Higher Education in Regional and City Development

Catalonia, Spain

OECD

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Catalonia, Spain

2010

OECD

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Please cite this publication as:
OECD (2010), *Higher Education in Regional and City Development: Catalonia, Spain*, OECD Publishing.
http://dx.doi.org/10.1787/9789264089006-en

ISBN 978-92-64-08900-6 (PDF)

Series: Higher Education in Regional and City Development

ISSN 2218-3140 (online)

Cover image design © Francisco Esquer Mares.

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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 education for economic, social and cultural development of cities and regions. The reviews analyse how the tertiary education system impacts local and regional development and help improve this impact. They examine tertiary education institution's 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 tertiary 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 review of the Autonomous Region of Catalonia is part of the second round of the OECD reviews of the Higher Education in Regional and City

Development. It coincided with the review of the Autonomous Region of Andalusia and followed the reviews of the Canary Islands and the Region of Valencia that took place during the first round 2005-07. The review report for Andalusia: *Higher Education in Regional and City Development: Andalusia, Spain* (OECD, 2010) has a strong focus on how to improve the relevance of educational provision and the employment and entrepreneurship outcomes of university graduates. The recommendations and good practice examples in the Andalusian report are also relevant for the universities in Catalonia, and readers interested in them should refer to this report.

Acknowledgements

Numerous national and regional stakeholders and representatives of universities provided valuable insights during the review visit and in the form of comments. The OECD would like to thank in particular the lead co-ordinators and other active local counterparts for this review. The Regional Co-ordinators – Josep Mª Vilalta (ACUP) and Martí Parellada (Fundación CyD) and their working team José García-Quevedo (University of Barcelona), Alicia Betts (ACUP), Marta Doménech (ICC Consulting), Néstor Duch (University of Barcelona and Fundación CyD), Xavier Fina (Autonomous University of Barcelona and ICC Consulting), Héctor Pifarré (ACUP) and Jose Luis Polo (Fundación CyD and University of Barcelona).

The OECD would also like to thank the members of the Regional Steering committee, Josep Ribas (Regional Government of Catalonia, Department of Innovation, Universities and Enterprises), Dídac Ramírez (Rector of the Universitat de Barcelona), Josep Joan Moreso (Rector of the University Pompeu Fabra), Imma Tubella (Rector of the Open University of Catalonia), Esther Giménez-Salinas (Rector of the University Ramon Llull), Joaquim Coello (President of the Social Council of the University of Barcelona), Angel Cunillera (President of the Social Council of the University Rovira i Virgili), Xavier Testar (Director of the "Barcelona, Research & Innovation" Programme of the Barcelona city Council), Jordi William Carnes (Deputy mayor of the Barcelona City Council), Ramon Roca (President of Ros-Roca), Josep Lluís Bonet (President of Freixenet and Fira de Barcelona), Miquel Valls (President of the Barcelona Chamber of Commerce) and Eva Granados (General Secretariat of the Trade Union in Catalonia).

This publication draws on interviews carried out during a week-long review visit from 28 February – 6 March 2010, on the findings of the Autonomous Region of Catalonia's Self-evaluation Report 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 a regional Self-evaluation Report which went beyond description to postulating a number of hypotheses about strengths and weaknesses which the team were able to test.

Both the review visit and the self-evaluation report had a focus on university system, while the growing vocational tertiary education sector was outside of the scope of the review. The team were able to rely on a range of other reports, including the OECD Review of Tertiary Education – Spain (2009), OECD Review of Regional Innovation: Catalonia – Spain (2010), White Paper on the University of Catalonia (2008) as well as other materials published by the Catalan Association of Public Universities (ACUP) and tested their conclusions and recommendations with the tertiary education authorities in the Autonomous Region of Catalonia.

The review visit was led by Jaana Puukka (OECD/IMHE), with support from Ernesto Flores, a secondee from Sonora Institute of Technology (ITSON) to the OECD/IMHE. This publication was co-ordinated by Jaana Puukka, with support from Inmaculada Periáñez-Forte, a secondee from the Regional Government of Andalusia and Austin Delaney, both from the OECD/IMHE. Susan Christopherson (Cornell University, United States), Ellen Hazelkorn (Dublin Institute of Technology, Ireland), Karen Maguire (OECD/GOV Regional Competitiveness and Governance), José-Ginés Mora (University of London, United Kingdom/Valencia University of Technology, Spain) and Maria Helena Nazaré (former rector of the University of Aveiro, Portugal) contributed to the report. Further details about the Review Team can be found in Annex 1 of this report. Rachel Linden supervised the publication process.

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Acronyms

ACC1Ó	Public Agency for business development and external promotion of the Catalan Ministry of Innovation
ACECU	Catalan Association of University Continuing Education
ACES	Curricular Environmentalism of Higher Studies
ACUP	Catalan Association of Public Universities
AFOPA	Association of permanent education classes for elderly people of Catalonia
AGAUR	Agency for Management of University and Research Grants
ANECA	National Agency for Quality Assessment and Accreditation
APL	Accreditation of prior learning
AQU	Catalan Agency for Quality
AUPA	Andalusian Association of Public Universities
BCU	*Barcelona Centre Universitari* Barcelona University Centre
CARI	Catalan Agreement for Research and Innovation
CBUC	Consortium of Catalan University Libraries
CCRI	Catalan Council for Research and Innovation
CCUC	Collective Catalogue of Catalan Universities
CDTI	*Centro para el Desarrollo Tecnológico Industrial* Centre for the Development of Industrial Technology
CEDEFOP	European Centre for Development for Vocational Training
CELLS	Synchrotron Light Laboratory
CEO	Chief Executive Officer
CEPIMA	Centre for Processes and Environmental Engineering
CESCA	Supercomputing Centre of Catalonia
CEU	Associate professor
CFGM	Intermediate vocational education degrees
CFGS	Vocational tertiary education degrees
CGPU	*Conferencia General de Política Universitaria* The General Conference on University Policy
CIC	Interuniversity Council of Catalonia
CIDEM	Regional Agency for Innovation and Business Development
CIDOB	Barcelona Centre for International Studies
CIDUI	International Congress of University Teaching and Innovation
CIRC	International Centre of Research on Coastal Resources
CIRI	Inter-ministerial Research and Innovation Commission

CIRIT	Interdepartmental Commission for Research and Technological Innovation
CNEAI	National Commission of Evaluation of the Research Activities
CREAF	Centre for Ecological Research and Forestry Applications
CREBEC	Bioengineering Reference Centre of Catalonia
CRESIB	Barcelona Centre for International Health Research
CRETESOS	Centre of Research in Technologies for Sustainability
CREUP	Coordinator of Public University Student Representatives
CRUE	Conference of Rectors of Spanish Universities
CRUMA	Conference of Public University Rectors of Madrid
CSIC	*Consejo Superior de Investigaciones Científicas* Superior Council of Scientific Research
CU	*Consejo de Universidades* Council of Universities
CVC	*Centre de Visió per Computador*
CYD Foundation	*Fundación Conocimiento y Desarrollo* Foundation of Knowledge and Development
DIUE	Catalan Ministry of Innovation, Universities and Enterprise
DOGC	*Diari Oficial de la Generalitat de Catalunya* Official journal of the Regional Government of Catalonia
ECTS	European Credit Transfer and Accumulation System
EHEA	European Higher Education Area
ENQA	European Association for Quality Assurance in Higher Education
EQUAR	European Quality Assurance Register for Higher Education
ERC	European Research Council
ETSEQ	Technical School of Chemistry Engineering
EU	European Union
EUPMA	Polytechnic University School of the Environment
EUR	Euros
EUS	Firms-University-Society
FCRI	Catalan Foundation for Research and Innovation
FECYT	*Fundación Espanola para la Ciencia y la Tecnologia* Spanish Science and Technology Foundation
forQ	Agency for the Quality of Lifelong Learning
FP	EU Research Framework Programmes
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
GFC	Global Financial Crisis
GVA	Gross Value Added
HCB	*Hospital Clínic de Barcelona*
HEI	Higher Education Institution
IBEI	*Institut Barcelona d'Estudis Internacionals*
ICFO	Institute of Photonic Sciences

ICREA	Catalan Institution for Research and Advanced Studies
ICT	Information and communication technologies
ICTA	Institute of Environmental Science and Technology
IDESCAT	*Institut d'Estadística de Catalunya* Catalonian Institute of Statistics
IDIBAPS	*Institut d'Investigacions Biomèdiques August Pi i Sunyer*
IMA-UdG	University of Girona Environmental Institute
IMHE	OECD Programme on Institutional Management in Higher Education
INE	*Instituto Nacional de Estadística* Spanish Institute of Statistics
INTE	*Instituto de Ténicas Energéticas* Energy Technology Institute
IQS	Chemical Institute of Sarrià
IREC	Catalan Institute for Energy Research
ISCED 5B	Programmes at the tertiary education level that focus on practical, technical or occupational skills for direct entry into the labour market.
KIC	Knowledge and Innovation Communities
LOGSE	Organic Law on the General Organisation of the Educational System
LOMLOU	*Ley Orgánica por la que se modifica la Ley Orgánica* Universities Act Amendment Act (2006)
LOU	*Ley de Ordenación Universitaria* Universities Act (2001)
LRU	*Ley Orgánica de Reforma Universitaria* Universities Reform Act (1983)
LUC	Catalan Universities' Act
ME	Ministry of Education
MTG	Music Technology Group
OCRI	Government of Catalonia, Research and Innovation Coordination Office
OECD	Organisation for Economic Co-operation and Development
OTRI	*Oficina de Transferencia de Resultados de Investigación* University office for the transfer of research results
PAS	Administrative and support staff
PCB	*Parc Científic Barcelona* Barcelona Science Park
PCT	Patent Co-operation Treaty
PDI	Teaching and research staff
PEMB	Strategic Metropolitan Plan of Barcelona
PROFOR	Programme to Foster Research
PRBB	Barcelona Biomedical Research Park
PPP	Public-private partnership
R&D	Research and development

R&D&I	Research, development and innovation
REACU	Spanish Network of University Quality Agencies
RPL	Recognition of Prior Learning
RUEPEC	University Network of Postgraduate Studies and Continuing Education
SME	Small and medium-sized enterprise
SWOT	Strengths, weaknesses, opportunities and threats
UAB	Autonomous University of Barcelona
UAO	University Abat Oliba
UB	University of Barcelona
UdL	University of Lleida
UIC	International University of Catalonia
UNED	National Distance University
UOC	Open University of Catalonia
UdG	University of Girona
UPC	Polytechnic University of Catalonia
UPF	University Pompeu Fabra
URL	University Ramon Llull
URV	University Rovira i Virgili
USD	US dollars
UVIC	University of Vic
Tertiary level A	Tertiary-type A programmes (ISCED 5A) are largely theory-based and are designed to provide sufficient qualifications for entry to advanced research programmes and professions with high skill requirements, such as medicine, dentistry or architecture. Tertiary-type A programmes have a minimum cumulative theoretical duration (at tertiary level) of three years' full-time equivalent, although they typically last four or more years. These programmes are not exclusively offered at universities.
Tertiary level B	Tertiary-type B programmes (ISCED 5B) are typically shorter than those of tertiary-type A and focus on practical, technical or occupational skills for direct entry into the labour market, although some theoretical foundations may be covered in the respective programmes. They have a minimum duration of two years full-time equivalent at the tertiary level.
XIT	*Xarxa d'Innovació Tecnològica* Network of Technological Innovation Centres
XTT	*Xarxa de Trampolins Tecnològics* Network of Technological Springboards

Assessment and recommendations

Catalonia: from science and technology push to inclusive and balanced regional development

With more than 7.5 million inhabitants, the Autonomous Region of Catalonia is the second most populous region in Spain, representing 16% of its total population. Catalonia is the main contributor to the Spanish economy with nearly 19% of Spain's GDP. The GDP per capita is higher than the European Union average (EU-27).

The engine of Catalonia's development is Barcelona, which has transformed itself from a declining industrial city into a global gateway and one of Europe's centres for design and biotechnology. Barcelona is a magnet for students, researchers and artists from Europe and abroad, with direct impact on the regional economy.

Catalonia has a diversified economy. Manufacturing and market-related production services account for more than half of the region's employment and GVA. 66.8% of employment is in the tertiary sector, 26% in manufacturing, 10.2% in construction and 2.2% in agriculture. Small and medium-sized enterprises (SMEs) dominate the regional economy.

Productivity (GDP per worker) for Catalonia, like Spain overall, has been slipping relative to the rest of the OECD, decreasing from 115% of the OECD average in 1995 to only 91% by 2005. This has been due to the expansion of a less educated and lower skilled workforce, and the inability of firms in major Catalan industries to move up the value chain via product innovation. Almost two-thirds of manufacturing employment is in medium-low or low-technology industries. Catalonia's manufacturing base is increasingly faced with the pressures of global competition and industrial relocation.

Since 2007, Spain has been severely affected by the global economic crisis. It has the second highest unemployment rate within the EU at 20.4% in the third quarter of 2010. Youth unemployment reached 43.5% in the end

of 2009, an increase of 24.7 percentage points since the end of 2007. Unemployment in Catalonia is approximately 16.53%, highest among the young under 24 years (41.2%) and those with low skills. While educational attainment levels have improved in Catalonia in the two last decades, a large proportion of population has low skills and 9.6% of the population is illiterate or without schooling.

To prepare for the post-crisis economy, Catalonia and its universities and other tertiary education institutions in regional development need to address the following challenges:

- How to create jobs, address unemployment 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 transform the economy through upgrading established industries and building new market opportunities? 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 with a large number of immigrants and a growing number of ageing citizens?
- How to reform the governance and management to unleash the potential of universities for local regional development and greater efficiency and productivity?

