesion. Thirdly, Andalusian universities need to respond more actively to environmental challenges and opportunities. Spain is a world leader in building a "green" economy, especially through energy efficiency industries and strong national policies to move away from dependence on fossil fuels to more renewable sources of energy. Andalusian universities have an important role to play in: *i)* demonstrating how major institutions can become more energy efficient, *ii)* training for green skills and *iii)* exploring ways in which the productive sector, agriculture and SMEs can achieve energy efficiency gains.

In the context of these challenges and opportunities, this chapter examines:

- What is the contribution of universities to Andalusia's cultural, social and environmental development, particularly in terms of health and social cohesion, cultural and creative industries, and sustainability and green growth?
- Are the university activities appropriately targeted to address the key challenges in Andalusia? Are there gaps in delivery and are resources and incentives aligned with the objectives?
- What lessons can be learnt from international experience?

5.1 Tourism and culture

International tourism accounts for approximately 30% of global service exports. In Spain, tourism accounts for 11% of GDP and 13% of employment, and contributes substantially to offsetting the trade deficit. Over 2.6 million people work in Spain's tourism sector. Tourist arrivals increased by 93% in the period 2004-08. With 97.8 million foreign visitors in 2008 (1.1% fewer than in 2007) and tourism receipts of close to EUR 41.9 billion (0.4% less than in 2007), Spain has consolidated its position as the second-largest destination in terms of tourist arrivals and receipts (OECD, 2010a). Andalusia plays an important role in the tourism industry: it is the second among the Spanish regions attracting 13.9% of the tourists visiting Spain, after Catalonia (25%) but before the regions of Valencia (9.9%) and Madrid (8.07%) (INE, 2010).[1] (OECD, 2010a)

Autonomous regions in Spain have the responsibility for the promotion and regulation of tourism within their territories, but the state develops and undertakes the promotion of tourism abroad, the design of tourism policy and the co-ordination of regulation. The Spanish Ministry of Industry, Tourism and Trade has the responsibility for government policy in tourism. It acts through the State Secretariat for Tourism, who has the responsibility for the definition, development and implementation of tourism policy and also liaises with autonomous regions, local authorities, ministries and the tourist sector.[2] The Spanish Tourism Institute (TURESPAÑA) is in charge of promoting Spain abroad as a tourism destination.[3] *Paradores de Turismo de España* is a state company who manages and runs state-owned historic buildings that have been adapted for hotel use.

OECD has highlighted the mutually beneficial relationship between culture and tourism which can strengthen the attractiveness and competitiveness of cities, regions and countries (OECD, 2009a). The combination of tourism and culture is a potent economic engine. Atlas Survey (2007) has shown that expenditure by cultural tourists far exceeds that by other type of tourists, particularly those on sun and beach holidays. According to Europa Nostra (2005) "*more than 50% of tourist activity in Europe is driven by cultural heritage and cultural tourism is expected to grow the most in the tourism sector*." UN World Tourism Organization estimates that cultural tourism accounts for 40% of international tourism.

Cultural tourism is also attractive because of the widespread cultural, economic and social benefits it can deliver to local communities.[4] Cultural institutions can be used to lead the urban regeneration of old industrial or distressed areas, rejuvenating local economies and increasing property values. In rural areas, cultural tourism can be equally or even more important, since there are often few alternative sources of income and

tourism can be used to support traditional livelihoods and crafts and sustain communities threatened with out-migration.

Regional and national governments can play an important role of supporting the cultural heritage of Andalusia and strengthening its tourism appeal. Considerable efforts have already been made to diversify tourism to higher value-added segments. Universities and other tertiary education institutions could support this work by providing learning and skills development programmes, undertaking research, innovation and entrepreneurship activities and collaborating in flagship events.

HEIs and cultural tourism

There are some initiatives led by Andalusian universities, individual departments or entrepreneurial faculty members to capitalise on the cultural heritage of Andalusia to attract high quality tourism. One promising initiative is the strategic partnership between the University of Seville, the City Council of Seville and a local tourist agency to promote cultural tourism in Seville among international students and their families (see Box 5.1.). This initiative provides an international gateway to the region and promotes the cultural assets in Seville by providing better services to the university's international students and their families.

Box 5.1. Partnership to develop tourism in Seville

The Visit Us programme was launched by the University of Seville, the Local Tourism Board and the Cajasol Travel Agency in February 2010. It is targeted at international students, their families and friends. The programme provides students with information about the city of Seville and the university and offers them a wide selection of hotels and a range of package tours, cultural and recreational activities at competitive prices.

The partnership is co-ordinated among the three partners: the International Relations Office of the university provides information about the project among their international students: the Local Tourism Board advises about the cultural and touristic programme and provides access to historic monuments, expositions and museums at reduced fees prices. The Cajasol Travel Agency manages the project and has maintains a dedicate website (*www.visit-us.es*) where information is made available. Furthermore, the university guarantees a personalised service and a comprehensive study of each family´s personal and economic circumstances for those who fill in an online application. Tailored services are provided to students with special needs.

Box 5.1. Partnership to develop tourism in Seville (continued)

In the first half of 2010 (February to May) the international relations office at the University of Seville registered over one hundred enquiries about the services. So far no evaluation has been made about the customer satisfaction or impact of services on regional economy.

Source: University of Seville (2010), Visit Us programme, *www.visit-us.es.*

A region-wide university collaboration within the Visit Us programme could enhance the visibility and access of the Andalusia's culture to a larger group of international students and families, and to the wider public. The regional economy would also benefit from closer and stronger collaboration between universities, regional and local governments and the tourism industry by sharing information on universities' cultural and educational offer. In addition to international students, this service could also target the migrant communities in Andalusia.

Consideration should also be given whether the University of Seville's Visit us programme would allow for collaboration with the International University of Andalusia's (UNIA) Art & Thinking project (*Arteypensamiento*) and the Atalaya Project and its Cultural Observatory in which the universities already work together to deliver a broad cultural programme to the regional population. The Atalaya project was launched in 2006 as a joint initiative of the Andalusian universities to improve the co-ordination of universities' cultural activities, to enhance university networking in arts and culture and to evaluate the practices, methods and activities. In the arts and culture, the Atalaya programme, co-ordinated by the University of Cadiz and supported by the Regional Government of Andalusia, is the first region-wide programme in Spain where universities' cultural offices work in close collaboration. The programmes draw on the cultural heritage of Andalusia ("Networked flamenco" *Flamenco en Red*) and highlight the contemporary cultural scene (*Canal de cultura contemporánea*). Recently, the programme has also embarked on collaboration with the Andalusian Federation of Provinces and Municipalities to ensure wider dissemination of the cultural programme. The Atalaya programme maintains a web portal (http://observatorioatalaya.es) which highlights ten different cultural programmes that are each co-ordinated by one university. This portal could be developed to provide an international gate to the Andalusian culture among students and foreign visitors and to help attract international talent.

Skills development in tourism

Spain has invested in quality improvement and skills development in tourism. Under the *Anfitriones* (hosts) project, the programme called *Cultura del Detalle* (Attention to Detail) aims to enhance visitor-perceived quality by improving the level of attention paid to customers. For this purpose a strategy has been developed to enrich the experience of tourists visiting Spain, promoting attention to detail, hospitality and good workmanship. Between September and December 2009, 800 training courses were arranged in 40 destinations throughout Spain involving over 12 000 students. 26 customer-attention good practice handbooks have been drawn up. (OECD, 2010a).

Despite the importance of tourism to the economic development of Andalusia, programmes to support education, training and RDI in tourism do not feature highly in the portfolio of the Andalusian universities or those of the vocational higher education institutions. This is in contrast to many OECD countries and regions which are building skills to move to higher value-added segments in tourism. The leading university in hospitality and hotel administration is the Cornell University in the United States which provides education, R&D and innovation, as well as professional development opportunities in the increasingly global business. Recently, the school has also embarked on stronger internationalisation efforts and the development of students'entrepreneurial skills (see Box 5.2.).

Box 5.2. Cornell University School of Hotel Administration

Founded in 1922, Cornell University's School of Hotel Administration was the first higher education programme in hospitality management in the United States and is today the world leader in its field. Its students learn from 60 full-time faculty members, who are experts in their disciplines and dedicated to teaching, research and service. Learning takes place in state-of-the-art classrooms, in the on-campus Statler hotel and in varied industry settings around the world. The school's large alumni group of corporate executives and entrepreneurs advance the industry and share their experience with the students and faculty.

The school is active in industry relations. In 1973, it launched the first master's degree programme for the industry. This programme gives senior managers the knowledge and skills required in a complex global industry. Executive courses help industry leaders accelerate their careers. In 2006, the hotel school partnered with the Culinary Institute of America on a collaborative degree programme offering education in hospitality management and the culinary arts. Students earn a BSc degree in Hotel Administration and an Associate in Occupational Studies degree in Culinary Arts.

Box 5.2. Cornell University School of Hotel Administration (continued)

The school's Center for Hospitality Research (CHR) undertakes research on and for the hospitality industry. It creates new knowledge and shares that knowledge to develop the industry. Hotel school faculty, corporate partners and other industry leaders collaborate at roundtables and meetings to frame and understand the developments in the industry. Fellows work with business leaders to develop new ideas, theories and models that improve strategic, managerial and operating practices. These insights are captured in research reports and industry tools that are available online at no cost. An active knowledge-sharing programme distributes the center's work around the globe. CHR also publishes the award-winning hospitality journal, the Cornell Hospitality Quarterly.

The hotel school is also widening its global reach. In 2004, it established a joint master's programme in hospitality management with Nanyang Technological University in Singapore. Launched in 2006, the Cornell-Nanyang Institute educates up to 50 students per class who split their time between NTU's campus and Cornell's campus in Ithaca, N.Y. The programme is the first joint degree programme for both institutions.

In 2006, Leland '69 and Mary Pillsbury announced a USD 15 million gift to the Hotel School. The gift, the largest single gift ever made to the school and one of the largest ever in hospitality education, supports the Leland C. and Mary M. Pillsbury Institute for Hospitality Entrepreneurship. Faculty teams with entrepreneurs to give students the knowledge and skills to pursue their entrepreneurial ambitions.

Source: Cornell University School of Hotel Administration www.hotelschool.cornell.edu

In Europe, a number of countries have launched skills development programmes to train and up-skill personnel for tourism. Some of the programmes have a regional focus and emphasis on cultural tourism. This is the case for example with the Welcome Ireland programme ("Fáilte Ireland") that has funded a regionally-focussed capacity building programme for SMEs (see Box 5.3.)

Box 5.3. Supporting workforce training and development in tourism

Major initiatives which are helping to enhance the status and position of the tourism sector as a career option include the United Kingdom's People 1st Programme and Canada's Tourism Human Resources Council which emphasise stakeholder engagement as well as industry needs. These programmes highlight the need for long-term continuity in state policies and investment in tourism training and development to build the capacity of the workforce.

Ireland has made a sustained intervention through the funding of its national training body CERT which was merged to create Fáilte Ireland. It is one of the most comprehensive approaches to education and training, co-ordinating all education and training needs for the industry as well as labour-market planning. Fáilte Ireland trained 10 000 staff in the sector in 2007 to improve skills and industry capability to complement the higher level skills at the Institutes of Technology and Universities. Fáilte Ireland has also funded a Human Resource Development Strategy, Management Development Programme and a regionally focused capability building programme for SMEs.

Many OECD countries are using migration policies to address skills shortages in tourism since the financial rewards in the hotel and catering sectors are often uncompetitive. For example, the Scottish government's Fresh Talent Policy – a managed migration policy to attract returning Scots and overseas skilled labour – has addressed skills shortages in tourism and hospitality, notably in larger cities with high labour turnover rates. Here, eastern European labour has been used to fill significant skill gaps. In Canada, the Temporary Foreign Worker Programme helped streamline the time required to employ a foreign worker while also extending the length of time lower-skilled workers could stay in the country. A new scheme introducing faster processing of job applications helps employers facing labour shortages in high demand occupations such as tourism.

Source: OECD (2010a), Tourism Trends and Policies 2010, OECD, Paris. 2010.

Innovation in tourism

OECD countries and regions invest in tourism innovation programmes and to address specific barriers to tourism such as seasonality[5], peripherality and the challenges of the SME sector. For example Sweden is developing a network for tourism research to improve competitiveness. Innovation Norway has funded the ARENA Programme to create regional clusters of tourism and developed a project that aims to develop mountain tourism into an all-year activity with attractive products by focusing on network development, entrepreneurship and innovation. Scotland has a dedicated tourism innovation programme and in Quebec, the Tourism Intelligence

network was developed in collaboration between the University of Québec in Montreal and the public and private sector (see Box 5.4.).

Box 5.4. Programmes to support innovation in tourism

The Nordic region is actively promoting innovation in tourism and other services to overcome major barriers to tourism (*e.g.* seasonality, peripherality in relation to major tourism markets and small domestic tourism markets). Most policies are a result of national innovation programmes and not necessarily targeted at tourism only. For example, in Norway, Innovation Norway has funded the ARENA Programme to create regional clusters of tourism. For example, the Innovative Mountain Project aims to develop mountain tourism into an all-year activity with attractive products by network development, entrepreneurship and removal of barriers to innovation. The public sector as a lead partner pools expertise and resources and encourages co-operation with universities and private sector partners to enhance innovation and opportunities for business development.

Scotland has a dedicated tourism innovation programme led by its main economic development agency – Scottish Enterprise – addressing many of the policy weaknesses with specific innovation programmes and objectives to promote product development within the sector. It has secured major achievements in new product development, dovetailing with the private sector which drives elements of the innovation programme in conjunction with VisitScotland. Innovation is explicit as a policy objective in the tourism strategy – A Tourism Framework for Change to 2015. Outputs and achievements are regularly evaluated using international measurement tools. Innovation policies are promoted due to perceived low levels of innovation in the national economy.

The Quebec Tourism Intelligence Network was developed in May 2004 as a partnership between the Quebec tourism industry and Tourism Quebec to support intelligence gathering in collaboration with the University of Quebec in Montreal. The organisation's purpose is to: "*provide the Quebec tourism industry with a holistic knowledge base to improve industry operations and competitiveness and to help reduce internal competitiveness between organisations by providing a public knowledge base and disseminating it to the complete industry*." The Tourism Intelligence Network is a structured industry tool for gathering and analysing information. It monitors changes in tourism around the world and produces brief analyses to Quebec decision makers working in SMEs.

Source: OECD (2010a), OECD Tourism Trends and Policies 2010, OECD, Paris.