In order to slash unemployment and to improve productivity, Catalonia needs to foster human capital development for new and changing jobs. There is a need to balance the current strong focus on talent attraction with nurturing talent at home and by improving the access of new immigrants to tertiary education. Catalonia and its universities need to view job creation as a key goal for innovation and adopt a wide innovation concept beyond science push. At the regional and institutional level stronger incentives for regional engagement could be provided through performance-based funding and "challenge-driven" competitive calls. There is also a need to monitor the rate of return and effectiveness of public investment in research and innovation. Finally, to unleash the full potential of universities in regional and local development, it is necessary reform the university governance in Spain, by strengthening the institutional autonomy of universities and building effective accountability structures. Continuing collaboration between regional and local governments, private sector and tertiary education institutions is necessary.

Human capital development in Catalonia

Tertiary education in Spain and Catalonia has experienced growth and transformation over the past decades. The expansion of tertiary education has widened access in Catalonia, but the overall participation rate remains below the OECD average. Economic recession has contributed to the deterioration of the labour market and a large number of youth are outside education, training and labour market. In future, widening access and social inclusion will need to feature more prominently on the policy agenda.

Spanish tertiary education system has experienced significant growth and transformation over the last 20-25 years. In Catalonia, the average number of years in formal education for the working population has doubled, and the population with tertiary education qualifications has grown almost seven-fold. Currently, about one-third of the total working population has received some form of tertiary education. This progress is partly due to the considerable expansion of the tertiary education system now encompassing eight public universities – including the Open University of Catalonia – and four private universities, and more than 300 centres providing vocational tertiary education. There are 177 000 undergraduate and masters' students in universities in Catalonia, representing 12.5% of the Spanish university system in 2009-10. Around 43 500 students are enrolled in vocational tertiary education.

Although student enrolments overall have increased since 2000, with the greatest expansion in vocational education, participation rates for Tertiary-A programmes are below the OECD average. In Catalonia, a significant proportion of the young age group remains outside education and training. In Spain, nearly one in three people 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).

While equity policies have improved in Spain, students' financial, academic and social support systems are in need of strengthening. In Catalonia, participation in tertiary education continues to be related to socio-economic background. Because of the lack of adequate student support, student mobility is limited and a significant number of students need to work while studying. There is also a high level of educational failure with the

drop-out rate estimated at 30% by some institutions, and students take longer than necessary to complete their degree programmes.

Challenges in tertiary education in Spain and Catalonia are partly linked to the problems in the secondary education system which features high drop-out rates and poor learning outcomes. Those in school perform poorly in international testing (PISA). According to Pisa results for 2006, fewer than one in 20 of Spain's 15-year-olds reach the top levels of science proficiency. Furthermore only 1.5% of 15-year-olds in Spain belongs to the top performers for reading, the lowest percentage in the OECD countries apart from Mexico. In Catalonia, students learning outcomes have improved since 2000 and the 2009 results are slightly above the national and the OECD averages. However, a lot remains to be done to reach the level of the best achieving OECD countries.

The primary responsibility for overcoming quality and equity gaps in secondary education 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. Catalan universities' focus on widening access measures remains limited in scale and impact, and without collaborative action. Despite some good examples in this field, none of the universities have adopted a strong corporate approach to creating and enforcing mechanisms to facilitate access of the upcoming generations of new migrants to tertiary education. Long-term institution-wide and system-wide collaboration between schools and universities are needed in Catalonia in order to improve the quality of teaching and to raise aspirations.

The current economic crisis has led to the deterioration of the labour market, especially for the young. The rise in youth unemployment obliges young people to stay in or enter the tertiary education system, but offers poor prospects for finding jobs after graduation. Unemployed workers and people in weak economic sectors are increasingly looking to education and training opportunities to improve their position in the labour marker. There is a need to focus on the quality and relevance of education and align it with the regional needs.

Unemployment in Catalonia has remained consistently high throughout the first decade of the 2000s, not falling below 12% and reaching 16.53% in the third quarter of 2010. Since the onset of the global economic crisis, unemployment in the 16-24 year cohort is running at 37% with even higher rates among young males. While unemployment hits harder those without a tertiary education degree, the labour market outcomes of the university graduates are also deteriorating.

In order to better understand how education meets the needs of society and the economy, there is a need for a region-wide system to provide adequate vision of graduate employment and the labour market needs. Furthermore, the universities themselves need to develop a system of tracking the progress of their students and graduates in order to inform curriculum development and align educational provision to regional needs. Porta22 in Barcelona Activa, the local development agency, maintains a data-based labour observatory, conducts research on labour market trends and provides an extensive outreach services to schools and individuals to assist them in assessing job opportunities. There is scope to extend Barcelona Activa's services to act as an intermediary between industry and the regional tertiary education institutions and offer mechanisms for determining changing skills needs in regional firms and industry groups.

There is considerable variation among the Catalan universities in making an effective linkage with the skill needs of the region. While universities have established various forms of work-based learning opportunities and entrepreneurship training for students, in many cases only a small proportion of students in a limited number of fields benefit from them. There appears to be a need for more systematic practice-based pedagogy and research, broader and universal opportunities for student internships and work-based learning, as well as interdisciplinary activity with the fields relevant for the regional economy such as the arts and media, and tourism. The ongoing pedagogical reform under the Bologna agreement provides an opportunity to create stronger ties between students and regional employers through internships and co-operative programmes. It also provides an opportunity to extend internship experiences to community-based organisations in the context of a university commitment to a wider range of regional needs.

The high and rising levels of unemployment necessitate effective lifelong learning provision. Unemployed workers and people in weak economic sectors are increasingly looking to education and training opportunities to improve their position in the labour marker. Currently, there is an abundance of public and private providers in continuing education. The Consortium for Continuing Education in Catalonia is in charge of the co-ordination of continuing professional education but does not embrace

universities which have each developed their own lifelong learning activities.

There is limited hard data available to understand the needs of the adult population or the efficacy of tertiary education in meeting them. Barriers remain in developing new university programmes, including the regulated fee structure. There is also scope for improving the universities' interaction with local industries and firms to increase their managerial capacities, technical skills and general knowledge regarding market opportunities. This interaction is particularly important for small and medium-sized enterprises (SMEs) which often lack the managerial skills that could help them specialise and increase productivity. The growing share of skilled services associated with the manufacturing sectors suggests an opportunity to develop educational programmes aimed at high-skilled services to build industry productivity.

The Regional Government of Catalonia, City of Barcelona and the Catalan universities have focused on talent attraction, targeting at international top researchers and students through joint marketing and services. To prepare for the post-crisis economy, these efforts should be continued and balanced with a focus on nurturing talent at home, by utilising the human capital potential among the migrant community. Actions need to be taken quickly to retain and reintegrate immigrants in the workforce and educational system in Catalonia.

Catalonia's talent attraction policies for high level researchers have proven effective. ICREA brings to the regional innovation system top researchers. In 2010, there were about 250 ICREA researchers, who collectively attracted more than their costs in research funds from outside the region. ICREA researchers 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. While highly successful, ICREA represents one of the many initiatives in Catalonia that have been created to bypass the rigidities of the university system, leaving the "academic heartland" of the universities untouched.

In the national comparison, Catalonia is one of the most attractive regions in Spain for international students. Joint marketing and services of the University of Catalonia and an increasing offer of study programmes in English attract talent to region and enhance the visibility and impact of the

University of Catalonia System. Efforts have been made by the City of Barcelona to build a "Barcelona Higher Education Cluster" to attract international master's students.

Immigration has been a key driver for economic growth in Catalonia in the recent years. Catalonia has received many waves of migration and successfully integrated newcomers into the labour market and education system. Between 2001 and 2008, despite a steep decline in its domestic population, Catalonia experienced its largest period of population growth, due primarily to foreign immigration. By 2008, foreign residents accounted for 85% of the growth rate, representing over 1 million inhabitants or 15% of Catalonia's population.

Unemployment among the foreign-born labour force has increased in all OECD countries. Immigrant youths have suffered disproportionately during the crisis and the comparison with native-born youth, who suffered more than prime-age adults, is significant. In Catalonia, unemployment was highest amongst the immigrant population even before the current crisis; over 45% of immigrant males and almost 40% of females are in temporary employment compared with approximately 17% and 21%, respectively, for the Spanish population. Integrating immigrants into education and labour market systems are important challenges for Catalonia.

Catalonia's tertiary education sector features an attractive and growing vocational education sector. But the pathways between universities and vocational institutions are in need of strengthening. Catalonia would benefit from a more comprehensive human capital development system stretching from secondary education to tertiary education and lifelong learning.

The tertiary education sector in Catalonia features limited pathways and interaction between universities and the vocational tertiary education and secondary education. Despite the efforts made by the Spanish Government to increase collaboration between vocational and university sectors, for example in the International Campus of Excellence competition, there are only a few examples where universities and vocational education institutions collaborate closely together.

The Regional Government of Catalonia could build stronger relationships among the different components of the education sector: universities, vocational tertiary education institutions and secondary

education, so that they operate as an integrated developer of human capital potential. Furthermore, a mechanism for accreditation and recognition of prior learning could provide a more flexible system by which learners can take up different learning opportunities at different stages of their life.

The challenges of unemployment and widening participation, financing and costs, and internationalisation and competition require tertiary education institutions to work together in partnership with their regions in order to build human capital potential and compete successfully in the global setting. Catalan Association of Public Universities's (ACUP) efforts to build a strategic approach in order to globally position Catalan university education are to be commended. The ACUP governance model, embracing representation from the universities' social councils, is an important development and an indication that the important role of universities in regional development is understood in Catalonia. This concept could be developed further into a tertiary education council, embracing vocational tertiary education institutions, public and private universities, and key external stakeholders. It should also include regional representation, from the public and private sector.

The following measures would promote human capital development in Catalonia:

Recommendations for the Spanish government:

- *Improve affordability of education.* The issue of affordability should be taken up in the national agenda in order not to price tertiary education attainment beyond the reach of students from low socio-economic backgrounds. The national government should develop the form of cost sharing in tertiary 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 improve financial assistance to low income students.

Recommendations for the regional (Catalan) government and universities:

- *Improve evidence-based decision making.* The regional government in collaboration with the Catalan universities should develop a wider portfolio of robust data to support evidence-based decision-making and support targeted efforts to address human capital development needs. 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 to come together and students to move into employment. Efficient systems also use data strategically to identify regional priorities and at an institutional level, to respond to the data in terms of course provision and the provision of employer specified skills. The US National Centre for Public Policy and Higher Education produces useful indicators which might help establish some benchmarks for assessing educational attainment.

- *Create a Strategy for Human Capital Development.* Catalan universities and key stakeholders of the economy and society should work together to develop a long-term Strategy for Regional Human Capital Development to: *i*) define region-wide goals, policies and priorities extending from primary to tertiary education and beyond and *ii*) develop strategies to reach currently under-served population groups. With a large number of young people outside of tertiary education, the strategy should focus on developing pro-active mechanisms to ensure social-inclusion and equity beginning in the early years. Widening access to tertiary education will require multi-stakeholder collaboration between tertiary education institutions, schools and government including pathways between vocational and university sector through development/implementation of a qualifications framework and recognition of prior learning. Stronger efforts are necessary to increase the enrolment and success of first generation students by improving academic, social and financial support. Universities' and other tertiary education institutions' lifelong learning activities should be strengthened and they should improve their capacity to provide up-skilling and re-skilling for the adult population who combine work and study or are unemployed. Policymakers and university leaders should look at initiatives being proposed by the Lumina Foundation, USA, for widening participation and ensuring more adults successfully complete higher education.

- *Reach out Innovation in Catalonia to migrant population*. Regional and local governments should, in collaboration with tertiary education institutions, schools and the private sector, reach out to migrant populations to ensure social and economic cohesion. Current activities need to be scaled up in a systematic way, including long-term multi-stakeholder collaboration with schools to raise aspirations among migrant youth and to improve the quality of teaching. Tertiary education institutions should also reach out and

empower the migrant population to address their own challenges through community development programmes.

- *Improve learning and employment outcomes and relevance of education.* Significant multi-stakeholder public-private efforts should be made to boost entrepreneurship, business formation and business development. Tertiary education institutions should focus on strengthening the regional employability and entrepreneurial skills of all graduates. Creating ties between students in fields of critical importance to the region and regional employers through internships and co-op programmes should be made a priority. Work- and problem-based learning methods and programmes to build entrepreneurship skills should be developed to improve the productivity of local production systems, for example in traditional sectors such as textiles.
- *Strenghten sectoral orientation in workforce development.* The industry or sectoral orientation should be extended to human capital development in order to galvanise technical and managerial training around cluster-based manufacturing and manufacturing services. The workforce development system should be adapted to the needs of small firms and to the development of companies in place.

Catalonia has led strategic investment in research and development in Spain and successfully attracted research funds to the region from Spanish and EU sources. Today, Catalonia has a large share of Spain's innovation activity and resources, a strong research infrastructure and a higher share of the labour force with tertiary education than OECD averages.

Catalonia has a long tradition of active regional government policies to promote its innovation system. Its science, technology and innovation policy has focused on knowledge generation and on the "academic" route by providing funding for universities and research centres. Catalan policy for research and innovation has developed with a goal to maximise resources from Spanish and EU levels through the competiveness of its research assets. While the strategy has focused to a large extent on research centres outside of universities, the region's approach has also benefited some universities that have been able to build capacity to apply for such funds.

Spanish funding sources, which have shown considerable growth rates over the last several years, are under pressure due to the economic crisis.

Catalonia accounts for a large share of Spain's innovation activity and resources. It is responsible for 21% of Spanish research and development (R&D) investment and 33.7% of its patents. It contains 22.5% of Spain's innovative firms, a far greater share than other regions. Given its scale and performance, Catalonia is often the largest or second largest recipient region of R&D and innovation-related programme funds from the Spanish government and the European Union (EU) Framework Programme.

R&D spending in Catalonia has increased in absolute values over four-fold from 1996-2008, reaching an overall R&D intensity of 1.61%. Catalonia has been able to capture a growing share of Spain's total EU Research Framework Programmes (FP) receipt over time, from 14.7% in the Third FP to 23% in the Sixth FP. Within the Seventh FP, Catalonia's researchers have successfully accessed the funding streams of the new European Research Council (ERC). Researchers based in Catalonia accounted for 51 out of 90 Starting Independent Research Grants and ERC Advanced grant projects in Spain (2007-10).

Among the region's main strengths are its strong research infrastructure and regional attractiveness, Catalonia being one of the top regions in Spain. Several major scientific installations in the region are associated with universities, such as the Barcelona Supercomputing Centre (Polytechnic University of Catalonia, UPC), the Synchrotron Light Laboratory, CELLS (Autonomous University of Barcelona, UAB), the Centre of Supercomputing of Catalonia, CESCA (all public universities), the Maritime Research and Experimentation Channel (UPC). Several other installations under construction in biological fields and engineering are associated with universities. This strong presence of scientific infrastructure also helps attract international top researchers.

The governance of the regional innovation system in Catalonia is complex. This complexity is due in part to the proliferation of research entities, networks and science parks over the last several years. Catalonia has 25 science and technology parks, 17 led by universities. The regional government has recently taken measures to better manage this complexity through mergers and new co-ordination structures. These measures should be continued and strengthened.

Universities have made commendable progress in knowledge generation but there is scope to improve knowledge diffusion. The dominant

innovation model has a science and technology focus which limits the mobilisation of universities for social and cultural innovations. There is also a need to balance the current focus on commercialisation with long-term university-industry collaboration. Finally, incentives for universities to engage in regionally relevant research need to be strengthened.

Scientific production has experienced a positive trend, Catalonia accounting for 25% of Spanish total production. During the period 1996 to 2006, the region's share of Spanish production grew from 21.2% to 25.5%, and of world production from 0.5% to 0.9% (1% today). Most of those publications are coming from the province of Barcelona (87%), reflecting the concentration of university faculty there. Universities are responsible for 60% of the region's scientific production, 50% of scientific publications focus on biomedical and clinical research.

There has also been a positive trend in patenting activity in universities, with the technological university UPC BARCELONA TEC accounting for the largest share of university patents. There has been a focus among universities and the regional government on creating university spin-offs, but the spinoffs often remain academically-oriented and facing challenges for growth. Public universities have each gone down the route to establish technology transfer offices, but many of these focus on administrative, rather than strategic functions and lack critical mass.

According to the Spanish Law, universities provide a public service through research, teaching and collaboration with society. While most Catalan universities embrace regional engagement in their strategic plans, there is a narrow understanding of the third mission and regional engagement, focusing on "science and technology push" model which limits a broader approach to regional and local development. Furthermore, an emphasis on long-term relationship and partnership building would allow the universities to improve access to knowledge captured within the institution and improve the quality and scale of knowledge exchange activities.

One of the main challenges for promoting universities' regionally relevant research and technology transfer activities is the lack of incentives for individual researchers and institutions. Professor evaluations for salary and access to research grants have been based mainly on publications and did not consider research or consulting with firms. Initial attempts to improve incentives are found in the new Catalonia Research and Innovation

Plan 2010-13 which proposes to put in place several actions to change the incentives for professors, research groups and universities. These incentives concern evaluations of professor performance as well as considerations for research grants and programme contracts with research groups and universities that would require an orientation of a certain share of resources towards regional priorities. These developments are commendable and should be strengthened in the coming years.

The following measures would promote regional innovation in Catalonia:

For the Spanish government:

- Accelerate *curriculum reform:* There is a massive effort underway already in curriculum reform with the Bologna Process. Remaining barriers for universities to adapt curriculum to meet innovation system needs should be tackled.
- *Embark on a university governance reform:* Some of the barriers to university engagement relate to the democratic selection process of several layers of hierarchy. The unintended consequences of this system are an inability for universities to make decisions that could promote engagement in the regional innovation system but are "unpopular" or require flexibility to set aside resources.

For the regional (Catalan) government:

- *Increase efforts to organise and stimulate firm demand for knowledge to better interface with universities.* This brokering role is costly and complicated for universities when the private sector itself has not been organised. The success of BioCat proves this point. In the sub-regional capitals of Girona, Lleida and Tarragona, it can be easier for universities to identify the right firm groups for effective dialogue.
- *Make effective use of performance indicators*: The regional government has taken a positive step to require performance indicators in the funding mechanisms for universities. While knowledge generation is a primary goal for universities, a wider concept of innovation should be adopted and there should be a caution on focusing only on university patents and spinoffs as indicators. Which illustrates a narrow approach the university role in a regional innovation system.

- *Provide "challenge-driven" research grants for universities.* Regional challenge-driven research grants should be made available for areas of importance to the region, in science-based research or other forms of social innovation. Generally universities are better placed for inter-disciplinary research needs than a separate research centre structure. 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 campus and community.
- *Promote greater territorial specialisation in S&T and innovation.* Such support would help orient the role of different actors, including universities, in their regional engagement. Again, the 2010-13 Plan should help as it has added a new focus on this territorial dimension. Strengthening this approach could help clarify sub-regional strategies and priorities as well as firm needs.
- *Improve university-government interface for policy design.* Identify ways to improve university-regional government relations through existing councils linked to the Catalan Ministry of Innovation, Universities and Enterprise (DIUE) but also through other government initiatives. There are a number of strategic agreements that either directly concern universities or address areas where universities could play a stronger role.
- *Improve data reporting and analysis.* There are some platforms in Catalonia and Spain for universities to report on statistics related to their "third mission" activities. But standardised reporting is not occurring consistently and on a sufficiently wide range of indicators. Common definitions and consistent collection of such data is essential both for analysis of progress and as the basis for possible performance incentives in funding.

For the Catalan universities:

- *Take action despite constraints.* Many universities have already taken action in different areas that impact the regional innovation system, depending on the culture of the institution.
- *Further integrate the entrepreneurship/firm perspective.* There are attempts to inform students in different degree programmes, particularly PhDs, about entrepreneurship, but currently only a small proportion of students benefit from these activities. More joint efforts are required in this area.

- *Map university expertise to better interface with productive sector.* Mapping of different departmental areas of expertise can be challenging, but it is needed for helping firms access information. There are some marketing efforts focused on patented areas of expertise in science and R&D intensive areas, but this needs to be expanded.
- *Promote PhD mobility to firms:* This is a challenge in Spain generally, and there are national programmes that also support this goal. Universities could take more action as well, not only in hard sciences but also in other fields such as social sciences.
- *Build opportunities for more inter-disciplinary linkages*: Given the governance challenges in universities, it is difficult to formally develop new curriculum or research agendas. There are also unexploited opportunities in the region, such as bringing together multiple disciplines to work with researchers in the science parks, including business schools.
- *Develop regional knowledge transfer model* that is based on ongoing relationship with industry: 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. Localised supply networks are therefore critical to the process through which innovation is transferred to enterprises and to create new innovation and transforms and upgrades existing industries. The development of a well-functioning regional knowledge transfer model requires ongoing relationship with industry to determine what innovations have the best opportunities for adoption and commercialisation and the creation of an industry-university learning environment. It requires support for the human capital development required to adopt and apply process and product innovations and collaboration with SMEs as well as large corporations. It measures success in terms of the sustainability and transformation of regional industry and employment growth.
- *Reform degree programmes* to improve employment and entrepreneurship outcomes by integrating work-based, problem-based and co-op models

Cultural and creative industries and sustainable development in Catalonia

Barcelona is a leader in cultural and creative industries which form a pillar of its economic development and future prosperity. However, the City of Barcelona and the Regional Government of Catalonia have not given the cultural and creative industries a major focus in cluster development. There is also scope for universities to play a more active role in this domain.

Barcelona is a centre of creative industries in Europe with strengths in design, including textile and industrial design and architecture. There are also spillovers to other cities in Catalonia and evidence of indigenous development in cultural and creative industries in the provincial capitals. Cultural and creative industries contribute to the growth and development of Catalonia, through attraction and retention of talent and knowledge-intensive businesses that tend to move to regions with "talent, technology and tolerance". Catalonia is ranked sixth among the top 25 European regions in cultural and creative industries, with an over-representation of employment in the sector when compared to other European regions.

While specialised design training programmes in Barcelona have high impact on the local economy, the Catalan universities' contribution to the development of skills that support the creative industry presence in the region could be improved. Given the high proportion of self-employment and small business in the creative sector, the universities in Catalonia 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. Furthermore, the Catalan universities could jointly sponsor an observatory on cultural and creative industries.

Among the most important fields in the creative industries are software, television and radio and advertising. This strength in the Catalan economy is related partly to the bi-lingual character of the region and the need to provide specialised language programming in both Catalan and Spanish. Universities participate in the preservation and celebration of the Catalan language and culture. Universities could also contribute to building a more inclusive Catalan culture.

Spain is a world leader in renewable energy industry development. Catalonia has been an active region in building a renewable energy economy and also in research and development efforts that can position the region internationally as a leader in new renewable energy technologies. There is also a need to create skills for "green jobs".

Spain is a world leader in renewable energy industry development. This leadership has emerged from supportive national government policies. Although lagging Spain in providing its own renewable energy sources, Catalonia has been an active region in building a renewable energy economy and also in research and development efforts that can position the region internationally as a leader in new renewable energy technologies. For example, since 2006, water systems in all new residential construction in Catalonia must be heated by solar panels. Since 2007, the Catalan government has given more than EUR 15 million in grants to homeowners to help pay for renewable energy installations.

Despite the university initiatives and research centres focusing on environmental development and sustainability, the university sector in Barcelona lacks strength and visibility in the arena 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 seem warranted. Tertiary education institutions in Catalonia 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, tertiary education institutions could help these agencies acquire the specialised skills to advice firms on the cost-effective ways to reduce emissions.

Many national and regional governments in the OECD area are adjusting their skill strategies to take into account 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. Catalonia could take steps to anticipate what the employment effects and labour reallocation are needed across industries. Skill creation for "green jobs" could be more efficiently organised at the regional level by pooling learning resources of educational institutions and industries.

Barcelona and Catalonia is known for the quality and ambition of its physical planning, for environmental and urban planners' ability to integrate

the old with the new, and for innovative approaches to enhancing an environment with advantageous location. Co-operation in this domain should be extended to a broader agenda to make Barcelona and Catalonia an urban model for energy efficiency and the use of renewable energy.

Barcelona's urban regeneration model has transformed old industrial and/or distressed areas into multi-functional urban areas and placed universities at the core of these developments. This collaboration should be continued to prepare for the post-crisis economy and to ensure creativity, social cohesion and economic development.

The following measures would enhance the cultural and creative industries and sustainable development in Catalonia:

Recommendations for the regional and local governments:

- *Boost green growth and eco-innovation*. Collaboration between tertiary education institutions and industry should be enhanced, for example through targeted innovation vouchers for small and medium-sized enterprises and collaborative platforms for eco-innovation. Skill creation for green jobs should be more efficiently organised by pooling learning resources of educational institutions and industries in Catalonia and providing flexible pathways between educational institutions.
- *Support cultural and creative industries.* In cultural and creative industries regional government should, in collaboration with educational institutions and the public and private sector, increase its efforts to support entrepreneurial skills among students and graduates and better further education opportunities. Multidisciplinary collaboration across tertiary education sectors and different institutions should be encouraged through and encouraging the establishment of joint institutes, departments and institutions.

Recommendations for the Catalan universities:

- *Develop a forum for social, cultural and environmental development.* A systematic exchange of information and experience should be put in place between tertiary education institutions in terms of environmental sustainability, eco efficiency and green growth, urban regeneration and integration of migrants, and cultural industries facilitated by ACUP, the regional or city government(s)

in order to bring greater efficiency and balanced coverage and to avoid fragmentation and reduplication. There is a need for a tracking of various initiatives and an exchange forum where different initiatives would be identified and best practices publicised for urban policy fine-tuning and for widening access to tertiary education institutions. Such a forum could organise thematic events, with regular information retrieval and exchange facilitated by a dedicated website.

- *Capitalise on Catalonia's attractiveness to immigrants.* The universities of Catalonia should take a leadership role in regional initiatives to develop strategies to integrate immigrants, including those from families with low educational attainment. The universities of Catalonia would also benefit from an active role in international study of immigration, integration and the metropolis and to help build regionally relevant integration plans. Catalan universities could raise public officials' and other stakeholders' awareness of labour market and educational strategies and encourage positive action.
- *Contribute to the cultural and creative industries.* Given the high proportion of self-employment and small business in the creative sector, the universities of Catalonia should 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. For example, the University of Catalonia could sponsor an observatory on cultural and creative industries.

Capacity building in the tertiary education system of Catalonia

Strengthening of the university autonomy can unleash the potential of universities for regional and local socio-economic development and improve efficiency and transparency in education. But 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 such activity.

University education in Spain is governed through complex and overlapping legislative and policy agenda at the national, regional and sub-regional level. Since 1985 the jurisdiction for the universities has rested with the Government of Catalonia. The Association for Catalonian Public Universities (ACUP), and the Interuniversity Council of Catalonia are the co-ordination bodies for the university sector. Despite the system level co-ordination, universities compete for students, staff and external funding and have limited tradition for collaboration, leading the duplication of programmes and a lack of specialisation.

Catalonia has a number of key strategy documents and plans with a focus on internationalisation and regional development, featuring growing participation of universities in their development and implementation, including the Strategic Agreement for the Internationalisation, Employment Quality and Competitiveness of the Catalan Economy 2008-11 and the Catalan Agreement on Research and Innovation, CARI. However, participation of universities in regional government bodies is not mandatory and there is no clear mechanism of articulation among the different strategies, plans and other instruments. In order to ensure return on public investment there is a need for better co-ordination between the strategic plans and their implementation. Furthermore, a permanent partnership structure bringing together the regional government, tertiary education sector and key public and private stakeholders could improve the situation.