There is considerable scope for increasing the knowledge transfer from universities to the Andalusian tourism industry. National level incentives to boost tourism innovation are already in place. For example, the National R&D Plan promoted by the Science and Innovation Ministry aims to

encourage tourism R&D initiatives. Special measures have included setting up the Tourism Innovation, Development and Research Centre and the Culinary Innovation and Research Centre. An Internet-based Tourism Research System (*Sistema de Información por Internet sobre Investigación Científico-Turística – SICTUR*) has been set up to enhance the scientific and technological competitiveness (OECD, 2010a). SICTUR brings together the State Secretariat for Tourism and the 14 universities, which belong to the Tourism Postgraduate University Network (*Red Universitaria de Postgrados en Turismo*) to promote Internet-based technology and scientific research in the tourism industry. The universities of Seville and Malaga are involved in these activities. Recently, the regional government has launched a new initiative – AndalusiaLab – to foster competitive and sustainable tourism sector based on broad collaboration with professionals.

Universities and vocational higher education institutions could also help SMEs to better access global markets. Global value chains and networks encourage SMEs to make improvements in skills development, innovation and products and process. Policy measures and collaboration by universities and other tertiary education institutions are needed to ensure that SMEs do not miss out in their ability to compete with larger suppliers.

The measurement and evaluation of policy outcomes in tourism – whether policies and programmes are appropriate and efficient in achieving their intended objectives – is still in their infancy. Universities have taken steps to address this challenge. For example, researchers at Nottingham University in the United Kingdom and the Sustainable Tourism Cooperative Research Centre (STCRC) in Australia are working with specially constructed tourism Computable General Equilibrium (CGE) Models which can be used to estimate impacts of changes in tourism demand on the tourism sector and across the economy. This type of analytical tools would help regional and local development authorities also in Andalusia.

Collaboration in flagship projects: European Capital of Culture

Tourism policies and their integration into local plans can be used to address intra-regional socio-economic disparities. There is often competition among cities instead of developing complementary tourism products. An important challenge is to set up governance mechanisms to improve tourism's competitiveness and quality at the local level and to ensure coherence of policy development and implementation and balanced tourism development in the region.

During the time of the OECD review visit, Malaga and Cordoba were both competing for the candidature of the European Capital of Culture 2016.[6] The universities of Cordoba and Malaga, together with their

respective local governments and supported by the regional government, had created the Cordoba City of Culture Foundation and the Malaga City of Culture Foundation. These foundations were established to develop and promote cultural activities in the two competing cities. In Cordoba, the foundation´s offices are located in the university premises. Cordoba, which was selected as one the national candidates in September 2010, supports the campaign mainly with its existing cultural offer.

While in the past the European Capital of Culture (ECOC) event has been hosted by cities, since 2007 the European Union has encouraged a regional dimension in the event. For example in 2007, the ECOC was hosted by Luxembourg and Greater Region, covering five different regions of Luxembourg, Belgium, France and Germany. 130 out of more than 500 projects were cross-border events involving two or more regions. The year-long event generated more than 3.3 million visits across the whole region. In Luxembourg there was a 6% growth in hotel occupancy, while the event injected over EUR 56 million (USD 44 million) of visitor expenditure into the local economy.

Regional collaboration in the bidding process for the European Capital of Culture (ECOC), even if eventually unsuccessful, can mobilise universities and other stakeholders for regional development. For example in the Newcastle-Gateshead this process provided a concrete goal upon which a wide range of public, private and community partners including the universities could work together. In the long run, the Capital of Culture bid represents only one example within a long string of high-profile cultural development projects and networks within the region. Each of the five universities has identified their own strengths to drive the cultural revival in the region (see Box 5.5.) (OECD, 2007).

Box 5.5. Universities and cultural and creative industries in England

The universities in the North East have recognised the potential for collaboration, partnership and advocacy in culture and cultural industries which are seen as a major source of growth for the region. They collaborate to drive the renaissance of local culture and *e.g.* support the two major developments on the Tyne: The Baltic Contemporary Arts Centre and the Sage Gateshead Music Centre.

Each university has its own strengths to drive the cultural agenda. For example, The Centre for Cultural Policy and Management of Northumbria University provides advice, project development and research in relation to cultural policy and is working closely together with the range of cultural stakeholders in the region. Newcastle University in partnership with Sage Gateshead Music Centre and the region's other universities a national Centre of Excellence in Teaching and Learning in Music which *inter alia* uses music as a pathway from the community into a wide range of academic programmes. The university is also leading a partnership of local bodies to establish a Cultural Quarter which will transform the space where the city and the university meet into an area of social and cultural activity.

The higher education regional association Unis4NE and its special committee for culture plays an important brokerage role in the projects.

Source: OECD (2007), Higher Education and Regions. Globally Competitive, Locally Engaged, Paris.

Successful bids for the European Capital of Culture often require long-term collaboration and major investments in new cultural facilities and programmes. Glasgow embarked on a campaign of economic regeneration and image change in the early 1980s, using culture as a major attraction. The city staged the European Capital of Culture in 1990 and opened a number of new cultural facilities, including the Burrell Collection and the Glasgow Museum of Modern Art. These investments have generated tangible impact on local economy The city is capitalising on its improved image through the brand "Glasgow: Scotland with style", which is utilised in tourism and to brand the city as a vibrant place to live, work, invest and study. (see Box 5.6)

Box 5.6. Glasgow: culture as a catalyst of economic growth and image change

The European Capital of Culture saw considerable improvement in the image of Glasgow: Positive press coverage of the image of the city grew by over 17% between 1986 and 2003, while positive coverage of culture grew by more than 40% and tourism by 150%, indicating a strong positive relationship between tourism, culture and place image. The increased attractiveness of the city had economic effects: Between 1994 and 1998, the city's economy grew by 15.9% compared to 10.3% in Scotland and 11.4% for the UK as a whole. Some 29 640 people were employed in tourism-related activities in Glasgow in 2005, accounting for 7.6% of all jobs in Glasgow. In 1995, 1.49 million trips were made by visitors to Glasgow, generating GBP 263 million in expenditure. By 2005, this had increased to 2.8 million trips with expenditure of GBP 700 million. Glasgow is now the fourth most popular UK city destination for foreign tourists (excluding London).

Glasgow has been revitalised as a place to live, work and invest in. The total population and the working age population of the city have increased since 2000, reversing a long period of decline. In 2006-07, hotel and leisure developments worth almost GBP 45 million (EUR 58 million, USD 89 million) were completed, and permission was granted for a further GBP 91 million of development.

The creative rationale for the city's new brand "Glasgow: Scotland with style", is derived from the "Glasgow Style" movement of the early 1900s, led by Charles Rennie Mackintosh. Conviction that culture is central to improving the quality of life of residents and visitors has been backed by GBP 200 million capital investment in cultural facilities between 2006 and 2011.

Source: OECD (2009a), The Impact of Culture on Tourism, OECD, Paris; Garcia (2005); Glasgow City Council (2007), Glasgow Economic Facts website, *www.glasgoweconomicfacts.com/Dept.aspx?dept_id=143*.

Multi-cultural heritage and three cultures

Andalusia's multi-cultural heritage, geographical location, connections with North Africa and the presence of migrants from this area constitute strong assets that the region could capitalise on in developing cultural tourism, attracting foreign direct investment, integrating migrant population and encouraging ethnic entrepreneurship. There is considerable scope for

expanding joint efforts by the regional stakeholders in this area which represents "a low hanging fruit" for the region.

The cultural and historical diversity of Andalusia is one of its strongest assets. More than 3000 years of settlement by different people – mainly, Christians, Muslims and Jewish – have left their traces in Andalusia and particularly the architectural inheritance (see Table 5.1). In 2006, Andalusia represented 11.4% of the museum collections in Spain, compared to Catalonia (6.8%), Madrid (6.9%) and Basque Country (5.7%) (INE, 2010).

Table 5.1.Goods, property and estates registered as cultural interest goods

Region	% 2000	% 2008
Andalusia	20.7	25.7
Catalonia	10.6	12.7
Valencia	4.7	4.9
Madrid	13.3	7.9
Total	100.00	100.00

Source: INE – Ministry of Culture (2010), Sub-directorate-General for Protection of Historical Heritage, INE, *www.ine.es* accessed 26 August 2010,

The growth of the markets and improvements in educational attainment levels and public management in the Middle East and North African countries (MENA) provide Andalusia an opportunity to improve its export balance and economic development. Andalusia's unique history with co-existence of three cultures in *Al Andalus*, Islamic architectural heritage and the largest mosque in the western world are potential magnets for attracting high-end tourism from the Arab countries. At the moment there appears to be limited number of targeted efforts to reach this audience. There is a need to develop and improve services in Arabic and design products targeting the Arab travellers. For example, the well-developed official tourism website for Andalusia provides information in six languages including Chinese and Japanese, but not Arabic. There are currently no well developed itineraries focusing on the Mudejar past in the same fashion as "Routes through Flamenco Territories". Universities could provide their expertise in designing new services with the help of their partners in North African countries. They could also assist in targeting part of their entrepreneurship activities at the immigrant community which often represents the most entrepreneurial segment of the society.

Andalusian Regional Government has taken steps to draw from its multicultural strengths. In 1998, the Regional Government of Andalusia and the Kingdom of Morocco created the Three Cultures Foundation (*Fundación Tres Culturas*) as a forum for dialogue and tolerance between Mediterranean

peoples and cultures (see Box 5.7.) The foundation is one of the few of its kind in the world that has a strong and balanced presence in several countries from different continents along the Mediterranean. The Three Cultures Foundation provides a well-developed structure to scale up the efforts to reach to the Arab world. It would also benefit from stronger collaboration with the educational sector.

There is scope for improving the universities contribution to support the co-existence of different cultures and integration of migrants. Some of them have already started to work towards this end. For example the University of Granada has a permanent presence in North Africa through its two decentralised centres in Ceuta and Melilla. The university has also developed a syllabus and a pilot scheme for the teaching of Arabic as a foreign language in secondary schools in Andalusia. The University of Almeria's "Join us in your university programme" (*ÚNETE*) helps raise aspirations among the migrant children and youth and facilitates retention at the university (Box 5.8.).

Box 5.7. The Three Cultures Foundation (La Fundación Tres Culturas)

The Three Cultures Foundation is a non-profit organisation that promotes dialogue and respect as means to achieve peace and understanding among the Mediterranean peoples and cultures. It was created in 1998 as the result of a joint initiative of the Regional Government of Andalusia and the Kingdom of Morocco and is supported by multiple Euro-Mediterranean institutions. The Peres Centre for Peace, the Palestinian National Authority and other institutions from Israel have joined this initiative This foundation promotes cultural activities such as courses, exhibitions, concerts, film festivals, publications, educational exchanges and sport competitions.

The Three Cultures Foundation is committed to fostering the co-existence of cultures and religions through the exchange of ideas and experiences with the aim of bringing together the Mediterranean people. Foundation's cultural programming and day-to-day activities focus on co-operation: *i*) within the Mediterranean and between Andalusia and Morocco, *ii)* in the Middle East, *iii)* and between the European Union and Mediterranean countries. The foundation organises language courses in Hebrew and Arabic, highlights the arts and crafts, history and contemporary phenomena of three cultures and arranges debates and seminars which are recognised by the Andalusian universities towards degrees.

Source: The Three Cultures Foundation, (*Fundación Tres Culturas*) *www.tresculturas.org.*

Culture and arts could be more efficiently used in the efforts to better integrate migrant children and improve their learning outcomes. International examples on how culture and arts can be used to integrate children include the work of the local authorities in Arles with gypsies and immigrants from North Africa.

Box 5.8. Culture enhancing integration of migrant children in Arles

The city of Arles has outstanding artistic and cultural heritage, linking it to the Roman world and the history of Provence. It has experienced difficult economic times that have blocked the integration of disadvantaged communities such as gypsies and immigrants from the Maghreb. Policies to regenerate the city have yielded new type mechanisms where culture has been used as a tool for integration. For young immigrants, Arles organised "discovery tours" of the city, through the Van Gogh College and the Charles Privat vocational high school. Activities included not only exploring the city's geography but also artistic workshops in design, photography and ceramics, dealing with different forms of built heritage. The definition of heritage was extended to include the banks of the Rhone River and abandoned rail sheds. Five years later, the same students were turning out *en masse* to help celebrate heritage days. A new ownership had been created in them which allowed them to view the city as theirs too and have a more positive look to the future.

A major obstacle in the integration of the gypsy population was the fact that children were discouraged by their families from learning to read, on the grounds that this skill was not useful for the traditional occupations in the community. The local education and cultural authorities devised an experiment to have students explore the city's streets and façades, venturing along routes that they would not usually take, helping the youngsters discovered a world that was unfamiliar to them. Their curiosity about the meaning of signs and posters was aroused, and this gave them an incentive to learn to read. In the course of this experiment, the community's resistance to reading disappeared.

Source: OECD (2005), Culture and Local Development, OECD, Paris.

5.2 Cultural and creative industries

Cultural industries encompass a wide range of activities, including the music industry, the literary market, the art market, the film industry, radio, the performing arts, the design industry, architecture and the press and all forms of entertainment. The term "creative industries" also includes the advertising industry and the software/gaming industry *etc*. The sector contributes to the growth and development of regions through attraction and

retention of talent and knowledge-intensive businesses that tend to move to regions with a high concentration of talents and creative workers. The attraction of talented people helps provide a fertile ground for a competitive business climate which in turn will help attract high-tech firms and will bring economic growth (Florida, 2002).[7]

Creative sector is a key economic driver globally: in several major economies, the value of the cultural industries ranges between 3% and 6% of the total economy. For example in the United Kingdom, the creative industries, excluding crafts and design, accounted for 6.2% of gross value added in 2007. The creative industries grew by an average of 5% per annum between 1997 and 2007, in comparison to an average of 3% for the whole economy. Software, computer games and electronic publishing had the highest average rate growth (9%). Exports of services by the creative industries totalled GBP 16.6 billion in 2007, accounting for 4.5% of all goods and services exported. 33% of the total creative industries exports were contributed by the software, computer games and electronic publishing sector. Creative employment totalled about 2 million jobs: over 1.1 million jobs in the creative industries and over 0.8 million further creative jobs within businesses outside these industries. Total creative employment increased from 1.6 million in 1997 to nearly 2 million in 2007, compared to 1% for the whole economy over this period. (DCMS, 2010)

Andalusia (Seville) is ranked number sixteen among the top 25 European regions with important "clusters" of cultural and creative industries (CCI)[8] and third at national level, after Madrid and Catalonia (see Annex A.5.1.). This ranking is determined by total employment of 71 843. However, a location quotient of 0.74 (measuring employment in the industry relative to the total employment of the region) places Andalusia (Seville) at the lower end in this field. Nonetheless, in 2001-06 Andalusia was the leading region for annual employment growth in cultural and creative industries (7.78%) in the top 25 regions that have labour markets over 1 million people (see Table 5.2.) (Power and Nielsén, 2010).

Table 5.2. Regions with the highest average annual growth in CCI employment 2001-06.