Spanish and Catalan universities have a legal obligation to public service, but there is a lack of national, regional and institutional policies to improve the incentive structures to support the regional and local engagement of universities and their faculty and staff. The lack of incentives is a common feature in many universities and countries where regional engagement is perceived not only as a secondary role for universities when compared with research but also as a detracting activity. In Catalonia, the recruitment, and promotion of the university staff are nearly exclusively determined by research performance, measured primarily by publications. Management and leadership functions are poorly rewarded and the "third mission" activities have been traditionally absent from the list of factors that have an impact on faculty career development. The rigid rules governing civil service and the fragmentation of staff into non-permeable categories have become obstacles to the diversification of tasks, salaries and duties that characterise modern universities. While innovative leadership can drive institutional change and mobilise university staff in individual institutions, such as the University Rovira i Virgili, system-level steering is required to mobilise the whole university sector.

Catalan universities perform under a system of shared governance which is decentralised and "democratic". The decision-making powers are shared

between all the potential stakeholders, which often result in a lengthy, unclear and cumbersome decision-making process. The public university governance is regulated by law, which prescribes in detail the internal organisation of the university with a number of collegial bodies. Most Catalan universities have also opted to use a maximum possible number of members for both Senate and the governing council. There is also a burdensome election process to identify the university leaders.

During the last five to ten years there has been a trend to change the university governance and management in Europe and to make the universities more responsive and accountable to their stakeholders. To unleash the potential of universities for local and regional development and industry collaboration, Spanish government could consider launching a university reform including the following elements: *i*) reduction of the level of regulation of the university system; *ii*) creation of governance boards or councils with an increased presence of members coming from outside the university; *iii*) enhancement of the power of the executive bodies: rectors and their management teams; *iv*) increased professionalisation of university management; *v*) modification of the functions of the collegiate bodies representing the academic community, *i.e.* the senate or academic board; *vi*) increased autonomy of universities with respect to the recruitment of teaching staff and *vii*) increased autonomy and freedom of universities in terms of teaching on offer, the access of and choices available to students, the cost of enrolment and the fees charged by public universities.

To move this agenda forward, the Spanish government could consider a pilot project for the governance of public universities in Catalonia through which the universities could progressively achieve opportunities for flexibility in institutional development and human resources management. The increased autonomy would need to be introduced differentially in a phased-up fashion, and over time depending on the capacity of the institution and the extent of the challenges they face.

Recommendations for the Spanish government:

- *Take steps to modernise university governance by launching a pilot project.* To remove the barriers for universities engagement in regional and local development and other entrepreneurial activities, the university collegial bodies, with elected rectors and deans, should be replaced by a dual structure with appointed leaders and boards including external stakeholders. Universities should have increased institutional autonomy over financial, estate and human resources management. An agreement could be reached whereby some Catalan universities could apply to adopt more managerial

forms of governance and be granted a higher degree of autonomy. Such a programme could run for five to seven years as a pilot project that would be evaluated and results disseminated afterwards throughout the university system.

Recommendations for the regional (Catalan) government:

- *Establish a regional co-ordination platform for tertiary education.* To enhance co-operation and long-term dialogue between tertiary education and the region a co-ordination platform involving university rectors, presidents of social councils, and local and regional governments should be established. The Regional Government of Catalonia should develop a framework and a strategic plan, elaborated as a shared task between the stakeholders – university and the region – to promote this co-operation. Progress should be monitored and relevant changes included in a dynamic way. Steps should be taken to ensure that there is better collaboration between the university and vocational tertiary education sector.
- *Strengthen incentives for universities' regional engagement activities.* The Regional Government of Catalonia should design a funding allocation mechanism to drive the engagement of universities and different stakeholders in joint strategic initiatives. The regional government should take a full advantage of the decentralisation of the funding for universities in order to reward and incentivise contribution of universities to regional development.

Recommendations for the Catalan universities:

- *Prioritise regional and local development.* The universities of Catalonia should attach a top priority to the region-wide socio-economic development and engagement by making the rector or pro-rector (who is reporting directly to the head of the institution) responsible for this task. A professional management should be put in place to support this task. Along with science and technology transfer, stronger focus should be given to a broad range of regional and local development such as human capital development as well as social, cultural and environmental development. Incentives should be created to encourage university faculty and staff engagement.
- *Collaborate to rationalise the degree* programme *offer*. The universities in Catalonia should develop ways to rationalise their

offer of degree programmes and to develop joint degree programmes at master's and PhD level. Good progress has already been made in inter-university PhD and master programmes.

Chapter 1.

Catalonia in context

This chapter presents the profile of Catalonia with its main socio-economic characteristics. It provides a brief overview of the Spanish and Catalan tertiary education and RDI system.

Recent decades have marked the revival of the Catalan identity, language and cultural heritage, as well as economic growth and development. With a population of over 7.5 million inhabitants and a GDP of around EUR 200 billion Catalonia is one of the leading regions in Spain. Catalonia's economy has benefited from a large influx of migrant workers who have fed the expansion in service and construction sectors. While the GDP per capita has grown, the productivity has remained low.

Today, the period of growth has come to an end and Catalonia is faced with economic crisis combined with high unemployment rates and challenges in industrial relocation and social cohesion. Budget cuts at the regional and national level on research and education place a burden on the tertiary education system. Sustained investments in human capital development and innovation are necessary to prepare for the post-crisis economy. Greater collaboration between the universities, public and private sector is necessary.

Introduction

Catalonia is a Spanish autonomous region located in the Northeast of the Iberian Peninsula.[1] It is bordered by France and Andorra to the north and the Mediterranean Sea to the east. Catalonia is divided into four provinces – Barcelona, Tarragona, Lleida and Girona – and 946 municipalities. Its capital is Barcelona and the official languages are Catalan and Spanish, and Aranese in the small Aran Valley at the Pyrenees.

Catalonia is larger than many OECD countries in terms of population, surface and economy. With 7.5 million inhabitants, its population is similar to that of Switzerland. Catalonia covers an area of over 32 000km2 and has a surface area similar to Belgium. With a GDP of approximately EUR 200 billion, its economy is as large as Norway.

Catalonia has a long history since the end of the first millennium. For centuries it was an independent state although confederated with other Iberian kingdoms. Since 1714 a part of a unitary Spain, Catalonia has maintained its cultural, social and linguistic identity which is now protected by the Statute of Autonomy.

Catalonia has a high level of self-government in accordance with the Spanish Constitution of 1978 and the Catalan Statute of Autonomy – the latest dating from 2006. The central government is represented in the region by the central government office, composed by four provincial branch offices, which assume and manage the tasks assigned in their respective provinces. The central government delegation is responsible for managing ports, airports, trains and justice.

The administration of Catalonia is the responsibility of the Regional Government of Catalonia *(Generalitat de Catalunya)*. It is responsible for the administration of education, social affairs, transit, economic policies and trade, health, construction of public facilities, primary and secondary schools, universities and so on. The local authority is divided into municipal provincial councils (see Table 1.1. for the governance structure of Catalonia).

Table 1.1. The governance structure of Catalonia

Spanish Government	The Spanish governance structure is characterised by a central government and the governments of the 17 autonomous regions. There are specific competencies of the central government and for the autonomous regions. In addition, some competencies are shared between the central and regional governments. **Government:** competencies are executed by the central government through the ministries. **Government Office *(Delegación del Gobierno):*** represents the central government in the autonomous region. **Parliament (*Cortes Generales* composed by the Senate and the Congress)** is the legislative assembly of Spain and elects the central government. **Superior Court of Justice *(Tribunal Superior de Justícia)*** is highest judicial institution in Spain. It has administrative, civil, criminal and social chambers.
Autonomous Region of Catalonia (*Generalitat de Catalunya*)	**The Statute of Autonomy of Catalonia** (2006) defines the rights and obligations of the citizens and political institutions in Catalonia, their competencies and relations with the Spanish State and the financing of the Government of Catalonia. **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 (*Consell Executiu*):** holds executive and administrative powers. The council – president and regional ministers – holds weekly meetings. • **Regional ministries (*Departaments*): At the time of the OECD review visit, they were the following: H**ome affairs, institutional relations and participation; Economy and finance; Governance and public administration; Urban and rural planning and public works; Justice; Education; Culture and the media; Health; Agriculture, food and rural development; Employment; Innovation, universities and enterprise; Social action and citizenship; and Environment and housing. **Legislative power** • **Parliament of Catalonia:** passes regional legislation, monitors and encourages the performance of the governing council and approves of the 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 Catalonia 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, heritage and tourism.
Provinces (4) Barcelona, Girona, Lleida and Tarragona	**Provincial Office (Diputació Provncial):** 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.
Districts (*Comarques*) (41)	**District councils (*Consells Comarcals*)** are the administrative and governing bodies of the districts. Their organisation consists of a collegial assembly, a plenary and a President. The President is elected following a mixed voting formulae that takes into account the votes obtained by each candidate and the number of councillors (D'Hondt Law).
Municipalities (946)	**City council:** Members are elected every four years in municipal elections. City council is led by a 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 bodies linked to Catalan heritage etc. Municipalities can collaborate in delivery of services (*mancomunitats)*.

Source: Regional Government of Catalonia.

In education, the Regional Government of Catalonia is responsible for regulating, planning, steering and evaluating the education system, while

local governments are responsible for determining the supply and demand for education at the local level as well as of the implementation of evaluation programmes and fixing the school calendar. Spanish government is responsible for the legal framework for the educational system and also manages the Spanish plans for research and innovation. In addition, the Regional Government of Catalonia has its own plans for research and innovation.

Barcelona is the capital city of Catalonia. Today, Barcelona has almost 1.6 million inhabitants in an area of 100km2. The metropolitan region (approximately the footprint of the Barcelona Province) extends to almost 200 municipalities, representing 73% of the Catalan population and 74% of the economy. In 2005, there were more than 5 million inhabitants were located in Barcelona province (12% of Spain's population). Barcelona provides an example of a rapid transformation from an industrial city in decline to one that has a dynamic economy with a world class reputation. The Barcelona model of local development is internationally renowned and, even under the current economic crisis, positions the city on a robust footing for the future (OECD, 2009a).

The other three provinces, that account for one-fourth of Catalonia's population and economy, are Tarragona (10% of the regional GDP), Girona (10%) and Lleida (6%). They are less densely populated than Barcelona (657 inhabitants per km2), with Girona and Tarragona at 107 and 108 respectively and Lleida much more rural at 32. Nonetheless, GDP per capita in the three provinces is similar, slightly above EUR 20 000 in 2005 and above the Spanish average of EUR 16 924. The provinces of Lleida and Girona, with more agricultural and lower-technology industries, have a lower index of productivity than Barcelona and Tarragona which both feature stronger industrial sectors (OECD, 2010a).

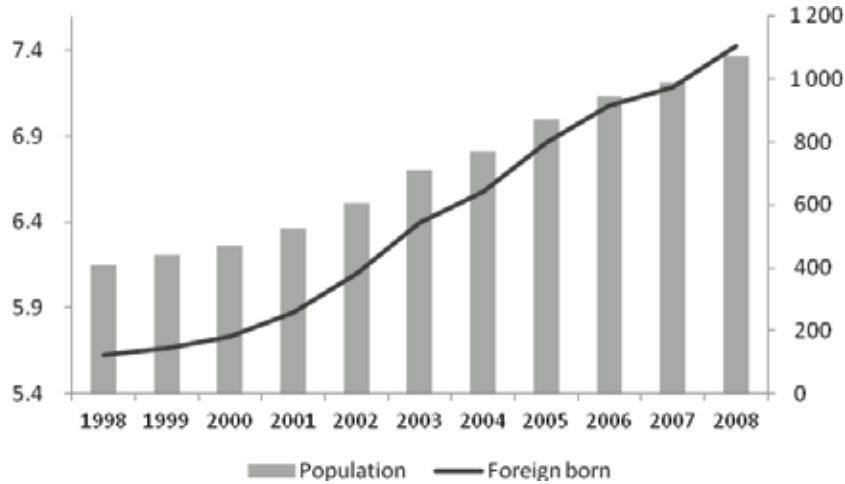
1.1. Demography: fast immigration-driven growth

With 7.5 million inhabitants, Catalonia is the second most populated region in Spain, after Andalusia. In terms of population growth, Spain has been among the fastest growing OECD countries, and Catalonia is among the fastest growing regions in Spain. During the period from 1995 to 2005, Spain registered higher average annual population growth rates than the OECD average (1% and 0.6% respectively). At the same time, Catalonia had an average annual population growth rate of 1.3%.

With recent immigration flows, Catalonia now accounts for 21% of Spain's foreign born population, totalling over 1.1 million in 2008. This is a nine-fold increase in the foreign-born population from the approximately

121 000 in 1998 to become approximately 15% of Catalonia's population today. Around 67.5% of the foreign born are located in Barcelona province, followed by Girona (14%), Tarragona (13%) and Lleida (6%). The increase in immigration has resulted in greater ethnic diversity of the regional population. The top three sending regions for the current foreign-born population were Latin America (30.4%), EU-27 (25.6%) and Africa (25.2%) as of 2008. The rest of the world accounts for the remaining 19% (see Figure 1.1.)

Figure 1.1. Population growth and immigration in Catalonia



Source: OECD (2010a), *OECD Reviews of Regional Innovation: Catalonia, Spain*.

Catalonia has a higher share of the workforce with tertiary education than the OECD regions in average. Catalonia performs relatively well in Spain in terms of the share of the workforce with a tertiary education (32% versus 24%) but is only the 8th ranked region behind the Basque Country (48%), Navarra (40%) and Madrid (38%). While Catalonia's foreign-born working population has relatively low educational attainment levels, one-fourth of migrants (24%) has tertiary education qualifications.

At the same time, Catalonia also has a high share of low-skilled population. Among its population over 16 years (regardless of labour force participation), approximately 9.6% were illiterate or without schooling in 2007. This is much higher than the Basque Country (4.3%) or Navarra (4.6%) and somewhat higher than Madrid (8.3%) (OECD, 2010a, based on

data is from the Spanish National Statistics Institute). Poor literacy rates can be related to a lower level of skills demand in Catalan labour market but also demographic, sociological and cultural factors.

Low skills and illiteracy are challenges for Catalonia, as regions with the highest volumes of workers, especially immigrants, in occupations with low qualification requirements are likely to be affected the most by the rise in unemployment with the crisis.

1.2. Regional economy with a diverse industry base

Catalonia makes a significant contribution to the Spanish economy. In 2009, Catalonia was 6.3% of Spain's territory, contained 16% of its population and contributed around 18.6% of its GDP, making the region the leading contributor to the Spanish economy. The province of Barcelona accounts for around 74% of the Catalan economy and generates 14% of Spain's GDP.

Catalonia's economy is based on a long-standing industrial tradition. It also serves as a commercial trading hub in the Mediterranean. The crisis of 1984, the entry of Spain in the EU in 1986, and the 1992 Olympic games, among other factors, helped transform the Catalan economy to a new economic development model. The current economic structure has experienced, like other regions, a continued increasing share in the tertiary sector.

Catalonia has been characterised by a large manufacturing base. In 2000, manufacturing sectors represented 26% of the regional GVA. By 2006, the manufacturing share of the Catalan economy had declined to 20% of regional GVA and 21% of employment as compared with Spain (15%) and the EU15 (17.9%). Both the tertiary sector and construction have absorbed many of the region's immigrants and the job losses in manufacturing. By 2006, the tertiary sector accounted for 67% of the region's GVA and employment, up from 65% and 63% respectively in 2000. Construction increased notably as well over the period, from 7% to 11% of GVA, and from 9% to 10% of the region's employment. This reflects national level trends, as construction was 12.2% of Spain's employment. The share of employment in construction is high for European regions (OECD, 2010a).

Catalan industry is characterised by a high degree of diversity. No category in manufacturing accounts for more than 17% of employment or gross value added. Traditional industries such as metal products and food are the most important activities in terms of employment, accounting for 26%. Chemicals, vehicles and machine/equipment manufacturing also

contribute an important share to the total industrial employment and gross value added.

Catalonia is specialised in high-tech and medium high-tech manufacturing relative to Spain (1.6 and 1.3 respectively in 2006). Employment in the manufacturing sector is 4.5% in high-technology (1.0% of all employment), but 32.1% in medium-high technology (7.3% of all employment). However, it is high-tech manufacturing that has shown increasing specialisation since 1994, while medium-high tech has been losing specialisation relative to the Spanish average. The combined share of the overall economy in medium-high and high-technology manufacturing is greater in Catalonia (over 8%) than the EU15 (less than 7%).

One of the main characteristics of the Catalan and Spanish economies is the small scale of firms. Of all firms in Catalonia, 99.8% are firms under 250 employees, of which 92.5% are firms with no salaried employee or fewer than 10 salaried employees. Catalonia's SMEs employ 74% of the workforce, with 31.1% in firms with fewer than ten or no salaried employees. The 0.2% of firms with at least 250 employees account for 26% of employment given the large average firm size.

The Catalan economy has experienced significant internationalisation since Spain's accession to the European Union. In 2008, Catalonia accounted for 27% of Spain's exports and 27% of imports. Exports grew by an average annual rate of 5.5% in real prices as compared to Spain overall (4.9%) from 1995 to 2005. Imports over the same period grew slightly more in Spain (6.9%) than Catalonia (6.4%). In terms of trade openness, as measured by the sum of imports plus exports over GDP, Catalonia is above OECD and Spanish standards. While in Catalonia that figure grew from 24.7% to 32.5% between 1995 and 2005, those levels are higher than Spain overall (from 16.7% to 25.2%) and the OECD average (from 13.3% to 19.4%) over the same period. Medium-high technology industries account for the largest share of exports. The chemicals industry is one that has experienced an increasing share of exports in recent years.

Catalonia is the location for many foreign firms. Among the around 3 000 foreign firms, 24% are from neighbouring France. Germany, the United States and Italy are the next largest countries in terms of foreign firm presence. For these countries, and many others, more than half of these foreign firms in Spain are located in Catalonia.

Economic crisis in Spain and Catalonia

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.

Over the last 15 years prior to the economic crisis, Catalonia's economy had strong growth. In terms of GDP, Catalonia (3.2%) grew at almost the same average annual growth rate as Spain overall (3.3%) from 1995-2005, and higher than the OECD (2.9%). The massive immigration contributed to GDP growth and a higher employment rate, given the relatively young age structure of the immigrant population. At the same time, the productivity gap with regard to the majority of OECD countries grew. While Catalonia performs better than Spanish averages for productivity, there is a need for specialisation in sectors with higher levels of technology and skills to remain competitive globally.

In Spain and Catalonia, the economic crisis is attributed in part to the reduction of the construction sector and the adjustment of the financial markets. One of the consequences of the recession has been the sharp deterioration of the labour market. Unemployment increased dramatically in Spanish regions, including Catalonia, from first quarter 2008 to the present. During the third quarter of 2010 the unemployment rate in Catalonia had risen to 16.53%, compared to the Spanish average of 20.40% (Table 1.2.). However, these figures should be considered with some caution due to a large informal economy.

Table 1.2. Employed and unemployed by gender: activity and unemployment rates

(Absolute figures in thousands: rates as percentages)

Autonomous region	Employed	Unemployed	Activity rate	Unem. rate	Male Unem. Rate	Female Unem. Rate
TOTAL	18 546.8	4 574.7	60.08	19.79	19.29	20.40
Andalusía	2 826.8	1 129.5	58.48	28.55	26.94	30.67
Aragon	553.0	87.2	57.66	13.62	13.32	14.00
Asturias	413.4	68.9	51.83	14.29	13.68	15.01
Balearic Islands	506.0	104.5	68.13	17.12	18.54	15.43
Canary Islands	771.9	310.2	62.00	28.67	29.20	27.99
Cantabria	241.2	33.4	55.47	12.18	11.84	12.59
Castilla y Leon	1 013.7	181.4	55.64	15.18	13.26	17.66
Castilla-La Mancha	785.2	192.6	57.50	19.70	17.19	23.38

Table 1.2. Employed and unemployed by gender: activity and unemployment rates (continued)

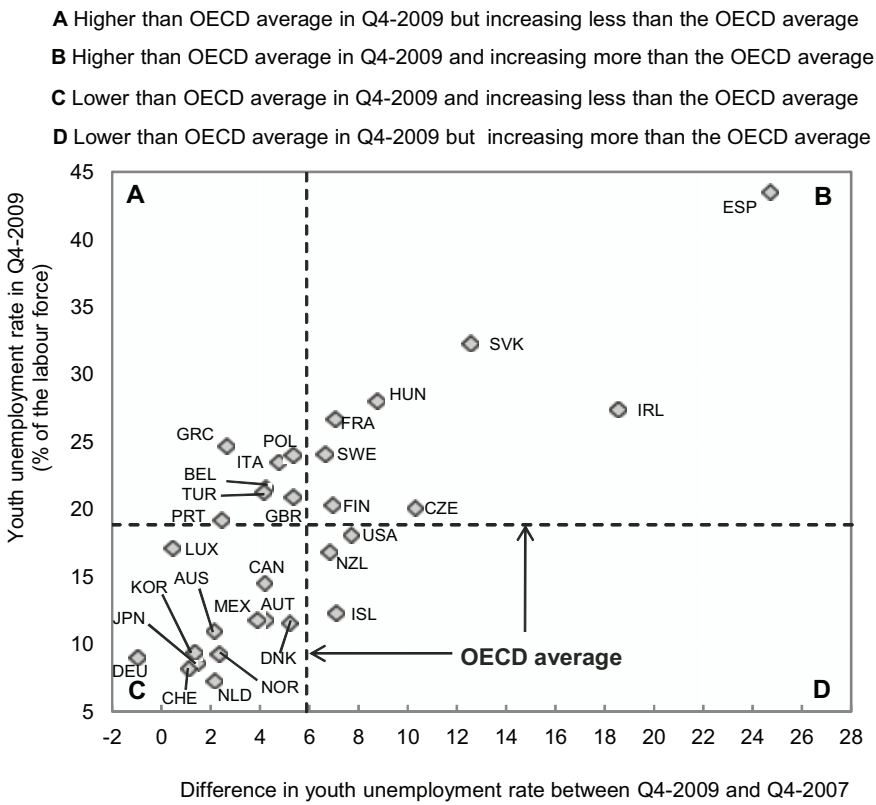
Autonomous region	Employed	Unemployed	Activity rate	Unem. rate	Male Unem. Rate	Female Unem. Rate
Catalonia	3 176.1	669.4	63.27	17.41	18.12	16.53
Barcelona	2 310.3	500.5	63.11	17.81	18.37	17.13
Girona	341.1	63.1	67.09	15.62	16.41	14.57
LLeida	175.2	28.1	56.35	13.99	13.73	14.34
Tarragona	349.6	77.4	64.66	18.12	20.28	15,30
Valencia	1 927.1	588.9	60.40	23.41	23.38	23.44
Extremadura	385.3	111.3	54.79	22.41	19.66	26.28
Galicia	1 118.7	195.3	55.14	14.86	14.00	15.88
Madrid region	2 870.4	545.6	64.93	15.97	15.29	16.74
Murcia	562.9	177.3	62.34	23.95	24.21	23.60
Navarra	270.2	38.5	60.16	12.47	10.56	14.88
Basque country	941.0	104.3	57.41	9.98	9.87	10.10
Rioja	136.8	22.3	60.29	13.99	13.04	15.22
Ceuta	24.8	7.2	53.85	22.44	22.11	23.02
Melilla	22.3	6.8	52.11	23.37	17.62	31.34

*Data below 5 000 are subject to strong variations, due to sampling errors

Source: National Statistics Institute (INE). *Employed and unemployed by gender. Activity and unemployment rates.* Third quarter 2010.

In the OECD area, the youth (15-24 years) unemployment rate rose by six percentage points in the two years to the end of 2009, reaching almost 19% and leaving nearly 15 million youth unemployed (OECD, 2010b). Spain has exceptionally high youth unemployment rate, reaching 43.5% in the fourth quarter of 2009, an increase of 24.7 percentage points since the fourth quarter of 2007. Unemployment in Catalonia, as elsewhere in Spain, affects particularly those with low skills.

Figure 1.2. Significant deterioration of the youth unemployment rate in 2007-09



a) Non-seasonally adjusted rates referring to the fourth quarter for all countries, except for Australia, Greece, Iceland, Italy, Norway, Turkey and United Kingdom for which data refer to the third quarter.

Source: OECD (2010b), "Rising youth unemployment during the crisis: How to prevent negative long-term consequences on a generation?" OECD Social, employment and Migration Papers, No. 16, April 2010.

1.3 Tertiary education system in Spain

The Spanish tertiary education system is divided into universities and non-university institutions. 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 vocational tertiary

education (*Ciclos Formativos Superiores*, CFS) (245 179 students) and specialised tertiary education, such as study of arts and design, sports or military education which represent a very small part of the system in terms of number of students (a few thousand students compared with 1.5 million in the university sector). Vocational tertiary education encompasses training programmes which under the new national regulation will have around two-year duration. The programmes typically comprise work placements to account for 350-750 hours.

The university degree structure in Spain, which included short cycles, second cycle, long cycle and third cycle courses, has recently undergone a change in order to adjust to the requirements of the Bologna declaration. Prior to the Bologna reform, Spanish universities had two types of programmes: short-cycle programmes that were more vocationally oriented and long-cycle programmes that were more academic or focused in professions such as lawyers, engineers or physicians. Approximately more than one third of students were enrolled in short-cycle programmes. 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 first at the master's level contrary to most EU countries.

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" and the official degrees were part of the Registry of Universities, Centres and Courses (RUCT) (Santiago *et al*., 2009). Currently, however, Spanish universities are able to define their curricula themselves.

Governance

The legal framework for the educational system is defined at the central level in Spain. Consequently, the basic structure of the Catalan tertiary education system is similar as elsewhere in the country. The central government holds responsibility of overall co-ordination of the tertiary education system, the European and international representation under a unique voice of the Spanish tertiary education system, and the co-ordination and control of scholarships and grants. The rest is under regional regulation, including university funding mechanisms. There are some differences in the

organisation and performance of tertiary education in different regions, with some regions performing at a higher level than others.

Spanish tertiary education is regulated by an abundant collection of constitutional rules, laws and royal decrees. In addition, the governments of autonomous regions can issue complementary legislation within the framework of their own legal powers. Formally, universities are autonomous but they have many restrictions regulated at central level such as the internal structure, the governance model, salaries and recruitment system for academic staff. In the case of public universities, institutional governing positions and collegial bodies are elected by staff (academic and non-academic) and students. Professors and most of the permanent positions (academic and non-academic) are civil servants with duties and rights fixed by the central government.