Selected regions with labour markets over 1 million people

	CCI Growth	Rest of the economy	CCI LQ	CCI Rank	CCI Employment
Andalucía (Sevilla), ES	7.78%	5.27%	0.74	16	71 843
Hants and Isle of Wight (Southampton), UK	7.22%	1.18%	1.27	45	38 851
Castilla-La Mancha (Toledo), ES	6.87%	4.79%	0.67	109	16 528
Jihovychod (Brno), CZ	6.65%	0.39%	0.86	89	21 606
Murcia, ES	6.35%	5.25%	0.61	152	10 906
País Vasco (Bilbao), ES	6.51%	2.52%	1.12	51	36 539
Valencia, ES	6.25%	4.48%	0.86	27	59 901
Kärnten (Klagenfurt), AT	6.13%	4.55%	0.73	222	4 950
Lietuva, LT	5.79%	3.63%	0.88	68	26 102
Galicia (A Coruña), ES	5.45%	2.71%	0.78	60	29 294
Picardie (Amiens), FR	5.41%	1.31%	0.55	181	8 934
Nyugat-Dunantul (Györ), HU	5.33%	0.51%	0.65	180	9 002
Extremadura (Mérida), ES	5.32%	3.11%	0.66	188	8 022
Canarias (Tenerife), ES	4.97%	4.16%	0.79	88	21 765
Steiermark (Graz), AT	4.87%	5.63%	0.76	144	11 479
Corse (Ajaccio), FR	4.72%	4.08%	0.45	247	1 092
Herefordshire, Worcestershire and Warwickshire (Hereford), UK	4.67%	0.84%	1.12	91	21 115
East Riding and N Lincolnshire, UK	**4.55%**	**1.61%**	**0.75**	**177**	**9 104**

Source: Power, D. and Nielsén, T. (2010), Priority Sector Report: Creative and Cultural Industries Europe Innova, European Cluster Observatory, EC. www.clusterobservatory.eu/upload/CreativeAndCulturalIndustries.pdf Accessed 20 June 2010.

Note: LQ is an indicator of CCI employment relative to the total employment of the region, where LQ>1 indicates an over-representation of CCI employment. Growth is measured using compound annual growth rates (CAGR).

In terms of employment, the most important creative and cultural industries in Andalusia are television and radio (see Table 5.3.) At the same time, the region does not feature highly in terms of artistic and literary creation, museum activity and advertising, revealing considerable scope for expanding entrepreneurial activities in cultural and creative industries, as compared to the other top performing European regions.

The lack of visibility of Andalusia in artistic creation is striking, considering the role of flamenco as one of the key cultural assets and main attractions of Andalusia.[9] The regional ministry for culture has recognised the potential of flamenco and created the Andalusian Agency for the

Development of Flamenco to promote and co-ordinate the flamenco policies at regional, national and international level. Since 2006, the agency has organised the biennial Dutch flamenco festival and collaborates in flamenco festivals in London, New York or Nimes. It has designed "Routes through Flamenco Territories" that encourage independent travel through Andalusian provinces to cities or rural villages with specific flamenco forms. The region also features the international flamenco competition held in Cordoba and the museum of flamenco dance (*Museo del Baile Flamenco*) in Seville that exhibits the history and art of flamenco and organises master classes and introductory classes. Seville has been recognised by the UNESCO Intangible Heritage register: in 2006 it was declared the first "City of Music" by UNESCO's Global Alliance for Cultural Diversity, because "*In Seville, music is everywhere and above all engages everyone….It is a place of inspiration for musicians and composers*".

Table 5.3. Top 15 regions by number of employees and share of European employment in four sectors of CCI

		Employ-ment	European share			Employ-ment	
	Radio and television activities				**Advertising**		
1	Inner London	31 231	8.08%		Île de France (Paris)	52 202	7.56%
2	Île de France (Paris)	24 472	6.33%		Lombardia (Milan)	30 020	4.35%
3	Madrid	19 105	4.95%		Inner London	24 348	3.53%
4	Cataluña (Barcelona)	10 756	2.78%		West-Nederland (Amsterdam)	19 876	2.88%
5	Köln	10 317	2.67%		Madrid	18 738	2.71%
6	Bucuresti – Ilfov	10 122	2.62%		Danmark	17 343	2.51%
7	Oberbayern (München)	10 037	2.60%		Cataluña (Barcelona)	12 410	1.80%
8	West-Nederland (Amsterdam)	7 647	1.98%		Düsseldorf	11 653	1.69%
9	Lazio (Rome)	7 516	1.95%		Stockholm	11 230	1.63%
10	Outer London	7 515	1.95%		Darmstadt (Frankfurt am Main)	10 053	1.46%
11	Andalucía (Sevilla)	7 385	1.91%		Hamburg	9 664	1.40%
12	Attiki (Athens)	7 100	1.84%		Attiki (Athens)	9 266	1.34%
13	Danmark	6 648	1.72%		Lazio (Rome)	9 246	1.34%
14	Rheinhessen-Pfalz (Mainz)	6 644	1.72%		Lisboa	9 217	1.33%
15	E Scotland (Edinburgh)	6 351	1.64%		Zuid-Nederland (Maastricht)	8 970	1.30%

Table 5.3. Top 15 regions by number of employees and share of European employment in four sectors of the creative and cultural industries (continued)

	Artistic and literary creation and interpretation				Museum activities and preservation of historical sites and buildings		
1	Île de France (Paris)	20 113	6.80%		Île de France (Paris)	10 675	6.24%
2	Inner London	18 434	6.23%		Inner London	6 993	4.09%
3	West-Nederland (Amsterdam)	5 774	1.95%		Danmark	5 162	3.02%
4	Outer London	5 357	1.81%		West-Nederland (Amsterdam)	4 525	2.64%
5	Danmark	5 156	1.74%		Scotland (Edinburgh)	3 370	1.97%
6	Stockholm	4 983	1.68%		Vlaams Gewest (Antwerpen),	2 850	1.66%
7	Etelä-Suomi (Helsinki)	4 549	1.54%		Lazio (Rome)	2 720	1.59%
8	Lombardia (Milan)	4 448	1.50%		Stockholm	2 648	1.55%
9	Rhône-Alpes (Lyon)	4 165	1.41%		Ireland	2 631	1.54%
10	Slovenija	4 119	1.39%		Latvija	2 497	1.46%
11	Lazio (Rome)	4 000	1.35%		Madrid	2 240	1.31%
12	Provence-Alpes-Côte d'Azur (Marseille)	3 767	1.27%		Kozep-Magyarorszag (Budapest)	2 120	1.24%
13	Surrey, E and W Sussex (Brighton)	3 714	1.26%		Cataluña (Barcelona)	2 102	1.23%
14	Cataluña (Barcelona)	3 539	1.20%		Malopolskie (Kraków)	2 040	1.19%
15	Kozep-Magyarorszag (Budapest)	3 533	1.19%		Oost-Nederland (Nijmegen)	2 010	1.17%

Source: Power, D. and Nielsén, T. (2010), Priority Sector Report: Creative and Cultural Industries Europe Innova, European Cluster Observatory, EC. www.clusterobservatory.eu/upload/CreativeAndCulturalIndustries.pdf Accessed 20 June 2010.

The concept of a "creative class" links business with education and culture thereby connecting three major policy areas in local, regional and national politics. In Andalusia, there does not appear to be strong awareness of the assets and opportunities in the cultural and creative industries through long-term skills development and research and innovation. This is in contrast to the situation for example in Berlin where the senate has defined creative industries as a profit-oriented segment of the local economy (see Box 5.9.)

The challenge for Andalusia is to strengthen collaboration among universities and the cultural and creative industries to develop learning and skills development programmes and support entrepreneurial skills among students and graduates. This collaboration should include public, private and the non-profit sector to enhance the exchange and value-creation relationship between the actors. Collaboration could be facilitated by web communications and an information platform for businesses and artists as

well as a museum portal, which combines e-commerce offers with qualitative information about Andalusia creative and cultural offer.

Universities, the regional government and the industry sector could also join efforts to develop mechanisms to nurture the cultural and creative talent among the regional population, to attract creative talent from outside of the region and to turn new ideas into cultural services. Stronger links with students, researchers and artists from Europe and elsewhere, could bring benefits to regional economy. In general, there is a need for a wider innovation concept: Innovation activities should also focus on Andalusia's attractiveness in terms of quality of life, rather than just science and technology.

Box 5.9. Berlin and creative industries

The Berlin Senate has defined creative industries as a profit-oriented segment covering all enterprises, entrepreneurs and the self-employed that produce, market, distribute and trade profit-oriented cultural and symbolic goods. The collaboration between public, private and non-profit sector enhances the exchange and value-creation relationship between the actors. Collaboration is facilitated by an information platform for businesses and artists (www.creative-city.berlin.de) as well as a museum portal.

One of Berlin's fields of competence, IT and Media, belongs to the creative industries. The Berlin Senate has appointed an interdepartmental and cross-sectoral Steering Committee for the Communication, Media and Creative Industries cluster, led by the Minister for Economics, Technology and Women and with members from relevant ministries and stakeholders in creative industries. The goal of the committee is to enhance co-operation and to create a coherent political strategy to support the creative economy. The board has accepted actions plans for the art market and the publishing industry as well as a comprehensive qualifications strategy. The cultural and creative industries have received not only greater political attention, but also financial support in Berlin. The Berlin Investment Bank (IBB) has increased its commitment to financing this economic branch, while the Berlin Partner GmbH has intensified its efforts in supporting business and new market development. The *Kulturprojekt Berlin GmbH* champions marketing efforts for cultural and creative ventures in Berlin by creating gateways and offering tailored services to Berlin's cultural and creative industries.

Box 5.9. Berlin and creative industries (continued)

Tertiary education collaborates in the cluster development and plays an important role in the industry through human capital development, research and outreach activities and makes Berlin an open, diverse and tolerant city. Educational and training institutions for creative professions include four internationally renowned art schools, universities, universities of applied sciences, technical colleges, 36 vocational schools and private educational-training providers. At the initiative of the Berlin Senate, a number of joint centres have been established, *e.g.* the Co-operative Jazz Centre in Berlin (2005) and the Co-operative Dance Education Centre (2006). This model of collaboration has received national recognition.

Source: OECD (2010b), Higher Education in Regional and City Development. Berlin, Germany. OECD Paris *http://www.oecd.org/dataoecd/59/6/45359278.pdf.*

5.3 Community development

Tertiary education institutions can have a strong emphasis on community engagement including neighbourhood renewal and welfare services. These forms of public service involvement represent an important part of the business of the tertiary education and the region, but the extent of this work of tertiary education institutions is often overlooked (OECD, 2007).

Despite considerable improvements in living conditions in the last 20 years, Andalusia is still among the poorest regions in Spain. The Gross Disposable Income per capita reflects the income available to households to consume or save. For Andalusia, it stood at EUR 2 420 in 1983, registering a continuous rise, reaching EUR 11 446 in 2006. In 1983, these values represented 84.6% of the Spanish average, while in 2006 it had dropped to 80.6%. At the same time, wage incomes remained about 10% lower than in the rest of Spain, with the exception of the construction sector where the figure was a little closer to the Spanish average. Nonetheless, Andalusia shows slight improvements in its relative position with respect to its income in the last two decades. The real improvement has been in the consumption capacity where Andalusia nearly reached the Spanish average, possibly due to transfers from European, state and regional public institutions.

At the same time, however, development has led to greater disparities. The estimation of internal inequalities for the year 2006, approximated by the Gini index shows Andalusia having higher inequality levels than the

national average. A report on the social inclusion in Spain shows that in 2006, 18.2% of the Andalusian lived with less than EUR 5 528, below the national average of 19.9%, 7.8% with less than EUR 3 686 and 4.5% with less than EUR 2 672 (Caixa 2008).

Universities in Andalusia are in the process of developing their community development portfolios. Due to the lack of tradition in this domain, sometimes wide-ranging services for university community are regarded as community services. This is the case for example in the University of Seville which provides a broad portfolio of support services for its students and staff through SACU (*Servicio de Asistencia a la Comunidad Universitaria*). Some of the initiatives include also a community outreach aspect and address the needs of the students and the community. This is the case for example in the programme for lodging university students with senior citizens, the disabled and with single parent families. This initiative allows students (over 70 students in 2009-10) from outside the city of Seville to benefit from free accommodation in exchange for helping around the house and with shopping and providing company. The initiative enjoys the support from the provincial delegation of social equality and welfare of the Regional Government of Andalusia.

Notable community outreach efforts have been undertaken by the University of Granada's Initiative Centre for Development (CICODE) that engages with the disadvantaged community in Granada. CICODE provides a structured framework through which the university community can collaborate with non-profit organisations in action research and outreach projects on IT, health care, drugs prevention, gender equality and elderly issues (see Box 5.10.).

Box 5.10. Support provided by CICODE in Granada

Education programme on new technologies and bridging the digital gap in Granada: since 2001 CICODE has organised campaigns for collecting IT equipment from the University of Granada to donate them to the non-profit organisations in Granada. Since 2006, under the framework of the regional government's support plan for Andalusian families, CICODE has offered IT and internet courses in the north and south part of the city. Tutors in these courses are university teachers and students. In collaboration with the Foundation Itaka, CICODE is extending its services for example to migrants' associations in Granada, by providing free workshops in basic IT and internet skills with the help of final year undergraduate or post-graduate students. To guarantee parents' access to services, a supervised free playroom is offered for children.

Box 5.10. Support provided by CICODE in Granada (continued)

CICODE-GCubo Software support: since 2005, CICODE-GCubo has allowed non-profit associations to use the university webpage as a platform for the promotion of their activities and services. The university community provides IT training for the associations on how to use the webpage and helps solve problems with the webpage management. During 2005-08, 29 non-profit organisations benefited from this support.

Source: University of Granada (2010), CICODE project, *www.ugr.es/~veu/cicode.*

Similar activities have been provided by the University of Malaga which partipates in the "Andalusian Digital Commitment Programme" of the Regional Government of Andalusia to reduce the digital gap in the region. The University of Malaga provides access to the university IT rooms to the general public. It has also developed a "Ciber-volunteers Programme" and a "Student-Mentoring Programme" to integrate Andalusian into the information society.

Important community engagement initiatives include the long-term presence of the Universidad Pablo de Olavide in *Polígono Sur,* the most distressed neighbourhood of Seville, through the Flora Tristan Student Residence where about 200 students and staff live. Through participatory action and continuous presence in the community the university has created trust and confidence and has now embarked on research activities. More than one out of four residents is actively involved in the neighbourhood volunteering activities. This initiative has brought concrete benefits to the population in the *barrio*, providing employment opportunities, building capacity among women, improving literacy rates and raising aspirations among children and youth. The technical staff of the student residence are recruited from the *barrio*. Secondary education students receive academic and social support from the students of the Universidad Pablo de Olavide who act as mentors. There is already some evidence of improved learning outcomes: In 2008, none of the secondary education students from the *barrio* passed the national three-day examination, which is necessary to apply for tertiary education. In 2009, after the mentoring by three Flora Tristán students, all eight students had passed the test, one was enrolled in Pablo de Olavide University and one at vocational education (see Box 5.11.).