Most Catalan and Spanish experts point out the need for a change in the governance model of universities. As the CYD report states: "Increasing autonomy, transparency and evaluation of universities will not be possible without introducing other criteria on how universities should be governed, and it is for this reason that this element becomes an essential part of the reform process" (CYD, 2008). Key elements for the reform of the university governance include the following:

- Reduce the level of regulation of the university system.
- Create governance boards or councils with an increased presence of members coming from outside the university.
- Enhance the power of the executive bodies: rectors and their management teams.
- Increase the professionalisation of university management.
- Modify the functions of the collegiate bodies representing the academic community, *i.e.* the senate or academic board
- Increase the autonomy of universities with respect to the recruitment of teaching staff.
- Increase the autonomy and freedom of universities in terms of teaching on offer, the access of and choices available to students, the cost of enrolment and the fees charged by public universities.

Funding

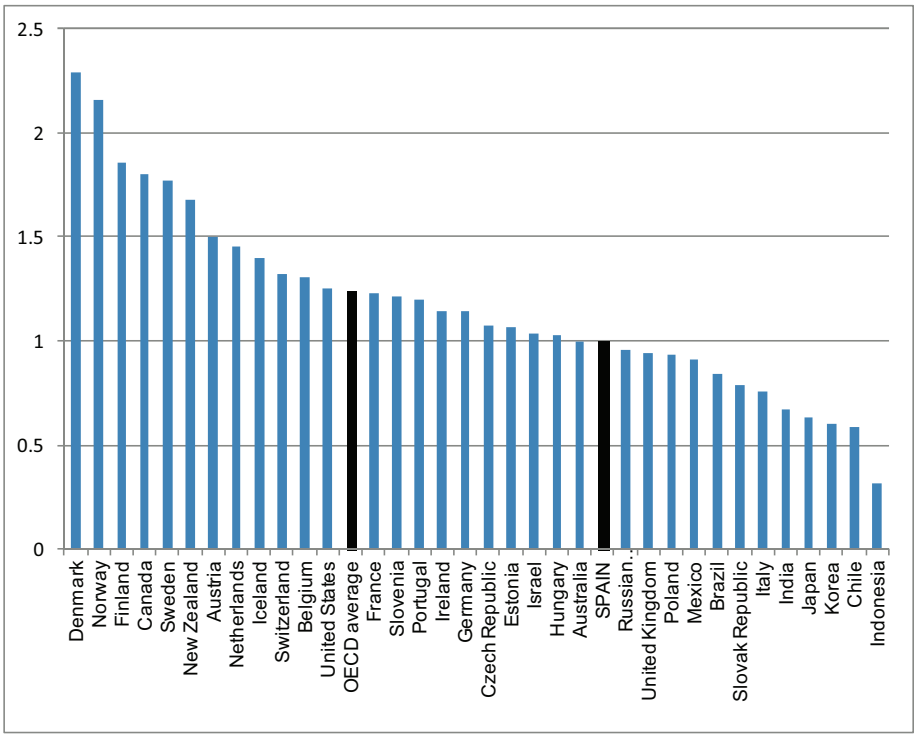
In 2005, public expenditure on tertiary education in Spain was equivalent to 1.1% of GDP, below the OECD average of 1.5%. However, in

terms of the annual expenditure by institutions in tertiary education per student, the Spanish figures were closer to the OECD average (see Figures 1.3 and 1.4).

Public funding of university education is the responsibility of autonomous regions, which leads to differences across regions over approaches to the public funding of tertiary education institutions. There is a general trend in the different autonomous regions to move from the traditional incremental allocation system towards more transparent formula-based models. For the funding of research activities, research staff is required to apply to the wide range of competitive funding programmes available from national, regional and European institutions.

Spain in general and Catalonia in particular have made a substantial and sustained effort in the last two decades to increase total spending on tertiary education. Currently, however, the economic crisis is affecting the level of public spending. In Catalonia, the regional government agreed to increase university funding by EUR 454.5 million in the period of 2007-10 (65% of which were to be linked with targets). The government was not able to meet this commitment so that by 2010, leading to a funding deficit of EUR 154.6 million. University budgets are expected to increase by 2% in 2011 and 4.7% annually in 2012-14.

Figure 1.3. Public expenditure on tertiary education as a percentage of GDP, 2007



Note 1. Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions.

Note 2. Countries are ranked in descending order. The year of reference for Canada is 2006, Chile is 2008 and for India is 2005. Figures for Luxembourg, Poland, Portugal, Switzerland, Brazil and the Russian Federation are direct public expenditure on educational institutions and do not include public subsidies to households.

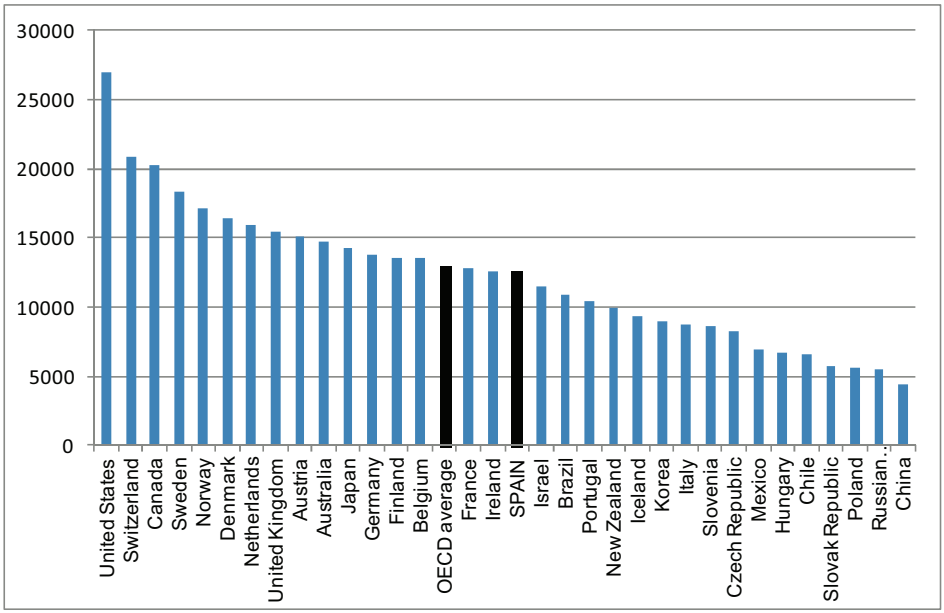
Note 3: For technical reasons, these figures use Israel's official statistics, which include data relating to the Golan Heights, East Jerusalem and Israeli settlements in the West Bank.

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

StatLink: http://dx.doi.org/10.1787/888932310339

Figure 1.4. Annual expenditure by educational institutions in tertiary education (including R&D activities) per student for all services (2007)

In equivalent USD converted using PPPs for GDP



Note 1. Countries are ranked in descending order. The year of reference for Canada is 2006 and Chile is 2008. Figures for Canada, Hungary, Italy, Luxembourg, Poland, Portugal, Switzerland, Brazil and the Russian Federation are for public institutions only.

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 (2010c), *Education at a Glance 2010,* OECD Publishing.

StatLink: http://dx.doi.org/10.1787/888932310282

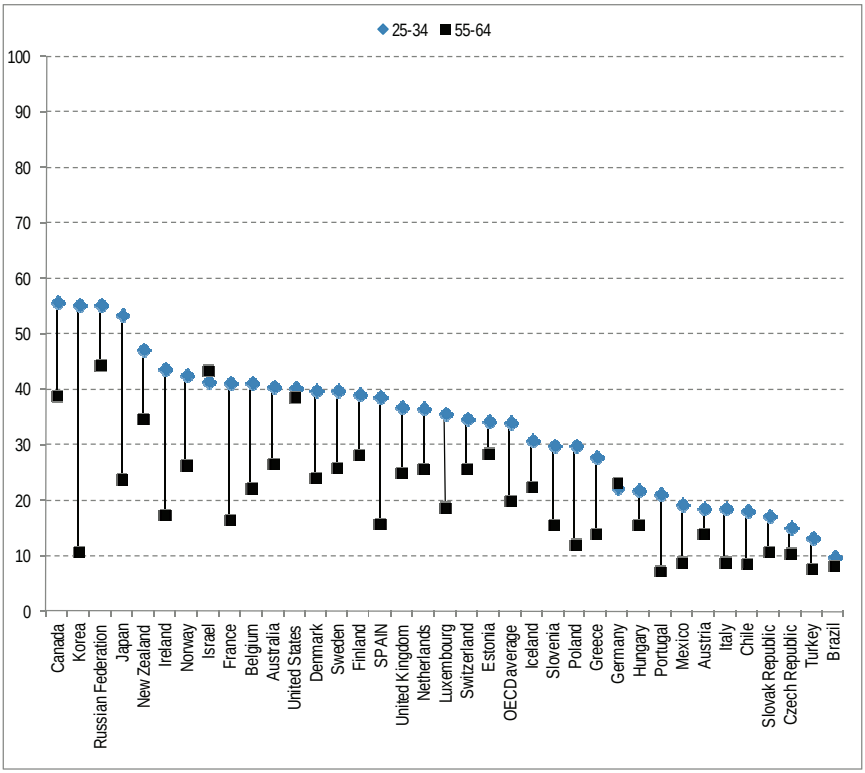
Attainment, access and retention

The OECD Data (*Education at a Glance, 2010*) show that in Spain, the proportion of people aged 25 to 34 that have attained tertiary education 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 1.4).

Figure 1.5. 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 (2010c), *Education at a Glance 2010,* OECD Publishing

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

The largest concentration of university qualifications awarded to students is in the combined fields of social sciences, business, law and

services (more than one-third of qualifications awarded) followed by the humanities, arts and education (24%) and then, health and welfare (15%).

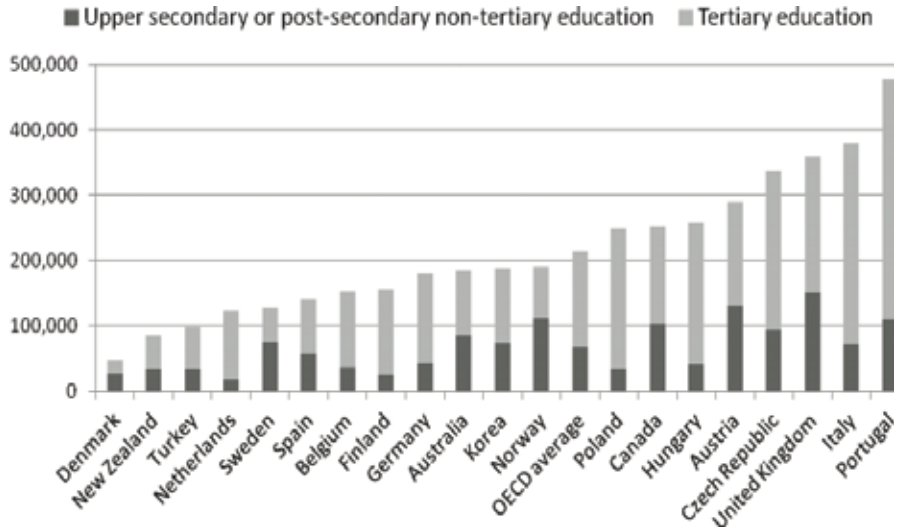
The key challenges in the university education are the length of time that university students need to finish their studies (much longer than those set out in the curriculum) and the high dropout rates (around 30%). Both factors erode the efficiency of the Spanish university system.

Equity in access to tertiary education remains a challenge despite progress made in this area. Equity has been improved due to the geographical expansion of institutions, low cost of tuition fees and the support of families. However, the student aid system in Spain (a Spanish government responsibility) is limited and only 0.08% of the GDP is devoted to this objective, mostly as mean-tested grants. The high drop-out rates are partly caused by the lack of financial, social and academic support.

Challenges in tertiary education are also due to poor preparation and problems in the pre-university education which features high dropout rates and weak learning outcomes. Nearly one in three Spaniards between the ages 18 to 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. According to Pisa results for 2006, fewer than 1 in 20 of Spain's 15-year-olds reach the top performers for reading, which is the lowest percentage in the OECD countries apart from Mexico. In Catalonia, students learning outcomes have improved since 2000 and the 2009 results are slightly above the national and the OECD averages (OECD, 2010d). There is, however, much to be done to achieve the levels of the best achieving countries.

Private returns on tertiary education are low in Spain in financial terms compared to the OECD average and there is comparatively weak incentive to enrol tertiary education (see Figure 1.5.). In addition, the proportion of the working population with university qualifications who are in skilled jobs (78%) is low compared to other OECD countries. However, 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 is only 5 percentage points in Spain, indicating a fairly close match between the supply and demand for high end skills. This points to the need for the economy to grow the number of skilled jobs.

Figure 1.6. Economic returns for an individual from obtaining higher levels of education, 2006

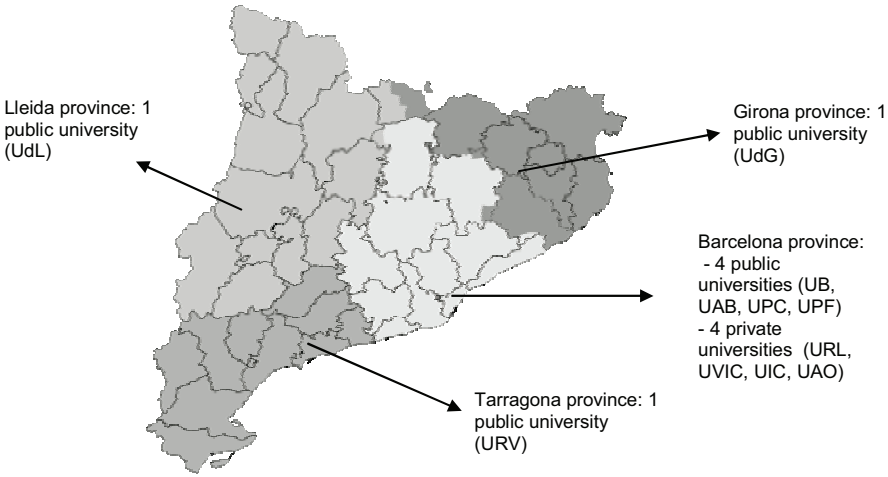


Source: OECD (2010c), *Education at a Glance 2010*, Tables A8.1 and A8.2, available at http://dx.doi.org/10.1787/888932310225.