Box 5.11. UPO's Flora Tristan: community outreach in a distressed urban area

Andalusia features pockets of social disadvantage in cities and rural and remote areas. In Seville, Polígono Sur is the most distressed neighbourhood of Seville with about 70 000 inhabitants in the southern part of the city. The clearly defined neighbourhood consists of three smaller areas, the southern part representing a community with long-term unemployment and high incident of drug-related crime (it includes a set of high-rise buildings known locally as Las Vegas). The population is mainly gypsies while recently there has also been a considerable influx of immigrants, many of them illegal making it difficult to estimate the actual number of inhabitants.

In 2003, as a demonstration of its social responsibility, the Pablo de Olavide University purchased seven buildings in the area called "*3000 viviendas*" (3 000 houses) in the Polígono Sur to transform them into a university residence. The aim was to enhance a sense of community, to reduce the social stigma associated with living in Polígono Sur and to provide a basis for urban regeneration through sharing the life of the population and permanent social action.

The Flora Tristán Residence encompasses 112 high quality flats, each accommodating two residents, either students or staff of the university. The residents from different study fields including social work and languages, business and sports. More than 30 different nationalities are represented among the Flora Tristán residents; at any time 30-60 international students are living in the residence mainly from Latin American and sub-Saharan African countries adding a multicultural aspect to the community. Each of the seven buildings has a student assembly for decision-making.

The Flora Tristan residence action is based on the philosophy by James Adams whose settlements in the 1930s Chicago combined the three "R": Research, Reform and Residence. Through participatory action and long-term presence in the area the university has created trust and confidence and is now planning to engage also in research activities. About 60 residents out of more than 200 are involved in the neighbourhood volunteering activities which have been defined by the 28 NGOs and associations active in the neighbourhood, for example, the association "We are also Seville".

The community action, which is organised under the University Vice Rector for social engagement, has an annual budget of EUR 450 000 and is largely self-sustained. The majority of the costs are covered by the rents paid by the students. In addition, the Flora Tristan Residence action receives funding from the local and regional governments (EUR 150 000 in 2009) and religious associations (EUR 3 000). Volunteering students receive a reduction on rent but no credits towards their degree as volunteering is not considered as work-based learning or training.

Major partners of the University Pablo de Olavide in the Poligono Sur outreach activities are the local and regional governments and non-profit organisations. There is considerable scope for collaboration with other educational institutions as well as departments of the University Pablo de Olavide through joint research, innovation and community service projects. Currently, the small scale activities depend on the enthusiastic leaders of the Flora Tristan and student volunteers with limited connections with the core university activities.

There would be scope for collaboration for example in improving learning outcomes of primary and secondary education students, building community development and prevention of crime. This could provide opportunities for example for the faculty of law of the University Pablo de Olavide to develop its expertise and outreach activities. International examples come from the UK where in 2005 the London Metropolitan Police asked the International School of Communities, Rights and Inclusion (ISCRI) at the University of Central Lancashire to help develop policing methods that would build community confidence and prevent crime. ISCRI trained and supported researchers from local community organisations to ask more than 1 000 people what they thought were the issues for themselves and their communities. In its role as an independent facilitator, ISCRI helped build a dialogue between the police force and its communities in a situation where trust and confidence were low. This work has been recognised by experts as significant joint effort local authorities and police to plan and deliver their services. It has also changed the way in which the force polices London. (HEFCE, 2010)

Sport as community engagement tool

Many tertiary education institutions provide sports activities and facilities for their own students and staff. There is a wide recognition among Andalusian universities about the capacity of sports to contribute to personal development and stronger interaction between students (Laurent, Periáñez and Petit, 2010). The leading university in this field is the University of Málaga (see Box 5.12).

Box 5.12 Combining sport and sustainability: University of Malaga

Universities in Andalusia provide sporting activities and facilities for their own students and staff and also open access to the general public. They offer a wide range of sporting activities, courses, competitions and recognition of credits through participation in sports activities. Also relevant is the participation of the Andalusian universities in provincial and regional championships organised by the universities in collaboration with the regional and national governments. The University of Malaga stands out in the field of sport thanks to its excellent sport 16 000 m² infrastructures, new cardiovascular rooms, paddle, sport centre and beach-volleyball, many sports events and programmes and awards.

The University of Malaga combines its commitment to sport with green campus ideology. Good practices include the use of salt for the disinfection of swimming pools, use of solar energy for water heating, creation of 10 000 m² of gardens according to xerogardening criteria, such as creating and "clean points" for recycling.

Source: Laurent, J., I. Periáñez and E.W. Petit (2010), Andalusia, Spain: Self-Evaluation Report, OECD Reviews of Higher Education in Regional and City Development, IMHE, *www.oecd.org/dataoecd/32/27/44666367.pdf*.

Using sport strategically can have a positive impact for regional development through strengthened social cohesion and higher educational attainment. Sport is a powerful tool as it can provide opportunities for all social groups and help raise aspirations to higher education. There is a growing incidence of Andalusian universities reaching out to schools and for example migrant youth with the help of sports activities, games and competitions. However there is less evidence of using sport strategically for regional development needs. In the North East of England, sport is regarded as a great leveler in facilitating knowledge sharing between universities and their communities. Sport is used in helping address disparities, in retaining a well-rounded and educated workforce, promoting social equity and impacting positively on the daily lives of the communities. The co-ordination and development of the sport activities is part of the remit of the sport committee of the higher education regional association (Universities for the North East, Unis4NE) that brings together the sport directors of the five universities to design programmes that reach out to the regional population, for example migrant women and youth in distressed areas (OECD, 2007).

International examples in community development

Berlin's neighbourhood management provides an example of long-term community development that empowers communities to help themselves. The key principle of neighbourhood management is that neighbourhood inhabitants know best what is important and what needs to be decided. The task of the interventions is to empower local people, organisations, SMEs and civil society so that they can better articulate their views with local administrations and decide on projects that improve the quality of life and promote social cohesion (see Box 5.13.)

The Berlin higher education institutions have been involved in neighbourhood management mainly through monitoring and evaluation, student internships, and seminars and academic events. "Education and training in the neighbourhood" (*Bildung im Quartier*, BIQ) is one of five new local regeneration projects implemented through the Neighbourhood Management Programme and co-funded by the European Regional Development Fund for 2007-13. The aim is to enhance learning and training outcomes and to help identify and realise local innovation potential through new governance and co-ordination mechanisms, such as local education and training networks. In the BIQ project, childcare facilities and schools are working together with other training providers and local government in developing new pedagogical forms of teaching and learning. This helps open the education and training offer to people living in the neighbourhood. The BIQ project also provides an opportunity for stronger engagement by Berlin higher education institutions through applied research, work-based learning and labour insertion of graduates.

Box 5.13. Neighbourhood Management in Berlin

The Social City Programme is co-financed by the Federal government and the *Länder*, with an EU contribution of around 30% coming from the Regional Development Fund.[10] The programme involves 35 active city areas, mostly in central Berlin[11]. The Berlin neighbourhood management areas cover 2 210 ha (Berlin: 89 175 ha), the smallest with 8.5 ha and the largest 248 ha. At the end of 2008 there were 400 000 inhabitants in these neighbourhoods, around 10% of Berlin's population, the smallest comprising less than 3 000 inhabitants and the largest, 24 000 inhabitants. Whereas the Berlin average for foreigners is of 14%, in these neighbourhood management areas, it reaches 28.74% to which an estimated 15% of Germans with immigrant background can be added. The number of inhabitants in these areas living on transfer payments reaches 36.33% (Berlin average 19.83%).

Box 5.13. Neighbourhood Management in Berlin (continued)

Each neighbourhood management area has an office and meeting place open to all inhabitants and a well trained NGO manager (often in urban planning or social work) who also serves as contact person, leading a small team of around three people. Both national and European assessments have praised the Berlin neighbourhood management: it has strengthened local democracy, enhanced local living conditions and improved the dialogue between inhabitants and district authorities and has changed methods and work processes within the city administrations themselves ("less command and control").

Organisation of cultural events, small rehabilitation or conversion of abandoned real-estate or land and parks, projects for the elderly or the handicapped and training to improve employability are examples of projects that have been implemented with neighbourhood management.

Source: SenStadt (Senatsverwaltung für Stadtentwicklung) (2009), Neighbourhood Management website, www.stadtentwicklung.berlin.de/wohnen/quartiersmanagement, accessed 25 January 2010.

In many countries and regions, "softer" and longer-term community development and cultural engagement by universities remain under-developed. This is due to the national and regional policy environmental and to the pressures on and behaviour of tertiary education institutions in this environment. Funding for regional development is typically project-based, short term and focused on economic development. Small scale support from national or regional governments could stimulate considerable efforts within the university sector, as the Social Entrepreneurship Awards by the Higher Education Funding Council in England (HEFCE) show (Box 5.14.)

Box 5.14. Social Entrepreneurship Awards in England

The Higher Education Funding Council for England (HEFCE) has developed Social Entrepreneurship Awards as part its efforts to encourage higher education to interact more with the rest of society. HEFCE is working with social enterprise charity UnLtd to support and explore the potential of social enterprise activities, and to raise the profile of this work throughout universities and colleges. HEFCE is doing this through a social entrepreneurship programme that aims to encourage staff and students at higher education institutions who have entrepreneurial solutions to social problems.

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Box 5.14. Social Entrepreneurship Awards in England (continued)

The programme runs over an 18-month period and gives individuals and groups an opportunity to apply for two levels of funding: The catalyst awards of small sums (on average around GBP 2 500 up to a maximum of GBP 5 000) for early-stage development of entrepreneurial solutions to social problems and development awards for projects that have already developed some track record of achievement in addressing an identified social problem. In this category, HEFCE funds approximately ten larger projects with a value of up to GBP 15 000.

Source: HEFCE (2010), "Service to society. Demonstrating the public benefits of higher education", www.universitiesuk.ac.uk/Publications/Documents/ServicetoSociety2010.pdf

5.4 Health and welfare

Despite rapid changes in life expectancy, health remains an important policy concern in OECD countries. There have been significant changes in the nature of health problems, with a growth in conditions related to chronic conditions such as diabetes, depression and the deterioration of health-related behaviour in the areas of diet, exercise and drinking. Increasing life expectancy has led to a growing share of the population at risk of "old-age conditions". There are also concerns related to health inequalities while certain demographic and socio-economic groups face significantly poorer health circumstances (OECD, 2010c; WHO, 2008).

Obesity rate has significantly increased in the last 30 years. Approximately 1.6 billion adults around the world are overweight (Rosin, 2008; WHO, 2009b). Mental health accounts for over a third of the burden of illness in Western Europe (WHO, 2004). The share of people reporting mental disorders range from 9% in Italy, Japan, Spain and Germany, to between 12% and 15% in Belgium, Mexico and the Netherlands, to 18% in France and 26% in the United States (OECD, 2009b). The WHO estimates that about 76.3 million people suffer from diagnosable alcohol use disorders (WHO, 2004). Although the level of alcohol consumption in OECD countries has declined by 15% between 1998 and 2005 (endnote), alcohol consumption has polarised and overall consumption remains high with a yearly per capita consumption of almost ten litres of pure alcohol. Younger generations are also at risk. In nine OECD countries, more than 15% of children aged 11 to 15 are either overweight or obese (OECD, 2009b) and

the WHO reports that 20% of children and adolescents have mental health disorders. Alcohol use is also increasing among adolescents (OECD, 2010c).

The regional health profile in Andalusia corresponds to that of the national average. There is limited robust evidence on the extent to which the Andalusian universities are responding to the major health challenges in the region through translational research, teaching and learning and outreach activities. However, the research-based work carried out in medicine and health, supported by national and regional programmes, illustrates that high quality research is not jeopardised by regional co-operation and application.

There are important outreach activities, often championed by individual professors or university departments that reach out to the local community to improve the health outcomes. The University of Seville has advocated a healthy lifestyle promoting a balanced diet, drug-fee university and responsible sexual behaviour among its student community. The experiences are now being disseminated throughout the Andalusian University System. The University of Seville's Faculty of Dentistry collaborates through the Social Dentistry Foundation (which was created on the initiative of a university professor) with the City of Seville in providing services in the dentistry clinic in one of the distressed areas in the city (the *Polígono Sur*) to reach out to people with substance abuse problems. This outreach helps integrate patients into the public health service and eventually to the formal economy. The Faculty of Dentistry has also developed international outreach activities and experiential learning opportunities for students that involve direct contact with the patients. In the Province of Granada, the University of Granada offers free odontological services for patients from lower socio-economic backgrounds carried out by students under the supervision of the odontology faculty. The university's Odontology Plan, launched in 2001, encompasses services for the elderly, offered in the home of the elderly person to ensure people with reduced mobility, and services for adults and children who are under the age of 13. These services can be accessed through local social services centres and non-profit organisations. The University of Granada has also created a Quality of Life and Ageing Office that uses retired professionals in health and welfare professions to advise and assist students in health fields to improve their professional skills and competencies.

Another notable effort is the programme developed by the University of Cadiz to integrate intellectually disabled people into society (see Box 5.15.). Despite the commendable efforts of these and other outreach activities, there is limited robust evidence on the impact of these projects or the number of students and/or patients that have benefited from them.

Box 5.15. Independent life for disabled people: The University of Cadiz

EQUA was created in 1997 as a non-profit entity to work with intellectually disabled people to have a normal life within society. This association organises training activities to provide this collective the necessary tools to access the labour market and also social and cultural activities to improve their interpersonal and social skills.

The University of Cadiz is one of the networking members of EQUA Association. The award-winning "EQUA Independent Life project" targets disabled youth to develop their social and personal skills and empowers them to live apart from their families. During a period of three months, the disabled youth live with students from the University of Cadiz are exposed to daily tasks without the support of their families. Qualified staff of the EQUA Association supervise the overall process. The project also enriches the learning process of students of pedagogy who can interact with the disabled youth to better understand their needs and to develop psycho-pedagogical skills. The EQUA Independent life project has achieved regional and national recognition (Andalusian Award for good practices for the disabled in 2009 and the Maphre Foundation Award in 2008). Fundacíon MAPFRE is an institution sponsored by the Spanish insurance group MAPFRE. The foundation's aim is to contribute to achieving objectives of general interest to society. One of the specific objectives is to contribute to improving the economic, social and cultural conditions of the more disadvantaged people and sectors within society.

Source: EQUA (Association for the social interaction of intellectual disabled people), www.redasociativa.org/*equa2*.

The Andalusian universities have also participated in the design (and implementation) of the Andalusian programme on the prevention of workplace accidents, the Andalusian Drug Prevention Plan and most importantly the Andalusian Public Health Plan, (Laurent, Periáñez and Petit, 2010).

Collaborating with the public health system

In the OECD area, overall levels of health expenditure have increased to 8.9% of GDP in 2007, up from 3.9% when the OECD was founded in 1961 and are likely to increase further due to the ageing population (OECD, 2007b; OECD, 2009c). In a similar vein, the health expenditure forms a considerable part of the regional government's budget in Andalusia.

The Andalusian Health Service (SAS in its Spanish acronym) was created in 1986 as an autonomous body attached to the regional ministry of health, forming an important part of the Andalusian Public Health System (SSPA). The Andalusian Health Service provides public primary and specialised health care to over 8 million inhabitants via 1 491 primary care centres, 29 hospitals and 8 blood transfusion centres, serving an area of 87 268 km. It is equipped with 83 132 health professionals (2007 data) and a budget of EUR 8.75 million (2008 data) (Gavira, 2009).

Ensuring that the public health care system has competent personnel is a challenge in many OECD countries. One of the major successes in regional collaboration between the Regional Government of Andalusia and the tertiary education sector is the development and implementation of the Strategic Plan for Comprehensive Training in the Andalusian Health Care System. The plan provides for compulsory clinical practice for health professionals as well as specialist training and professional development. The joint investments and collaboration in training have helped improve the health outcomes in Andalusia and the quality of healthcare delivery. This is one of the significant strengths in the region and could entail significant export potential (see Box 5.16).

Box 5.16. The Andalusian Public Health System Training

Launched by the Regional Ministry of Health in Andalusia, the Strategic Plan for Comprehensive Training in the Andalusian Public Health System is responsible for developing professional competencies during the compulsory education of healthcare professionals, including clinical practice, specialist training and continuing professional development. Training is based on an in-depth needs assessment and encourages collaboration and sharing of knowledge and experience among the health professionals by allowing for temporary transfers among departments and self-learning opportunities.

The Andalusian Public Health System is the largest provider of health professionals in Spain. It also accounts for the largest number of training activities and the largest budget for continuing professional development in this domain.

Every year, the Andalusian Public Health System provides clinical practice for around 850 undergraduate students, who obtain their medical degrees and who over a period of several years, spend varying periods of time in the public health centres. The beneficiaries of this programme are over 3 000 nursing, physiotherapy and speech therapy graduates and around 10 000 students enrolled in various degree programmes and diploma level vocational training courses in healthcare.

Box 5.16. The Andalusian Public Health System Training (continued)

Around 18 000 students from universities and vocational training institutions move through this network. The main potential employer of the new healthcare professionals is the Andalusian Public Health System. .

The Andalusian Public Health System also employs over 1 300 university lecturers and a large number of vocational training tutors. It has an exclusive responsibility over specialist training as it is in charge of training 3 360 specialty residents, of which around 950 finish their specialist training each year. To achieve the targets for specialist training, hospital departments, healthcare management departments and primary care districts have teaching units, accredited by the ministry of health, provided 1 276 places for specialist training in 2008.

There are around 900 tutors distributed among the various specialties who oversee the training process of specialty residents. The Andalusian Public Health System is responsible for the continuing professional development of over 450 managerial staff, 3 600 middle management staff, over 13 000 doctors, 20 000 nurses and more than 1 500 professionals and technicians from other disciplines.

The Andalusian University System provides funding for the compulsory training in health professions. The university system pays the portion of a professionals' salary (which corresponds the university salary levels) and also pays the salaries of part-time clinical associate teachers who work within the health system. Health centres cover other costs which are not funded by universities. Funding for postgraduate training is provided by the regional ministry of health, which receives an earmarked budget for this purpose and transfers the funds to the health centres. This budget covered the residency costs of junior doctors which are based on training contracts. A total of 3 360 health science specialists were trained in 2006 on the basis of at residency contracts. The costs of the specific training activities to the Andalusia Public Health Care System amounted to almost EUR 114 million 2006.

Source: Regional Government of Andalusia, Regional Ministry of Health (2009), Strategic plan for comprehensive training in the Andalusian Public Health System, Regional Government of Andalusia, Seville.

5.5 Environmental sustainability and green growth

Universities and other tertiary education institutions can contribute to sustainable environmental development in their regions in many ways, for example by: *i)* generating human capital in the region through their learning and further education programmes in areas of sustainable development, *ii)* acting as a source of expertise through research, consultancy and

demonstration, *iii)* playing a brokerage role in bringing together diverse regional actors and elements of capacity to the sustainability process, *iv)* demonstrating good practice through on-campus management and development activities, strategic planning, building design, waste minimisation and water and energy efficiency practice, responsible purchasing programmes and pursuing good citizen type initiatives like a "green campus" and *v)* offering recognition and reward incentives for staff to be involved in sustainable development leadership groups in the regional community (OECD, 2007).

Universities in Andalusia have established dedicated environmental management units which disseminate information and organise a broad range of activities, including courses, seminars, debates, exhibitions and competitions, to raise awareness among the university community and general public about environmental sustainability. The universities also work with each other and key stakeholders to identify lines of action in environmental sustainability. Co-ordination and collaboration mechanisms have been established often with the help and support from the regional government (see Box 5.17.).

Box 5.17. Andalusian universities and sustainability

The Andalusian Centre for the Evaluation and Monitoring of Global Climate Change: established in 2008 in Almeria, with the support of the regional government (ministry of environment and Ministry of Economy, Innovation and Science) this research centre focuses on multidisciplinary research in the fight against climate change by establishing a meeting point between the scientific community and the public and private sector.

University Environmental Volunteering Programme: launched and developed by the regional ministry of environment, this programme is open to the entire university community in Andalusia. The programme includes multiple actions for environmental improvement, research projects and raising environmental awareness. An example is the Green Space Magazine, which addresses environment improvement actions, research projects and raising awareness on environmental issues, targeting university community.

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Box 5.17. Andalusian Universities and sustainability (continued)

Rectors' Sectorial Commission for Environmental Quality: this commission has the mission to promote sustainable development and risk prevention in the universities, sharing the experiences of the university community on environmental management, good practices in "greening" the universities and risk prevention projects, whilst at the same time encouraging their mutual co-operation.

Source: Laurent, Periáñez and Petit, (2010), "Andalusia, Spain: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE, OECD, Paris. *www.oecd.org/dataoecd/32/27/44666367.pdf*

The Andalusian universities have also taken steps to develop on-campus management and development activities, including building design, waste management and minimisation, and water and energy efficiency practice. For example the University of Jaen has a solar panel system made up of 2 000 panels integrated in the university complex, distributed over the façade and the roofs of the car parks and pergolas. They produce 10% of the electrical power consumed by the university, generating significant energy saving. The University of Malaga has created 10 000 m² of gardens in line with xero-gardening criteria. Its sport unit uses salt for the disinfection of swimming pools and solar energy for water heating.

Steps have also been taken to support sustainable urban mobility among the university community. For example the University of Malaga and the University of Cadiz have developed car sharing pools for the university community who use private transport to travel daily to the different academic centres in order to reduce energy consumption, pollution and traffic density.

Despite the progress made, the contribution of universities to sustainable development in Andalusia has not yet reached its full potential. The current programmes are small in scale and fragmented among universities. Most of the actions are focused on demonstrating good practice through on-campus management and development activities, building design, waste minimisation and water and energy efficiency practice as well as pursuing small scale good citizen type initiatives. In most cases, no robust information is available on the outcomes of the various activities. More importantly there appears to be a lack of training for green jobs, joint RDI efforts to support the development of renewable energies and green growth,

and effective outreach activities to support energy efficiency in the regional industry.

RDI and knowledge transfer in environmental sustainability

Spain is a world leader in renewable energy industry development. This leadership has emerged from supportive national government policies, *e.g.* an aggressive feed-in tariff, which imposes an obligation on regional and national electricity distributors to buy electricity generated from renewable sources, such as solar power and wind power from eligible generators (Spanish Ministry of Industry, Tourism and Trade, 2008).

Over the past two decades, Spain has significantly diversified and increased the sources of renewable energy (reaching 7% of primary energy and 20% of electricity generation in 2007), while building a solid industry and technological base. Renewable energy is growing in volume and Spain has given priority to further developing its capacity, with the objective of renewable energies of reaching 12% of primary energy by 2010. While hydropower and thermal solar production have been well established, wind power has experiencing fast growth and its contribution was expected to account for over 11% of renewable energy supply in 2010. The share of renewable electricity production rose from 17 to 22% between 1990 and 2001 (with large variations in hydro generation, depending on weather conditions) (OECD, 2009d).

Deloitte's 2009 survey on Global Trends in Venture Capital reports that, despite the economic and financial crisis, 63% of venture capitalists anticipate an increase in their investment in clean-tech, the highest percentage among all sectors considered. Many of the new green technologies rely on local know-how, and generate new applications and higher demand for technologies developed by other, "non-green" industries. For example, the design of the new, three-blade turbines in the wind-energy clusters of Alborg and Arhus in Denmark was heavily influenced by the advances of the Danish agricultural engineering industry. These knowledge spillovers and technological branching of eco-innovation raise overall "inventiveness" of a region, and productivity and growth (OECD, 2011, *forthcoming*)

In the international scene, the inventions in green technologies tend to be highly concentrated in all OECD countries, reaching the highest levels for Canada, Australia and Turkey. The ten most productive regions account for 13.7% of overall green patenting (see Annex 5.A.2). Based on the ten leading regions in patents applicants in 13 environmental technologies, among Spanish regions, only Navarre features in the list as Number 4 in wind technology.

Box 5.18. Wind energy in Navarre

Navarre is one of the early adopters of wind energy technology and demonstrates the impact that wind energy can have in Spanish regions, not only in providing self sufficiency of energy supply, but also in terms of jobs created in this new sector, which can be part of the diversified economy of rural areas. From 1999 to 2004 wind energy used an estimated work force of 95 160 man-years in construction and installation, and 1 464 in operation and maintenance. For the period 2005-10 it is estimated to create 34 680 jobs in construction and installation and 3 113 in operation and maintenance.

Navarre began producing wind energy in 1994. Today, it ranks first in Spain, and is among the top regions in Europe in production of wind energy and of parts and machinery. Spain ranks second (after Germany) in terms of wind power capacity, with a world market share of 16% (accumulated capacity) and 22% (installed capacity). Navarre produces more than 45% of its electricity consumption from wind, and an additional 15% from other renewable energies, including mini hydraulic and biomass. In 2005, the installed renewable energy generation capacity should satisfy 97% of Navarre's electricity consumption. An outstanding wind power machinery manufacturing sector has been created, currently providing work for over 2 000 people.

In Spain the wind energy sector has created 47 000 jobs, 12 000 direct and 35 000 indirect. The origins of such an increase in wind power in Navarre lie in a mixture of factors – an excellent wind regime, a focused regional development policy and a national support scheme.

Source: OECD (2009d), *OECD Rural Policy Reviews*, Spain, OECD, Paris.

Andalusia has been active in building a renewable energy economy and also in R&D efforts that can position the region internationally as a leader in new renewable energy technologies. Andalusia is among the leading Spanish regions in biomass sector, photovoltaic installations and wind installations. The sector employs 8 786 people and there would be scope for improving the employment figures. Furthermore, the region has pioneered the first commercial project for solar thermoelectric energy and solar tower in Spain. (see Box 5.19)

Box 5.19 The world's first solar tower in Andalusia

Located in Sanlúcar la Mayor in the province of Seville, and just a few kilometers from the capital city of Andalusia, the PS-10 project was the first commercial project for solar thermoelectric energy in Spain and the first of its type (tower) in the world. The solar plant of 11 MV generates 24.3 GWh of clean energy capable of supplying 5 500 homes and saving 6 700 tons of CO2 by year. The technology consists of 624 heliostats or mirrors of 120 m2 each that rotate according to the sun and project and concentrate solar radiation in one point located at 115 m high in the solar tower. The receptor generates heat at high temperatures which is then utilised to move a turbine with a capacity of 11 MW. Another tower, the PS20, has a similar functioning but the double the power, with the capacity to supply 12 000 homes.

Source: OECD (2009d), *OECD Rural Policy Reviews*. Spain, OECD, Paris; Abengola Solar (2010), Solar Power for a Sustainable World, *www.abengoasolar.com*, accessed October 2008.

International examples show that the universities' research specialisation and research institutes can play important roles in the development of the industry in the renewable energy sector (OECD, 2011, *forthcoming*).[12] With respect to university participation in sustainable energy R&D in Andalusia, there are some significant but distinctive initiatives. For example the University of Almeria supports networking of green house producers in one of the largest green house production areas in Europe and facilitates transition of traditional agriculture to modern precision farming and eco-efficient greenhouse production. Despite this type of initiatives, and a set of research centres whose activity focuses on environmental development and sustainability, the Andalusian University System does not appear to be visible in the field of renewable energy research and development. Given the critical role that the development of sustainable energy and energy efficiency play in the Spanish national agenda and in the future of its economy, joint university efforts in this arena would be advisable.

Supporting eco-efficiency of the regional industry

Generating eco-efficiency means creating more goods and services while using fewer resources and creating less waste and pollution. Universities and other tertiary education institutions can play an important

role in supporting technical, organisational and process improvements for eco-efficiency of the existing industry.

The Andalusian University System does not seem to have a strong portfolio of specific programmes targeting emission reduction in industries that have been directly initiated by universities and other tertiary education institutions. Experience from programmes in Canada, Austria, the UK and the US shows that universities can become successful partners of local businesses who want to upgrade their environmental standards (see Box 5.20.).

Box 5.20. Design programmes for sustainable urban growth

Faculties in the two traditional disciplines areas of architecture and design are increasingly developing projects branching out into urban smart design, environmental management and policy, greenhouse emission reduction and behaviour change. A core characteristic of these programmes is their dedication to government advice and technical assistance to local industries. They do it by developing and demonstrating new design strategies, decision support tools and processes, as well as by assisting industry to design and use greener products, buildings and services and to develop more strategic environmental directions.

- The Faculty of Environmental Design (EVDS) at the University of Calgary in Canada provides an interdisciplinary teaching and learning environment that emphasises a co-operative, collegial approach to research, scholarship, creative endeavor, professional practice and outreach.
- The Centre for Design, at the Royal Melbourne Institute of Technology (RMIT) in Australia, works with industry and others to develop and demonstrate new design methods, tools and processes aimed at improving the environmental performance of buildings, products and services.
- The Centre for Sustainable Design, University College, UK, facilitates discussion and research on eco-design in product and service development.
- Green Design Initiative at Carnegie Mellon University, US promotes environmentally conscious engineering, product and process design, manufacturing, and architecture. The initiative involves forming partnerships with industrial corporations, foundations, and government agencies to develop joint research and education programmes.

Source: OECD (2011), Higher Education in Cities and Regions. For Stronger, Cleaner and Fairer Regions, OECD, Paris, *forthcoming.*

Universities and other tertiary education institutions in Andalusia could increase their co-operation with local or regional one-stop-shop agencies for business support. By training the trainers and other knowledge dissemination activities, universities could help these agencies acquire the specialised skills to advise firms on the cost-effective ways to reduce emissions.