Tertiary education system in Catalonia

Catalonia has 12 universities – 8 public and 4 private – which are located in largest cities. Nine universities, five public and four private, are located in the province of Barcelona (and eight in the metropolitan area), while the remaining three universities are located in Tarragona, Girona and Lleida. One of the public universities, the Open University of Catalonia, is a distance-learning university (see Figure 1.7.).

Figure 1.7. Catalonia map: public universities



Source: CRSC (Catalonia's Regional Steering Committee) (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", *OECD Reviews of Higher Education in Regional and City Development*, IMHE, *www.oecd.org/dataoecd/49/19/44899776.pdf*

The Catalan University system is dominated by public institutions: 89.6% of students are enrolled in public universities, while student enrolment in private universities was 10.4%, in the academic year 2008/09. The Catalan universities have approximately 177 000 undergraduate and masters students. In the 2009/10 academic year, 58% students were in the social sciences or humanities, with only 6% in sciences. A large proportion of students are enrolled in engineering and architecture (27%). Among PhD students in that same year, 27% were in science and 17% in engineering, and another 20% in health. Catalonia has therefore a higher share of doctoral students in sciences and engineering than OECD member countries generally, where the shares are 9.8% and 11.4% respectively.

In 2009-10, in Catalonia, there were 43 454 students enrolled in vocational tertiary education provided by 321 centres (*Ciclos Formativos Superiores*, CFS). In addition, 2 019 students were enrolled in CFS distance courses. Catalonia has a higher demand for vocational tertiary education than Spain in general: the gross rate of demand (number of students divided by the number of people in 18 to 19 year age cohort) is 33.2 in Catalonia and 27.8 in Spain as a whole (Ministry of Education, Non-University statistics, year 2009/10).

While enrolment in tertiary education has improved, the number of students in tertiary education as a share of the population is only 3.5% in Catalonia versus an OECD regional average of 5.4%. Considerable proportion of young age group is therefore outside of education, training and labour market.

The universities in Catalonia are increasingly operating under a co-ordinated system. Three elements play an important role in this context:

- The funding model applied by the Department of Universities of the Regional Government of Catalonia for Public Universities provides a tool for steering the university system.
- The Quality Assurance Agency of Catalonia (AQU) provides a tool for the improvement Catalan university education. This Agency has a leading role not only in Catalonia, but also at European level, being one of the three first agencies accepted in the European Quality Assurance Register.
- Public universities have established the Association of Catalan Public Universities (ACUP) which under the name "University of Catalonia" is developing a strategic plan for promoting and improving Catalan universities (ACUP, 2008).

An example of the interest of the Regional Government of Catalonia in its universities is the Strategic agreement for the internationalisation, employment quality and competitiveness of the Catalan economy that was signed in 2008 (Generalitat de Catalunya, 2008). This agreement includes several points related to the university sector, reflecting the main concerns of the regional stakeholders in relation to universities, such as the pursuit of excellence and internationalisation in education, stronger alignment of study programmes with the needs of the labour market and improved university-industry relations (see Box 1.2.).

Box 1.2. Strategic agreement for the internationalisation, employment quality and competitiveness of the Catalan economy

Development a university model that opts for excellence and internationalisation through:

- Encouraging Catalan universities to position themselves as excellent universities and leaders in their fields in relation to the rest of the world.

Box 1.2. Strategic agreement for the internationalisation, employment quality and competitiveness of the Catalan economy (continued)

- Establishing systems that regularly evaluate their results in teaching, research and the transfer of knowledge.
- Making university structures, regulations governance to make them responsive and flexible.
- Supporting internationalisation of the Catalan universities, through student mobility, joint degrees and development of language skills of university students.

Revising qualifications and teaching methods to adapt them to the needs of the labour market through:

- Revising the whole map of Catalan university academic awards.
- Supporting the effective adaptation of teaching methodology in accordance with the Bologna process.

Improving university-industry relations through:

- Changing the composition of the university social councils to improve university-industry relations and deepening the university's role as interface with the economy and society, encouraging the presence of key trade unions and business organisations.
- Encouraging agreements between universities and the private sector to enhance work-based learning opportunities.
- Enabling academic staff to work full time in technology and scientific centres without voluntary leave of absence.

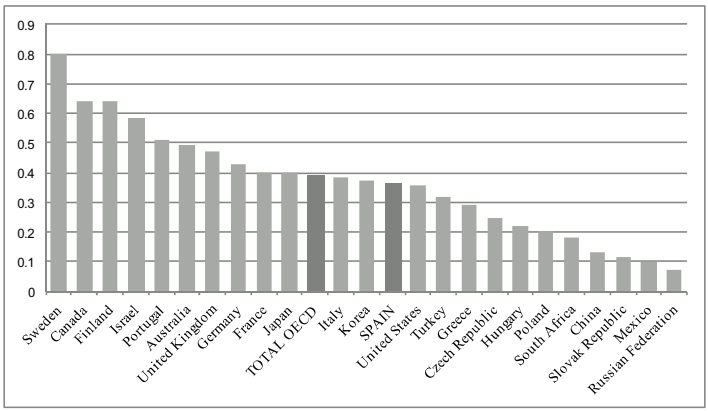
1.4. The research and innovation system

Spain spent 1.2% of GDP on R&D in 2006, which significantly below the EU27 (1.8%) and OECD (2.3%) averages, despite a substantial increase from the levels of the mid-1990s. The business sector finances 47% of gross

domestic expenditure on R&D; the government finances 42.5%, 5.9% is financed from abroad and 4.5% from other national sources. Boosting R&D and innovation in the business sector is a challenge as most industries are relatively low-technology and most firms are small or medium-sized. The regional governments are increasingly important players in innovation and have developed their own R&D and innovation policies.

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 1.2. and 1.3.).

Figure 1.8. HERD as a percentage of GDP in selected countries, 2008



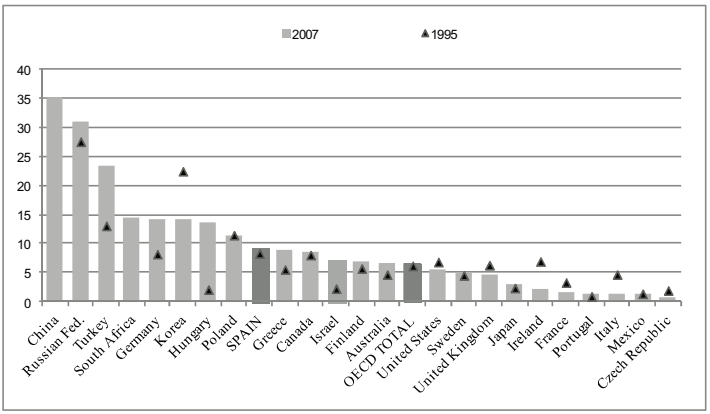
1. Or nearest available year.

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 Publishing.

Figure 1.9. 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 (2009b), *Main Science and Technology Indicators,* OECD Publishing.

A key objective of the Spanish RDI policy has been to expand the private sector capability for innovation and a number of instruments have 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.

As elsewhere in Spain, Catalonia's R&D intensity (gross investment in R&D as a proportion of its GDP) has grown significantly from its initially low value. However, Catalonia is still far from the 3% of R&D expenditures as a share of GDP established in the Lisbon Agenda. As compared to the R&D intensity of OECD regions, Catalonia is below OECD averages for all actors, including business (0.86% versus 0.93%), government via both Spanish and Catalan research centres (0.16% versus 0.21%), and higher education (0.3% versus 0.21%) (OECD, 2009b).

Over the period 1996-2008, Catalonia increased its R&D intensity from 0.9% to 1.61%, two-thirds of which was performed by the private sector. In absolute amounts, the expenditure by all actors on R&D increased four-

fold over that period to EUR 3.3 billion, or an average annual growth rate of over 13%. Catalonia ranks the second region in Spain in terms of the overall amounts of R&D expenditure. While Catalonia has been increasing its R&D intensity at a faster rate than the national average, other regions in Spain have even higher values, such as Madrid (2.0%), Navarra (1.92%) and the Basque Country (1.96%). Catalonia's R&D is mainly performed by the private sector, albeit the share has decreased slightly over time. In 2002, this proportion was around 68%, while in 2006, it was approximately 65%, just below the Basque County, Navarra and La Rioja (78%, 66% and 66% respectively using 2005 data).

Catalonia accounts for a large share of Spain's innovation activity and resources. In terms of R&D investment, Catalonia is responsible for 21% of the total in Spain. Catalonia also contains 22.5% of the innovative firms in Spain, a far greater share than other regions. Catalonia accounted for 33.7% of Spain's PCT patents. However, the share of the economy in high-technology and knowledge-intensive services is 36.9% in Catalonia versus 37.7% for OECD regions. R&D investment by different actors as a share of GDP is below average. Patents are also below average at 54.7 per million inhabitants, versus 72.3 for OECD regions, (OECD, 2010a).

Spanish and Catalan universities have improved their performance, particular with regard to their research and to a lesser degree knowledge transfer. In 2006, internal spending on R&D in Spanish universities increased 10.3% compared to the previous year. The trend in recent years is towards a growing number of people dedicated to R&D. The number of scientific publications in Spain has grown continuously since 1981, representing 3.1% of the total world output and placing Spain in tenth position among the 145 countries considered in the Web of Knowledge, and in 13th position worldwide in terms of citation per article. Also, the number of patent applications has increased steadily since 2000. In the period 2004-06 the number of companies collaborating with universities on innovation increased, as did the relative weight of these companies within the total number collaborating on innovation, coming to 29.9% of the total. The funds managed by the *Red OTRI* (knowledge transfer office network) in 2006 increased by 26.3% compared to the previous year, which was the highest increase since its creation.

The share of the Catalan workforce in research is an important indicator of the region's capacity to absorb R&D investment. All R&D personnel (in full-time equivalents) represents 1.2% of the labour market, while researchers account for 0.7%. These rates are higher than the EU27 average (1.0% and 5.8% respectively).

Conclusions

Catalonia has a strong identity, own language and distinct cultural heritage. Catalonia's diverse economic base has experienced regular growth over the last years. The growth has now come to an end and the region needs to prepare for the post-crisis economy by continuing to invest in human capital development and innovation. Long-term youth unemployment risks undermining the aspiration levels of young people and their trust in social institutions. Retaining and (re)integrating immigrants in the labour market and education system remains a challenge.

The Catalan tertiary education system has experienced a number of positive developments. The expansion of the system has widened participation in tertiary education. Institutional government modalities are becoming more responsive to various stakeholders. The principles of selective and earmarked funding have been accepted and quality assurance systems have been developed and implemented in line with international good practice. The resources devoted to research and development have increased in recent years, with improvements in human resources for R&D and the knowledge generation system. However, while Catalonia's level of expenditure in R&D is higher than the Spanish average, it is low compared to the best performing OECD countries.

At the same time, many aspects in the modernisation of tertiary education system remain underdeveloped. The university and vocational tertiary education sectors operate at a distance and have limited collaboration and pathways. The Catalan University System lacks differentiation, is mostly academically-driven and insufficiently responsive to the diverse needs of the economy and society. Teaching, both programme offerings and curricula, remains mostly supply-driven. The links with the labour market are weak and the input by employers/industry/trade unions to tertiary education remains limited. There is relatively little engagement with the "third mission" activities and in continuing education. Furthermore, the student support system is insufficiently developed, while the extent to which graduates contribute to the costs of their tertiary education is at a low level. Finally, university management and governance structures are at a suboptimal level and education system remains strongly regulated by the Spanish government. Stronger incentive and accountability structures and greater institutional flexibility could unleash the universities' potential for regional and local development.

Notes

1. Spain has 17 regions or autonomous communities and autonomous cities Ceuta and Melilla in Northern Africa. Each autonomous region has its own government and parliament.

References

ACUP (Association of Catalan Public Universities) (2008), *White Paper on the University of Catalonia*, ACUP.

CRSC (Catalonia's Regional Steering Committee) (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", *OECD Reviews of Higher Education in Regional and City Development*, IMHE, *www.oecd.org/dataoecd/49/19/44899776.pdf.*

CYD Foundation (Fundación Conocimiento y Desarrollo) (2008), *Executive Summary CYD Report 2008*. Fundación CYD.

Regional Government of Catalonia (2008), *Strategic Agreement to Promote Internationalisation of the Catalan Economy, the Strengthening of its Competitiveness and the Quality of Employment 2008-2011*. Regional Government of Catalonia, Barcelona. *www.acordestrategic.cat/doc/doc_31305876_1.pdf.*

Ministry of Education, Non-University statistics. Year 2009-10. *www.educacion.es/mecd/estadisticas/educativas/eenu/avances/Curso09-10/2%20Rdos%20CA%20RG%2009pdf.pdf.*

OECD (2009a), *Promoting Entrepreneurship, Employment and Business Competitiveness: the Experience of Barcelona*, OECD Publishing.

OECD (2009b), *Main Science and Technology Indicators*, OECD Publishing.

OECD (2010a), *OECD Reviews of Regional Innovation: Catalonia, Spain*. OECD Publishing.

OECD (2010b), Rising youth unemployment during the crisis: How to prevent negative long-term consequences on a generation? OECD Social, Employment and Migration Papers, No. 106, April 2010 [DELSA/ELSA/WD/SEM(2010)6].

OECD (2010c), *Education at a Glance 2010*, OECD Publishing.

OECD (2010d), *PISA 2009 Results: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science* (Volume I), OECD Publishing.

Santiago P. *et al.* (2009), *OECD Reviews of Tertiary Education, Spain*, OECD Publishing.

Chapter 2.