Tertiary education institutions could assist in greening the SMEs in the tourism industry. It is unclear to what extent the Andalusian universities have tapped into the possibilities provided by the Spanish FUTUR-E Plan, which promotes tourism eco-efficiency and innovation. This plan would provide opportunities for the tertiary education institutions to contribute to the rational energy use, the use of renewable energy sources, reduction of the water footprint and waste management in order. For example national authorities have set up the Centre for Tourism Sustainability and Environmental Technologies to bring the tourism industry's development into line with the challenges posed by climate change.

There is a rapid evolution of technologies and tools available to business to monitor the environmental sustainability of their production (*e.g.* sustainability audits) and undertake action to improve environmental performance (*e.g.* systematic use of life cycle assessments practices). With the help of them, the provision of technical assistance is now more carefully designed to build capacity within the firm, rather than substitute for it. (OECD, 2011, forthcoming). [13]

Creating skills for green growth

Jobs related to renewable energy and energy efficiency are projected to increase to several millions worldwide by 2030, most of these new jobs in a small number of innovative regions (OECD, 2009b).

Human capital development is critical to enhance the opportunities for wide market penetration of renewable energy and low carbon technologies. Inadequate skills and poor quality systems may limit the growth of renewable energy technologies. Many national and regional governments are adjusting their skill strategies to address the emerging demand for new skills in the green industries, by introducing incentives to facilitate re-training and efficient mobility of learners between vocational institutes, universities and industries. Emerging green occupations will also require the creation of new industry-recognised credentials and training programmes, and modifications of training packages for workers in traditional occupations (OECD, 2011, *forthcoming*) [14].

Given the high levels of unemployment in Andalusia, green growth would appear as one of the fields for the region to focus its workforce development. Currently, there is limited evidence of skill creation and re-skilling activities in green growth in Andalusia. Andalusia should take steps to anticipate the employment effects and labour reallocation needs across industries. Skill creation could be more efficiently organised by pooling learning resources of educational institutions and industries at the regional level, requiring collaboration across the university VET divide. Stronger partnerships between tertiary education institutions and industrial associations could stimulate innovation in the modes of delivery of education and training.

Conclusions and recommendations

Universities play an increasingly important role in facilitating social, cultural and environmental development in Andalusia. They provide significant contributions to local development by providing training for health professions in collaboration with the Andalusian Health System. Universities are also making available for public access a wide range of culturally-specific programmes and infrastructure, such as museums, libraries, theatre groups and sporting facilities. They contribute with education and community outreach to sustainable development, cultural vibrancy and public health services. Faculty and students are engaged in outreach activities. Activities are often carried out in the provinces where the universities are located reaching out to urban and rural communities in ways that bridge the gap between the university and the society.

There is, however, a lack of critical mass to generate projects which have strong impact at the local and regional level. There are some impressive collaborative mechanisms among the universities and the regional government, most notably in the field of public health services to ensure quality personnel, but also between universities for example in the cultural programming through the Atalaya project. In many cases there is, however, scope for stronger collaboration to build joint capacity and to foster joint efforts for regional development. This is necessary to ensure that limited resources are not spread thinly and that the projects will generate multiplier effects. Finally, there is considerable potential in a number of fields, such as generating green growth, supporting cultural tourism and cultural and creative industries, enhancing long-term community development and capitalising on Andalusia's multicultural heritage. This would entail mobilising universities' teaching, research and service functions and better aligning them with the region's needs.

One of the major successes in regional collaboration between the Regional Government of Andalusia and the tertiary education sector has been the development and implementation of the Strategic Plan for Comprehensive Training in the Andalusian Health System. The plan provides for compulsory clinical practice for health professionals as well as specialist training and professional development. Joint investments and collaboration in training have helped improve the health outcomes in Andalusia and the quality of healthcare delivery. This is one of the significant strengths in the region and could entail significant export potential.

Andalusia's multi-cultural heritage, geographical location, connections with North Africa and the presence of migrants from this area constitute strong assets that the region could capitalise on in developing cultural tourism, attracting foreign direct investment, integrating migrant population and encouraging ethnic entrepreneurship. There is scope for expanding joint efforts in this domain which represents "a low hanging fruit" for the region. The growth of the markets and improvements in educational attainment levels and public management in the Middle East and North African countries (MENA) provide Andalusia an opportunity to improve its export balance and economic development. Andalusia's unique history with co-existence of three cultures in *Al Andalus*, Islamic architectural heritage and the largest mosque in the western world are potential magnets for attracting high-end tourism from the Arab countries. Universities could provide their expertise in designing new services with the help of their partners in North African countries. They could also assist in targeting part of their entrepreneurship activities at the immigrant community which often represents the most entrepreneurial segment of the society.

The universities could capitalise on the cultural heritage of the region and contribute to the development of the regional cultural economy. They could develop and expand learning and skills development programmes, research activities and outreach efforts to support the cultural and creative industry development of the region. Bologna agreement provides an opportunity to integrate cultural – and social – activities into their educational programmes. They should also design programmes addressed to international students who could contribute with their knowledge of foreign languages to create links with other regions. Stronger connections with students, researchers and artists from Europe and abroad, could have an impact on the regional economy.

The new curricula under the Bologna agreement provides an opportunity to mobilise students for knowledge transfer and exchange, by requiring students participate in internships as a facet of their educational programme. The development of these internship experiences is currently uneven across

the universities and different disciplines. These internship experiences could be extended to community-based organisations in the context of a university commitment to a wider range of regional needs.

To continue to deepen the universities contribution to the social, cultural and environmental development in Andalusia the OECD review team recommends:

- The regional government could capitalise on its accumulated know-how and wealth of experience in the development and implementation of comprehensive training in the Andalusian Health System, that provides compulsory clinical practice for health professionals as well as specialist training and professional development. This is one of the significant strengths in the region and could entail significant export potential.

- The regional government and the universities could capitalise on Andalusia's multi-cultural heritage, geographical location, connections with North Africa and the presence of migrants from this area constitute in developing cultural tourism, attracting foreign direct investment, integrating migrant population and encouraging ethnic entrepreneurship. There is considerable scope for expanding joint efforts in this domain for example in cultural tourism.

- The regional government could encourage collaboration between tertiary education institutions and industry to boost green growth and eco-innovation. Skill creation for green jobs should be more efficiently organised by pooling learning resources of educational institutions and industries in Andalusia and providing flexible pathways between educational institutions.

- The regional government could consider providing stronger incentives for "challenge-driven" research to connect university research to community development. In order to make the connection between the current research focus and a more broadly defined third mission, "translational research" could be adapted to address the critical issues that bridge the university and community. In addition, university leaders could develop initiatives supported by small research grants to encourage faculty to undertake research activities that connect with community agendas.

- The Andalusian universities should develop a forum for social, cultural and environmental development to build on strengths, to identify unexploited opportunities and to address the regional needs. An exchange forum should be put in place to, track and monitor different initiatives and their outcomes and identify best practices

for publication and policy fine-tuning. Such a forum could organise thematic events, with regular information retrieval and exchange facilitated by a dedicated website. As a first step, universities' current connections, initiatives and projects involving stakeholder collaboration, community development and/or outreach should be mapped and published in the collaboration platform. Universities' social responsibility reports could serve as a basis to develop a social responsibility plan for the Andalusian University System to further enhance their engagement in cultural, social and sustainable development.

- Universities in Andalusia should capitalise on Andalusia's attractiveness to international students and tourists. Universities in Andalusia could take a leadership role in regional initiatives to develop strategies to take full advantage of its cultural and historical heritage. They could contribute to the development of the regional creative economy by developing and expanding programmes in entrepreneurship and non-profit management both in formal degree programmes and through extension efforts. Existing programmes should be extended further and linkages should be established with the cultural industry and international networking to connect the region internationally. Universities should also more actively contribute to the skills development and innovation needs in tourism.

- Universities should improve the monitoring and follow-up of the success and results of their initiatives, projects and programmes to show return on public investment. The lack of robust and comparable data constrains the visibility and impact of universities' activities. It also makes difficult to measure the success or failure of programmes. Universities' social responsibility reports could be used as a framework for the systemic mapping of activities.

- Universities should in collaboration with regional and local governments, schools and the private sector, reach out to socially underprivileged population to ensure social and economic cohesion. Current activities need to be scaled up in a systematic way, including long-term multi-stakeholder collaboration to raise aspirations among youth in socially unprivileged population and to improve their quality of life. Universities should also reach out and empower the migrant population to address their own challenges through community development programmes.

Notes

1. According to Ernst and Young, Catalonia was the third European region for international inward investment projects (368 projects or 13%) during the period between 2000 and 2004 (after London and Paris). The volume of effective gross investment in Catalonia also increased by 42% between 2004 and 2005. Before the economic crisis 2001-07, Barcelona continued consolidating its position as one of the most outstanding European cities in terms of growth in gross value added. Data published by Cambridge Econometrics place Barcelona in ninth position in the European ranking. European Cities Monitor 2006 report shows that the city has moved up one position since the previous year. Barcelona now occupies fourth place in the table of best business cities. The relationships between tourism and culture and the attractiveness of Barcelona are well understood by the local population. In a survey of residents, attitudes to tourism in 2007, 84% agreed that tourism improves the international image of the city, 81% that it strengthens the economy and 77% that it generates employment. When asked about future strategies for the development of tourism, 92% were in favour of developing cultural tourism. The role of residents in promoting and developing cultural tourism has also been recognised by Creative Tourism Barcelona, which has used the strong flow of visitors attracted by the creativity of the city to provide a forum for creative exchange between visitors and residents. The website (www.barcelonacreativa.info) acts as a broker service, linking creative people who want to visit Barcelona with local artists and cultural associations. It finds venues for people who want to perform, and courses for those who want to learn. This programme has been one of the factors in a strong growth in tourists learning the local Catalan language in the past two years.

2. The State Secretariat for Tourism is charged with: *i*) defining, proposing, lending impetus to, and co-ordinating government tourism policy, *ii*) drawing up general plans that serve to foster tourism products, improve the quality and technological innovation in tourist firms and promote co-operation with the private sector; its duties include identifying new tourism resources, diagnosing and assessing factors that affect the supply side of tourism, and designing strategies aimed at developing and enhancing tourist products and destinations, *iii*) liaising with autonomous

regions, local authorities, ministries and the tourist sector in general, to draw up the bases for and general planning of tourism sector policy, *iv*) undertaking research into factors that exert influence on tourism, as well as gathering, compiling and assessing statistics, information and data relating to tourism, *v*) defining the Spanish Tourism Institute's strategies and *vi*) handling institutional tourism relations between central government and international organisations – public and private – as well as international co-operation, in co-ordination with the Ministry of Foreign Affairs.

3. TURESPAÑA carries out activities in the following areas: i) planning, developing and executing activities aimed at promoting Spain as a tourism destination in international markets, ii) supporting the marketing of Spanish tourism products abroad in co-operation with the regional and local authorities and the private sector and iii) establishing the strategy, plan of action and investments for new establishments of *Paradores de Turismo de España*. In order to achieve its goals effectively, TURESPAÑA carries out its promotion and marketing activities abroad through a network of 31 Tourist Offices, which are part of Spain's embassies and consulates.

4. According to the National Trust for Historic Preservation in the United States these benefits include: creating jobs and businesses, increasing tax revenues, diversifying the local economy, creating opportunities for partnerships, attracting visitors interested in history and preservation, increasing historic attraction revenues, preserving local traditions and culture, generating local investment in historic resources, building community pride in heritage and increasing awareness of the site or area's significance.

5. In Spain, to reduce seasonal variations in tourism, a project called *Turismo Senior Europa* has been launched to increase Spain's winter tourism by showcasing the low-season potential of Spanish destinations to tap into a target public of over 100 million EU citizens in the 55-75 age bracket, 50% of whom have never travelled outside their home countries. This will be the driving force behind a revitalisation of the low season and an improvement of the sector's profitability and sustainability.

6. For further details about the Cordoba's bid for the European Capital of Culture candidature 2016, see: *www.Cordoba2016.es*

7. According to Richard Florida, regional growth requires educated people, a talented workforce, a base of economic activities and tolerant, open-minded, and diverse people climate which is associated with a broad range of elements that influence the milieu and atmosphere of a city. Low entry barriers, such as openness toward newcomers and open-mindedness toward different cultures and different norms, help regions compete for

talent. A good "people climate" attracts and retains creative and talented people, who, in turn, fertilise the ground for a competitive business climate. Finally, a good and competitive business climate has positive impact on economic growth.

8. The data from which these rankings were drawn is employment data and so does not count the substantial population in CCI in all of Europe that is self-employed.

9 . The liturgical music of the Mozarabs with Hindu, Greek, Hebrew, Persian origins combined with local folk music and dances and formed a unique Andalusian musical culture that now manifests itself in song (*Cante*), dance (*Baile*) and guitar playing (*Guitarra*).

[10]. Total 1999-2008 budget: EUR 162 million (Land Berlin EUR 73.5 million; European Union EUR 58 million; Federal Government, EUR 30.5 million)

[11]. The developments that follow are based on information provided to OECD by the Senate Department for Urban Development that oversees the Social City program.

[12]. For example, Bavaria, heavily dependent on agriculture in the early 20th century, has now become Germany's leading state for photo-voltaic technology, partly due to the collaboration between the Max-Planck-Institute and the GSF national research institute, operating under the umbrella of the Bavarian Energy Technology Cluster initiative. The strong research base in wind engineering and wind energy at the *Danish Technological Institute* and at Ålborg and Århus Universities have been essential for the development of the Danish wind energy industry.

[13]. In Canada, programmes such as the Eco-Efficiency Partnership in British Columbia, the Eco-Efficiency Centre in Nova Scotland and the EnviroClub of Quebec are examples of a multi-level approach to improving the environmental performance of small and medium-sized enterprises (SMEs). Within these public schemes, the contribution of universities can be channelled and upgraded according to what local businesses value.

[14]. The demand for low-carbon products will require the development of diverse skills, developers, engineers and designers, manual workers with the technical capability to install and maintain these products, and salespeople able to promote such estates in the market.

Annex 5.A.1.

Table 5.A.1.1. Regions with the highest average annual growth in CCI employment, 2001-06.

All regions

	CCI Growth	Rest of the economy	CCI LQ	CCI Rank	CCI Employment
Niederösterreich (St. Pölten), AT	16.63%	7.60%	1.07	84	22 593
Salzburg, AT	10.00%	6.32%	1.08	161	10 434
Oberösterreich (Linz), AT	8.99%	6.97%	0.73	126	14 506
Asturias (Oviedo), ES	8.42%	3.05%	0.85	146	11 399
Zapadne Slovensko (Nitra), SK	8.35%	1.96%	0.68	106	17 728
Cumbria (Carlisle), UK	8.31%	2.47%	0.84	220	5 087
La Rioja (Logroño), ES	7.99%	5.64%	0.70	237	3 217
Andalucía (Sevilla), ES	**7.78%**	**5.27%**	**0.74**	**16**	**71 843**
Hants and Isle of Wight (Southampton), UK	7.22%	1.18%	1.27	45	38 851
Castilla-La Mancha (Toledo), ES	6.87%	4.79%	0.67	109	16 528
Jihovychod (Brno), CZ	6.65%	0.39%	0.86	89	21 606
Murcia, ES	6.35%	5.25%	0.61	152	10 906
País Vasco (Bilbao), ES	6.51%	2.52%	1.12	51	36 539
Valencia, ES	6.25%	4.48%	0.86	27	59 901
Kärnten (Klagenfurt), AT	6.13%	4.55%	0.73	222	4 950
Lietuva, LT	5.79%	3.63%	0.88	68	26 102
Galicia (A Coruña), ES	5.45%	2.71%	0.78	60	29 294
Picardie (Amiens), FR	5.41%	1.31%	0.55	181	8 934
Nyugat-Dunantul (Györ), HU	5.33%	0.51%	0.65	180	9 002
Extremadura (Mérida), ES	5.32%	3.11%	0.66	188	8 022
Canarias (Tenerife), ES	4.97%	4.16%	0.79	88	21 765
Steiermark (Graz), AT	4.87%	5.63%	0.76	144	11 479
Corse (Ajaccio), FR	4.72%	4.08%	0.45	247	1 092
Herefordshire, Worcestershire and Warwickshire,, UK	4.67%	0.84%	1.12	91	21 115
East Riding and North Lincolnshire, UK	4.55%	1.61%	0.75	177	9 104

Source: Power, D. and Nielsén, T. (2010), Priority Sector Report: Creative and Cultural Industries Europe Innova, European Cluster Observatory, EC. www.clusterobservatory.eu/upload/CreativeAndCulturalIndustries.pdf, accessed 20 June 2010.

Note: LQ is an indicator of CCI employment relative to the total employment of the region, where LQ>1 indicates an over-representation of CCI employment. Growth is measured using compound annual growth rates (CAGR).

Table 5.A.1.2. Europe's Top 25 regions for creative and cultural industries employment clusters

Region	CCI Rank	Employment	LQ
Île de France (Paris), FR	1	301 895	1.53
Inner London, UK	2	235 327	2.19
Lombardia (Milan), IT	3	195 848	1.28
West-Nederland (Amsterdam), NL	4	195 646	1.56
Madrid, ES	5	172 800	1.58
Cataluña (Barcelona), ES	6	153 202	1.30
Danmark, DK	7	124 352	1.28
Lazio (Rome), IT	8	118 047	1.51
Oberbayern (München)	9	97 050	1.59
Stockholm, SE	10	86 239	2.16
Kozep-Magyarorszag (Budapest), HU	11	82 429	1.73
Outer London, UK	12	80 845	1.28
Berks, Bucks and Oxon (Oxford), UK	13	80 628	1.82
Attiki (Athens), GR	14	78 920	1.26
Oost-Nederland (Nijmegen), ES	15	74 064	1.39
Andalucía (Seville), ES	**16**	**71 843**	**0.74**
Ireland, IE	17	70 602	1.18
Zuid-Nederland (Maastricht), NL	18	70 543	1.28
Darmrstadt (Frankfurt am Main), NL	19	68 238	1.23
Piemonte (Turin), IT	20	66 291	1.04
Köln, DE	21	65 341	1.28
Etelä-Suomi (Helsinki)	22	64 500	1.43
Veneto (Venice), IT	23	63 024	0.89
Stuttgart, DE	24	61 626	1.17
Berlin, DE	25	60 736	1.53

Note: LQ is an indicator of CCI employment relative to the total employment of the region, where LQ>1 indicates an over-representation of CCI employment

Annex 5.A.2.

Table 5.A.2.1. Patent application in renewable energy technologies in OECD regions, 2004-06

Technology	Region	Patents
Wind	Ost-Friesland (DE)	340
	Los Angeles-Long Beach-Riverside (US)	129
	Tokyo (JP)	81
	Navarra (ES)	81
	Berlin (DE)	64
	Schleswig-Holstein Mitte (DE)	58
	Osaka (JP)	58
	Seoul (KR)	49
	Fyns amt (DE)	47
	San Jose-San Francisco-Oakland (US)	43
Solar	San Jose-San Francisco-Oakland (US)	323
	Los Angeles-Long Beach-Riverside (US)	191
	Tokyo (JP)	151
	Boston-Worcester-Manchester (US)	148
	Detroit-Warren-Flint (US)	141
	Sydney (AU)	139
	Munchen (DE)	137
	Washington-Baltimore-N.Virginia (US)	129
	Melbourne (AU)	94
	Kyoto (JP)	87
Hydropower	Ostwurttemberg (DE)	28
	New York-Newark-Bridgeport (US)	28
	Isère (FR)	22
	Los Angeles-Long Beach-Riverside (US)	22
	Sydney (AU)	19
	Linz-Wels (AT)	18
	Rogaland (NO)	18
	Melbourne (AU)	16
	Philadelphia-Camden-Vineland (US)	16
	Osaka (JP)	15
Geothermal	Aichi (JP)	21
	Los Angeles-Long Beach-Riverside (US)	19
	Stuttgart (GE)	14
	Houston-Baytown-Huntsville (US)	14
	Atlanta-Sandy Springs-Gainesville (US)	13

	Aachen (DE)	13
	Zug (CH)	12
	Hamburg (DE)	10
	Industrieregion Mittelfranken (DE)	10
	Greater Vancouver (CA)	10
Biomass	Oxfordshire (UK)	148
	New York-Newark-Bridgeport (US)	142
	Cleveland-Akron-Elyria (US)	135
	San Jose-San Francisco-Oakland (US)	128
	Cheshire (UK)	62
	Rheinpfalz (DE)	53
	Houston-Baytown-Huntsville (US)	50
	Philadelphia-Camden-Vineland (US)	41
	Unterer Neckar (DE)	30
	Berkshire (UK)	29

Source: Data are extracted from the OECD REGPAT dataset. Counts of patents are weighted according to the methodology described in OECD (2008), The OECD REGPAT Database: A Presentation OECD STI Working Paper, OECD, Paris.

Note. Regions in OECD countries are classified on two territorial levels to facilitate greater comparability of regions at the same territorial level. The lower level (TL3) consists of 1 681 regions. All the regions are defined within national borders and in most of the cases correspond to administrative regions

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Annex I: OECD review team

Jaana Puukka, a Finnish national, leads the OECD work on Higher Education and Regional and City Development. She joined the OECD Programme on International Management in Higher Education (IMHE) in 2005 to co-ordinate and manage the first round of OECD Reviews of Higher Education in Regional Development which took place in 2005-07 and embraced 14 regions in 12 countries. She is leading the second round of reviews in 2008-10 which has reached out to 14 regions and city-regions in 11 G8 countries and emerging economies. She is the co-author and editor of the OECD publication "*Higher Education and Regions – Globally Competitive, Locally Engaged*" (OECD, 2007). Before joining the OECD, Puukka had experience in higher education and regional development in Finland as a national and local government adviser, programme manager, practitioner and evaluator. She has management experience from both the university and polytechnic sector and has worked in university internationalisation, PR and communication and stakeholder management. In addition, she has experience in the corporate sector in the pharmaceutical industry.

Ernesto Flores served the OECD Programme on Institutional Management in Higher Education (IMHE) in Paris in 2009 for a 15-month secondment to support the OECD reviews in higher education in regional and city development. He holds a master's degree from Monterrey Institute of Technology and Advanced Studies, Mexico. He has worked as a Consultant in the Quality Centre of Monterrey Tech, developing projects in several companies. In 2002, he was invited to collaborate to the Strategic Planning and Regional Development Office of the Executive Office of the President of Mexico where he served as planner and consultant in strategic planning for Federal Government offices. Since 2004, he has been the planning co-ordinator at the Sonora Institute of Technology (*Instituto Tecnológico de Sonora*, ITSON), participating in projects that aimed at improving economic and social performance in the region, such as the creation of the Technology Park, the Digital City initiatives and innovation-based regional development.

Patrick Dubarle, a French national, former Principal Administrator at the OECD Public Governance and Territorial Development Directorate (GOV), has co-ordinated and contributed to a number of OECD territorial reviews at the national and regional level and has recently participated in the regional innovation reviews in Italy and Mexico. In 2004-07 he represented GOV in the OECD project on supporting the Contribution of Higher Education Institutions to Regional Development and co-ordinated the review of the Mid-Norwegian region. Patrick Dubarle is a graduate from the French *Ecole des Mines*, and holds a Master's degree in Economics from the University of Paris Sorbonne. He joined the OECD in 1978 as Administrator in the Directorate for Science Technology and Industry. He was appointed Secretary of the OECD Working Party on regional development policies in 1992, where he was responsible for country regional policy reviews and horizontal programmes. He has worked with national governments in many OECD countries and has spoken at several international conferences. He is the author of documents on high technology policies and sectoral questions including space industry, technological change, technology fusion, innovation and higher education in regional development.

Philip Wade, retired (2007) OECD Administrator, is an expert in regional and rural development, with specific knowledge in Information and Communication Technologies (ICTs). In OECD, Wade was responsible for several national territorial reviews in Europe, with the objective to identify and analyse the factors of disparity between regions and the implementation of regional policy, so as to formulate recommendations aiming to improve its delivery and increase its impact. He also carried out specific regional tasks and authored several rural case studies, and before that, the OECD report "ICTs and Rural Development". Presently, Wade is one of two experts, coordinating and supervising, under the aegis of the Government of Finland, a pilot rural development project in Mozambique. Prior experience in such countries was acquired in the field of technical assistance in Peru and Ethiopia. Philip Wade is a graduate in political science from Paris Sorbonne and in economics, law and public administration from ENA. He holds a degree in Higher Latin American Studies (IHEAL). Before joining OECD, he worked in various international positions in the public and private sectors in France. Besides OECD publications, he is the author of several books on broadcasting, ICTs and tourism development.

Francisco Marmolejo, born in Mexico, serves as executive director of the Consortium for North American Higher Education Collaboration (CONAHEC), a network of more than 140 colleges and universities from Canada, the U.S. and Mexico, headquartered at the University of Arizona, and Assistant Vice President for Western Hemisphere Programs. Previously, Marmolejo was an American Council on Education fellow on higher

education leadership development at the University of Massachusetts-Amherst. His past positions include vice president for administration and academic vice president at the Universidad de las Américas in Mexico. He has taught at several universities and has published extensively on administration and internationalisation. Marmolejo consults for Latin American universities and governments, and has been part of OECD and World Bank peer review teams conducting evaluations of higher education in Europe, Latin America and Asia. Currently, he serves on advisory boards at a variety of universities, and professional organisations, including the Mexican Association for International Education (AMPEI), the American Council on Education and NAFSA. During the 2005-2006 academic year he collaborated as an international consultant in the OECD Programme on IMHE. Marmolejo holds a Masters in Organisational Administration from the Universidad Autónoma de San Luis Potosí, and has conducted doctoral work at the Universidad Nacional Autónoma de México.

José-Ginés Mora is visiting professor at the Institute of Education, University of London. His research is focused on higher education and he is author of more than 220 publications. He is an expert in European higher education, higher education management, quality assurance, economics of education and higher education financing. He is external advisor to the Spanish Ministry of Innovation and Science, member of the Bologna Follow-Up Group, former Deputy-Chair of the Governing Board of the Institutional Higher Education Programme (IMHE) of the OECD, former President of the EAIR (the European Higher Education Society), and ex-member of the Steering Committee of ENQA (the European Association for Quality Assurance in Higher Education). He is associate editor of Tertiary Education and Management and member of the Editorial Boards of Higher Education Policy, Higher Education in Europe, Higher Education Quarterly and Higher Education Management and Policy, and ex-Joint Editor of the European Journal of Education. He has worked as consultant for higher education matters for several governments and international organisations (EC, World Bank, OECD).

Annex II: Programme of the review visit

OECD review visit to Andalusia, 25-29 January 2010

Sunday 24 January – Seville

19:30 OECD Review Team internal meeting

Monday 25 January – Seville and Huelva

09:00-10:30 **Meeting at the Regional Ministry of Innovation, Science and Enterprise**

- Francisco TRIGUERO, Secretary General of Universities, Innovation and Technology
- Victoria ROMÁN, General Director of Universities
- Susana GUITAR, General Director of Research, Technology and Enterprise

	Team A		Team B
11:00-11:50	**Meeting on spin-off and enterprises** • Juan Carlos RODRÍGUEZ AGUILERA, Entrepreneur and Head of the Physiology, Anatomy and Cellular Biology Department, Pablo de Olavide University (UPO) • Juan José INFANTE, R&D Director, Bionaturis (UPO) • Antonio TORRALBA SILGADO, Professor of Electronics Technology, Spin-off promoter (UPO) • Domingo PÉREZ MIRA, R&D Responsible, AZVI	10:30-12:00	**Transfer from Seville to Huelva**

	Team A		Team B
12:00-12:50	**Digital university project** • Joaquín TORRES RUIZ, Advisor to the Secretary General of Universities, Research and Technology • Andrés GARZÓN, Vice-rector for IT (UPO) • José Nicolás CRIADO VICENTE, IT Services Director, International University of Andalucía (UNIA) • Juan CAMARILLO CASADO, Technical Director of Digital University Area, IT Department, University of Seville (US)	12:30-13:20	**Meeting on Teaching at the University of Huelva (UHU)** • Alfonso INFANTE, Director of IT for Teaching • María del Carmen FONSECA MORA, Vice-rector for Innovation and HR Development for Faculty • María Luisa FERNÁNDEZ SERRAT, Director for the HR Development for Faculty programmes • Lucía RODRÍGUEZ MARTÍN, HR Development for Faculty • Joaquina CASTILLO ALGARRA, Director for Adult Education and Inn ovative Teaching • Inmaculada MARTÍNEZ GARCÍA, Professor of chemical engineering • Juan Gabriel VÁZQUEZ GONZÁLEZ, English Philology Professor
13:00-13:50	**Meeting with the regional steering committee** • Julio REVILLA, President of the Social Council (UHU); former president of the Andalusian Forum of Social Councils • Carlos GENTIL, Secretary of the Social Council of the University of Cadiz • Gerardo JIMÉNEZ, Technical Director, Technological Corporation of Andalusia (CTA) • Antonio BENÍTEZ, counsellor to the General Director for Education Planning and Assessment, Regional Ministry of Education • Joaquín Jesús GALÁN, President of the Economic and Social Council of Andalusia • Carmen ILLANA, Innovation and Cooperation Area, Andalusian Federation of Provinces and Municipalities	13:30-14:00	**Meeting on cultural activities (UHU)** • Manuel J. DE LARA RÓDENA, Vice-rector for University Outreach • Jesús M. SAEZ PADILLA, Director of Athletics • J. Luis CARRIAZO, Director de Cultural Promotion • Dimas BORREGO PAIN, Director of the Publishing Department • Manuel ACOSTA, Advisor to the Rector • Fernando LUNA, Home Center Co.
14:00-16:30	**Lunch meeting on university and research funding** • Pilar MARTÍNEZ, Counsellor on University Funding and Performance Indicators • Francisco M. SOLÍS, Andalusian R&D&I Planning Director	14:00-16:30	**Lunch meeting with students** • Pablo MARTÍN MUÑOZ • Elena MOLERO DE LOS SANTOS • Lola PÉREZ MEDINA • Rogelio PINTO GUERRA

	Team A		Team B
16:30-17:30	**Meeting with Health institutions representatives** • Teresa CAMPOS GARCÍA, Director for Professional Development and Training, Regional Ministry for Health • Armando ROMANOS, Advisor to Mrs. CAMPOS • Francisco BEDOYA BERGUA, Vice-rector for Student Affairs and Sports (UPO) • Isicio ORTEGA MEDINA, Relations with Hospitals and other Health Institutions (US)	16:30-17:30	**Meeting on research** • María del Mar DÍAZ REQUEJO, TTO (US) • Francisco TALLANTE, Director of the Research Area (UHU) • Pedro J. PÉREZ ROMERO, Senior Researcher (UHU) • Jesús D. DE LA ROSA DÍAZ, Director, Research Management Office (UHU)
20:30-22:30	**Dinner**	18:00-20:30	**Transfer to Cadiz**
		21:00-22:30	**Dinner with representatives of the University of Cadiz**

Tuesday 26 January – Cordoba and Cadiz

	Team A		Team B
09:20-10:15	**Transfer to Cordoba**	08:15-08:45	**Transfer to the University of Cadiz at Puerto Real**
10:30-11:15	**Meeting with University policy --- decision takers?** • Enrique AGUILAR BENÍTEZ DE LUGO, Vice-rector for Scientific Policy • Manuel TORRALBO RODRÍGUEZ, Vice-rector for coordination and communication • Manuel TORRES AGUILAR, Vice-rector for student affairs and culture • María José POLO GÓMEZ, Secretary General • Juan José RUIZ SÁNCHEZ, Vice-rector for planning and quality, Manager of the International Excellence Campus on Agri-food Sciences • José Manuel VILLALBA MONTOSO, Director, International Relations Office	09:00-09:50	**Institutional presentation of the University of Cadiz (UCA)** • Alfonso INFANTE, Director of IT for Teaching • Maria del Carmen FONSECA MORA, Vice-rector for Innovation and HR Development for Faculty • Maria Luisa FERNÁNDEZ SERRAT, Director for the HR Development for Faculty programmes • Lucía RODRÍGUEZ MARTÍN, HR Development for Faculty • Joaquina CASTILLO ALGARRA, Director for Adult Education and Innovative Teaching • Inmaculada MARTÍNEZ GARCÍA, Professor of chemical engineering • Juan Gabriel VÁZQUEZ GONZÁLEZ, English Philology Professor

	Team A		Team B
11:30-12:15	**Meeting with faculty members** • Eulalio FERNÁNDEZ SÁNCHEZ, Philosophy and Humanities School • David BULLEJOS, Polytechnic School Professor • Carmen GALÁN SOLDEVILLA, School of Sciences • Juana MARTÍN DE LAS MULAS, School of Veterinary • Manuel TENA SEMPERE, School of Medicine • José Emilio GUERRERO, Agriculture and Mountains Engineering School	10:00-10:50	**Meeting on cultural and social outreach (UCA)** • Juan Pablo CONTRERAS SAMPER, Director, Metrology Lab • Darío BERNAL CASASOLA, Researcher on Archaeological Patrimony • Manuel ACOSTA SERÓ, Researcher in Logistics • Remedios CASTRO MEJÍAS, Researcher in Oenology • Alejandro PÉREZ HURTADO DE MENDOZA, Researcher in Biology • Rosa RODRÍGUEZ CANO, Plan Bahía Competitiva
12:30-13:15	**Meeting with students** • María José ROMERO • Carmen GONZÁLEZ ESCALANTE • David CANO ESPEJO • Elena PÉREZ NADALES • Loida LÓPEZ FERNÁNDEZ • Manuel SÁNCHEZ LÓPEZ-BERGES	12:00-12:50	**Meeting on entrepreneurship culture and education** • Julio SEGUNDO GALLARDO, Entrepreneurship Chair • Alejandra BROME ROBLES, Technician, TTO • Pablo CELADA LÓPEZ, Provincial Director, Andalucía Emprende • Jesús RODRÍGUEZ VARGAS, Manager, Surcontrol, (UCA spin-off) • Rita BENÍTEZ MORA, Manager, Era (Management of Socio-Cultural Activities) • Raquel VELÁZQUEZ, Administrator, Innova Vegetalia del Mar - Sur Algae (UCA spin-off)
14:45-16:30	**Lunch meeting with stakeholders** • Anabel CARILLO DE LA FUENTE, President of the Social (UCO) • Carlota ÁLVAREZ BASSO, Manager, Cordoba City of Culture Foundation • Javier CAMPOS GONZÁLEZ, Manager, Campos Winery • Rafael CORPAS, President of the *Encuentro en la Calle* Association • Carmen TARRADAS, Director, TTO (UCO) • Antonio DÍAZ CORDOBA, Secretary of the Confederation of Entrepreneurs of Cordoba	13:00-13:50	**Meeting on teaching-learning experiences** • Eduardo BLANCO OLLERO, Vice Chancellor for IT and Teaching Innovation • Paula RODRÍGUEZ CASTRO, Postgraduate Student • Austine CEZANNE FINK, Undergraduate student • Dolores CERVILLA GARZÓN, Lecturer in Civil Law • Miguel Angel PUCHI HERRERO, Personnel manager, Navantia

	Team A		Team B
		14:00-14:30	**Visit to the Andalusian Centre for Marine Science and Technologies and the Andalusian Viticulture Research Centre (both University of Cadiz)**
		14:30-15:45	**Lunch meeting with students** • Paula RODRÍGUEZ CASTRO • Austine CEZANNE FINK
		15:45-16:00	**Farewell** • Diego SALES MÁRQUEZ, Rector of the University of Cadiz
17:00-19:20	**Transfer to Granada**	16:00-20:00	**Transfer to Granada**
21:00-22:30	**Dinner in Granada**		

Wednesday 27 January – Granada

09:00-09:15 **Welcome by the Rector of the University of Granada (UGR)**

- Francisco GONZÁLEZ LODEIRO, Rector
- Vice-rectors

09:00-10:20 **Meeting on spin-offs and enterprises**

- Dolores GENARO MOYA, Manager Director of the University-Enterprise Foundation (UGR)
- Jesús CHAMORRO, Director, TTO (UGR)
- Mónica OLIVARES MARTÍN, Biomedicine R&D&I Responsible at Puleva-Biotech Co
- Javier VELASCO, General Director, Neruon Biopharma
- Eva CARMONA, Human Resources Manager, Abbott

10:30-11:20 **Research at UGR**

- Maria Dolores SUÁREZ ORTIGA, Vice-rector for Scientific Policy
- María Luisa CALVACHE, Director, Office for Research Planning and Funding
- Pilar ARANDA RAMÍREZ, Professor in Physiology
- Alberto PRIETO ESPINOSA, Professor in Computer Technology and Architecture Engineering
- Ángel GIL HERNÁNDEZ, Professor and Molecular Biology

11:30-12:20 **Meeting on Cooperation and University Outreach**

- Miguel GÓMEZ OLIVER, Vice-rector for Outreach and Cooperation
- Dorothy KELLY, Vice-rector for International Relations
- Josefa CAPEL, Director, Centre for Cooperation to Development Initiatives
- Enrique GÁMEZ, Director, Granada Music and Dance International Festival
- Javier ARROYO JIMÉNEZ, Coordinator, Science Parks of Granada
- Rafael G. PEINADO SANTAELLA, Director, UGR Publishing Service

13:00-15:00 **Lunch meeting with students**

- Juan Manuel GARCÍA SIERRA
- Juan Gabriel JIMÉNEZ CAMPOS
- Fernando GARCÍA GARCÍA
- Sultana WAHNON BENSUSAN
- Guillermo OROZCO PARDO
- Antonio OSUNA CARRILLO DE ALBORNOZ

20:30-23:00 **Dinner with the Rector of the University of Granada**

- Francisco GONZÁLEZ LODEIRO, Rector
- Maria José LEÓN, Vice-rector for Quality Assurance

Thursday 28 January – Almeria and Malaga

	Team A		**Team B**
09:00-11:00	**Transfer to Almeria**	09:00-10:15	**Transfer to Jaen**
		10:30-11:00	**Institutional presentation of the University of Jaen (UJA)** • José Manuel PARRAS ROSA, Rector • Vice-rectors • Secretary General • Manager
11:30-12:00	**Welcome by the Rector of the University of Almeria (UAL)** • Pedro MOLINA GARCÍA, Rector	11:10-12:00	**Meeting on research and its connection with the regional environment** • Maria Ángeles PEINADO, Vice-rector for Research, Technological Development and Innovation • José Juan GAFORIO, Commissioner for Olive Trees and Olive Oil Studies • Gabino ALMONACID, Commissioner for Renewable Energies and Environment Studies • Jesús NIETO, Commissioner for Modern Languages Studies • Francisco FEITO, Commissioner for Information Technologies • Arturo RUÍZ, Director, Andalusian Centre for Iberian Archaeology

	Team A		Team B
12:10-13:20	**Meeting on research / Visit to the Science and Technology Park** • José Luis MARTÍNEZ VIDAL, Vice-rector for Research • Diego Luis VALERA, Researcher • Antonio FERNÁNDEZ BARBERO, Researcher • Manuel PÉREZ GARCÍA, Director, Centre for Solar Energy Research • Pilar MARTÍNEZ ORTIGOSA, Director for Research • Cynthia GIAGNOCAVO, Research scholar funded by the UAL research plan	12:00-12:50	**Meeting on knowledge transfer** • Pedro PÉREZ, Director, TTO • Nicolás RUÍZ, Vice-rector for Infrastructure and Campus Development • Armando CASTRO, Manager, Scientific and Technology Campus of Linares Foundation • Javier REY, Director, Polytechnic School of Linares • Jesús MUÑOZ, Manager, Geolit Scientific and Technology Park
13:30-14:00	**Meeting on teaching** • Jose Antonio PLAZA, Director, UAL Strategy • José CÉSPEDES LORENTE, Dean, School of Economics • Ramón HERRERA DE LAS HERAS, Professor, School of Law	13:00-14:00	**Meeting on teaching and research** • Mercedes ROLDÁN, Director, Communication Office • Juan HERNÁNDEZ, Professor • Francisco LUQUE, Professor • José Ángel MARÍN, Director, Cultural Foundation Office • Isabel MORENO, Director, Cultural Activities Office
14:00-16:10	**Lunch meeting with students** • María del Mar GARCÍA • Kornelia BUNTINAITE • Djenabu Olga DJALO • Patricia GÓNGORA • Violeta KRULM • Rosa María FERNÁNDEZ ROPERO • Juan Miguel ROMERO GARCÍA • Eduardo CUETO SOLA	14:00-16:30	**Lunch meeting with students**

	Team A		Team B
16:20-17:10	**Meeting on relations with the society** • Luis FERNÁNDEZ-REVUELTA, Vice-rector for Planning, Quality and External Relations • Carlos CANO GUILLÉN, Director, Prospective Studies Office • Mario MARTÍNEZ ESCORIZA, Administrator, Strategic Planning Office • José Antonio PLAZA, Director, UAL Strategy • Almudena GUARNIDO, Director, Relations with Society • Ana GEA SEGURA, Manager, University-Enterprise Foundation • Joaquín SALVADOR PADILLO, Entrepreneur • Francisco AMIZIAN ALMAGRE, Councillor, Almeria Town Hall	14:30-15:45	**The University of Jaen and its relations with local and provincial governments** • María del Mar SHAW, Councillor, Jaen Town Hall • Moisés MUÑOZ, Vice-president, Provincial Government Office • Carmen RISQUEZ, President, Economic and Social Council of the Province of Jaen • Manuel ANGUITA, Secretary, Social Council of the University of Jaen • Inmaculada HERRADOR, Responsible, II Strategic Plan of the Province of Jaen
18:00-20:30	**Travel to Malaga**	18:00-20:30	**Travel to Malaga**
21:00-22:30	**Dinner in Malaga**		

Friday 29 January

08:30-09:20 **Meeting on teaching and research**

- Antonio MORENO ORTIZ
- Maribel LUCENA GONZÁLEZ
- Víctor Fernando MUÑOZ MARTÍNEZ
- Pedro FARIAS BATLLE
- Ramón Muñoz CHÁPULI ORIOL
- Ana María RODRÍGUEZ QUESADA
- Emilio LÓPEZ ZAPATA

09:30-10:20 **Meeting on links with companies**

- Luís Fernández Martínez
- Felipe ROMERA LUBIAS
- Ana LÓPEZ
- Luís MARTÍN ÚBEDA
- José Antonio CRISTÓBAL ÁLVARO
- Ana María GARCÍA RODRÍGUEZ

10:30:11:20 **Meeting with public and private institutions representatives**

- Isabel GÁLVEZ CABELLOS
- Francisco J. SALAS MÁRQUEZ
- Pedro MARTÍN ALMENDRO
- Maria Jesús MORALES CAPARRÓS
- Rosa MARTÍN REYES
- Antonio MERINO MANDLY
- Ainhoa OTAMENDI, Andalusian Technological Corporation Network (RETA)

11:30-12:20 **Meeting with professors and students**

- Carmen MUÑOZ HERNÁNDEZ
- María DEL OLMO BAÑUELOS
- Carlos RUBIO RUEDA

13:30-18:30 **OECD Review Team internal meeting**

19:00-20:30 **Feedback session**

21:00-23:30 **Farewell dinner**

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where governments work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

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Higher Education in Regional and City Development

The Autonomous Region of Andalusia, Spain

Andalusia is the most populous region in Spain with over 8 million people. Historically a crossroads of three cultures – Hispanic, Jewish and Arabic – it has enjoyed remarkable growth and development over the past decades, but still lags behind the Spanish averages in key socio-economic indicators.

The recent economic crisis has affected Andalusia more than other regions. How can the region and its universities fuel local growth and create jobs and new businesses? How can the Andalusian University System improve students' learning and employment outcomes? How can the region capitalise on its existing assets and promising clusters?

This publication is part of the series of OECD reviews of Higher Education in Regional and City Development. These reviews help mobilise higher education institutions for economic, social and cultural development of cities and regions. They analyse how the higher education system impacts upon regional and local development and bring together universities, other higher education institutions and public and private agencies to identify strategic goals and to work towards them.

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