Human capital development, labour market and skills in Catalonia

This chapter addresses the ways in which universities in Catalonia contribute to the development of human capital. It identifies the twin challenges of developing and recruiting talent to support regional investment in high-tech R&D, for example in biosciences, and widening participation and strengthening social equity in light of rising unemployment and increased immigration.

The chapter concludes with a series of recommendations to foster a more systematic approach to tertiary education, with a goal to support sustainable regional development and to enhance the role that the Regional Government of Catalonia, together with the universities and other tertiary education institutions and regional stakeholders, can play in improving human capital development in the region.

The key message is that Catalonia needs to balance its well functioning talent attraction programme with nurturing talent at home to better address the needs of the underrepresented groups. There is a need to build a stronger tertiary education sector with pathways between universities and vocational tertiary education institutions. Finally, there is also a need to improve the learning and employment outcomes of university graduates and the overall relevance of education.

Introduction

Universities and other tertiary education institutions can contribute to the human capital development in Catalonia basically in four different ways, by:

- Widening access to and success in tertiary education of the existing youth and adult population of the region.
- Attracting talent to the region, including students and highly qualified faculty and researchers.
- Producing graduates with knowledge/skills relevant to the region's economy.
- Contributing to developing an economy that will employ graduates and retain and attract educated population.

Tertiary education institutions raise human capital levels in a region in two ways. First, and most obviously, they educate and train the regional population, produce graduates and draw students from other regions, some of whom may remain in the region and contribute to the aggregation of human capital.

Second, but less recognised, tertiary education institutions train researchers who go on to develop knowledge capital. Research activity by tertiary education institutions increases the demand for human capital in the region by attracting inward investment and people with high skills, and encouraging local firms to emphasise and develop human-capital-intensive activities. This leads to the growth and expansion of knowledge-intensive activities through business incubators, research parks or faculty ties with local industry. Sometimes this cycle of development leads to emphasising investment in science and technology-based education and R&D, but there is also evidence that the arts, humanities and social sciences can make important contributions to economic growth – through the development of new business ideas and processes, social innovation and by fostering cultural and community activities (OECD, 2007).

This chapter addresses the ways in which universities and other tertiary education institutions in Catalonia contribute to the development of human capital. Human capital is critical to regional development because individuals with higher-level skills and knowledge are more productive and because individual workers are more productive in regions where their peers

have higher levels of human capital. Higher levels of human capital are also associated positively with regional economic growth and indicators of regional wealth: "People who complete a high-school education tend to enjoy better health than those who quit at the minimum leaving age. And people with university degrees are more interested in politics and more trusting of other people" (OECD, 2009a).

In short, tertiary education is necessary, although not sufficient requirement for the development of a socially and culturally aware, participative, and healthy civil society.

In this context, this chapter will address four main questions:

- Participation in tertiary education: do the universities offer adequate education and learning opportunities to the region's population? To what extent can more formal pathways and collaborative frameworks with vocational schools be used to widen opportunities for entry-level learning and for life-long learning (*e.g.* re-skilling and up-skilling).
- Demand for skills: are the existing programmes offered by vocational schools and universities adequately aligned with the skill needs of the region's economy? How can programmes be strengthened to provide better employment and career opportunities to meet anticipated skill needs and graduate desires?
- Research and regional development: to what extent are the research activities of Catalan universities aligned with regional human capital development requirements? How can Catalan universities become a major source of human capital and economic development in the region, especially in professional occupations encompassed in the creative economy, including in the fields of design and communications?
- Governance and financing framework: whilst acknowledging the complex governance and funding framework, how can Catalonia integrate, co-ordinate and govern vocational tertiary education institutions and universities in a manner that balances needs and requirements across the full tertiary education system?

2.1. The contemporary context for human capital development in Catalonia

Catalonia has led strategic investment in research and development in Spain. Its major city, Barcelona, has a strong reputation as one of Europe's

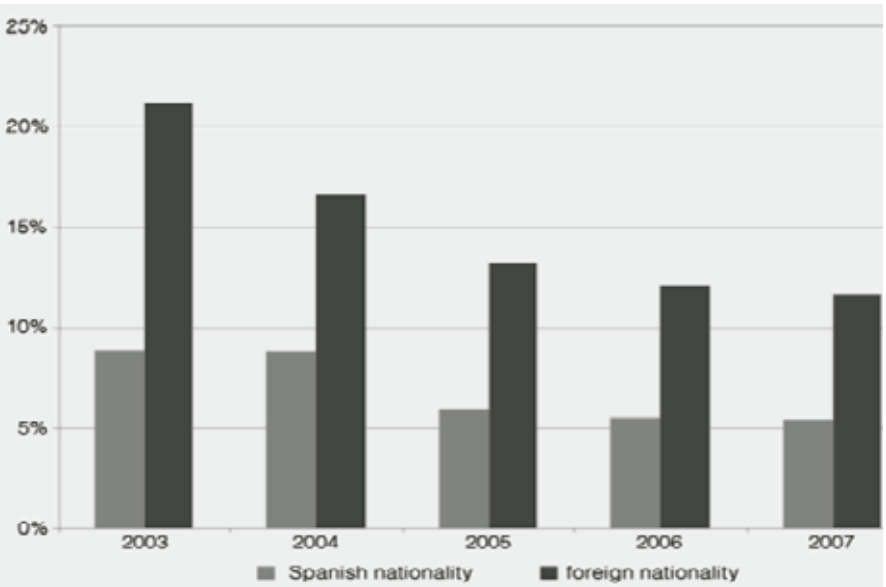
centres for design, and it is perceived as a global gateway for Spain and Europe. Since 2007, however, Spain has been severely affected by the global financial crisis (GFC) and had the unemployment rate of 20.4% during the third quarter of 2010. Spain has exceptionally high youth unemployment rate, reaching 43.5% in the fourth quarter of 2009, an increase of 24.7 percentage points since the fourth quarter of 2007. Unemployment in Catalonia is 16.53% (third quarter of 2010), highest among youth and those with only a general education or lower.

In conjunction with the pre-crisis building boom and economic opportunities, Catalonia has witnessed significant net immigration. The recent migrant stream is composed of two very different groups – high-level international researchers, scientists and design entrepreneurs and lower or non-skilled economic migrants from elsewhere in Europe as well as Africa and Latin America. Despite a steep decline in its domestic population, Catalonia experienced its largest period of population growth, due primarily to foreign immigration, between 2001 and 2008. By 2008, foreign residents accounted for 85% of the growth rate with 60% of immigrants in Catalonia living in the Barcelona metropolitan area; they represent over 1 million inhabitants or 15% of Catalonia and 21% of Spain's total population (SIC, 2008, p19). However, the new Spanish population experiences particular difficulties. Unemployment was highest amongst the immigrant population even before the current crisis (Figure 2.1.); over 45% of immigrant males and almost 40% of females are in temporary employment compared with approximately 17% and 21%, respectively, for the Spanish population (SIC, 2008). These disparities are reflected in educational attainment levels, with immigrants over-represented amongst with the population with only primary or no education.

The tertiary educational system manifests parallel challenges with respect to socio-economic differentiation (Osborne, 2003), and, significantly, the situation has remained the same since the mid-1990s (Mora, 1997). Educational inequalities cannot therefore be attributed to recent demographic change or to the recent economic downturn. Although student enrolments overall have increased since 2000, with the greatest expansion at ISCED 5B vocational education, participation is closely related to socio-economic position. Despite the OECD Technical Note for Education at a Glance 2008 stating that "40% of students in higher education in Spain come from families where the father has a blue-collar occupation", the Catalan Self-evaluation Report acknowledges that:"in spite of the progress made in widening university access, data on the socio-economic origin of university students shows a marked orientation towards families with medium to high incomes, indicating that there is much room for improvement in the area of equity" (CRSC, 2010, pp 53-54).

Similar concerns are expressed in the *Review of Tertiary Education – Spain* (Santiago *et al.,* 2009); it notes that considerably more attention has focused on the expansion of overall enrolment rather than the question of equity of access which relates more to the question of differences in participation rates among groups of students – by socioeconomic background, region of residence, cultural background or disability (Santiago *et al*., 2009). This differential follows through into the labour force, with "the proportion of the working population with tertiary-type A or advanced research qualifications who are in skilled jobs (78%) [being]"…quite low compared to other OECD countries" (OECD, 2008a). Because of the lack of adequate student support, there is little mobility by Spanish/Catalan students, and a significant number of students work out of necessity while studying. Perhaps as a consequence, there is a high level of educational failure" (Calero, 2005) with the drop-out rate estimated at 30% by some institutions, and students taking longer to complete their degree programmes. In addition, there appears to be poor tracking of student progression and achievement. Moreover, there is little interaction, synergy or mobility among the vocational sector, specialist arts institutions and universities.

Figure 2.1 Unemployment rate by nationality



Source: SIC (Statistical Institute of Catalonia) (2008) *Immigration, Here and Now. Catalonia 2008.* Statistical data, p21.

This situation poses major human capital challenges for Catalan society as it aims to transform itself into one that is knowledge and innovation-based. There are deep and growing structural problems in human capital formation – which the current review of regional and city development aims to address. *The Strategic agreement for the internationalisation, employment quality and competitiveness of the Catalan economy (2008-2011)*, developed in a partnership connecting the government, business community and trade unions, sets out some clear targets and responsibilities. While most of the actions are focused on making changes to public sector business processes, the plan recognises that continuing the improvement of education and human capital, research, development and innovation, the infrastructure, the quality of employment and social cohesion have logically once again become the fundamental axes of the future strategy.

There is little doubt that the level of investment in high-technology based research centres and science parks has been extremely impressive. However, the advent of the global economic crisis highlights underlying tensions between the policy emphasis on high-level talent and the relative lack of attention given to developing domestic and low(er) skill human capital. To paraphrase Osbourne, there is a big difference between "getting on" and "getting beyond"; even if some aspects of access are "solved", attention now must be turn to questions of building an integrated tertiary education sector if the gains are to be consolidated (Osborne, 2003).

In summary, the changing demographic profile of Catalonia is one in which the new immigrant population is growing *vis-à-vis* the domestic Spanish population, unemployment among young people appears to be a structural issue, and the new immigrant population records both the highest levels of unemployment and the lowest levels of educational attainment. As the new immigrant population grows, the human capital requirements for the knowledge economy could become compromised. Problems of completion rates, affordability and other indicators of educational performance suggest another set of issues requiring attention.

2.2. The educational and qualifications framework: participation in tertiary education

Spanish tertiary education system has undergone a significant transformation and growth in recent years, and is to be commended on making strong progress, especially in light of its recent political history. Since 1990, four new public universities have been developed in Catalonia: Universitat Pompeu Fabra (UPF) in 1990, and the Universitat de Lleida (UdL), the Universitat de Girona (UdG) and the Universitat de Rovira i

Virgili in Tarragona (URV) in 1991. In addition, there are three private universities of which Universitat Ramon Llull (URL) is the largest, with 13 000 students (Table 2.1.) The number of undergraduate students in public universities represents 177 100 which amounts to 12.6% of the national total. The overwhelming majority of first year students (91%) come from Catalonia, with most students attending their local university; only 8% of students from the rest of Spain. European students comprise 0.9% of entering students and only 0.7% comes from the rest of the world.

The tertiary education sector in Catalonia is principally a university system; there is some diversity of mission but the overwhelming emphasis is on classical academic provision. Participants to the OECD review and various reports, including the Regional Self-evaluation Report for this review, claimed there was insufficient differentiation, with too much overlap and repetition among the universities. University students tend to be concentrated in the social sciences, engineering and architectural disciplines, with relatively few students in health and science, despite policy and research focus on the bio-sciences. There appears to be a need for stronger practice-based pedagogy and research, broader opportunities for student internships and work-based learning, as well as interdisciplinary activity with other disciplines such as the arts and media. Participation rates for Tertiary-A programmes (at 43%) are below the OECD average of 56%, while participation rates at Tertiary-B level (at 21%) are above the OECD average of 16% (2006) (Catalonia's Regional Steering Committee, 2010).

Overall, there has been strong expansion among the university system in Catalonia. However, this has been uneven and in the public universities, excluding the Open University of Catalonia (UoC), the number of students has decreased by about 10% in the last eight years. While the Open University of Catalonia has experienced the greatest expansion, the University of Barcelona (UB) the Autonomous University of Barcelona (UAB), the Polytechnic University of Catalonia (UPC) and the University of Lleida show significant reduction. There are also private design training and certificate programmes, which appear to be a prominent part of the educational infrastructure but are disconnected from the universities.

Table 2.1. Total number of students enrolled in Catalan universities, 2000-09

Year	UB	UAB	UPC	UPF	UdG	UdL	URV	UOC	URL	UVIC	UIC	UAO	Total
00-01	60 377	38 250	35 518	8 962	12 836	11 257	12 751	14 837	13 007	3 671	2 324	0	**213 790**
01-02	59 121	37 757	34 724	9 175	12 669	10 487	12 395	21 374	12 657	3 678	2 262	0	**216 299**
02-03	57 582	37 285	33 744	9 370	12 656	9 788	12 404	25 783	12 413	3 643	2 258	0	**216 926**
03-04	55 648	37 157	33 938	9 465	12 416	9 192	12 300	29 988	11 984	3 964	2 291	317	**218 660**
04-05	54 074	36 908	32 627	9 405	12 260	8 766	11 676	33 307	11 909	4 180	2 253	564	**217 929**
05-06	53 230	36 446	32 091	9 557	11 903	8 033	11 673	36 217	12 211	4 438	2 331	762	**218 892**
06-07	53 152	35 773	31 681	9 960	11 870	7 929	11 976	39 398	12 124	4 575	2 732	1 038	**222 208**
07-08	52 327	35 275	30 997	10 305	11 716	8 067	11 855	41 222	12 655	4 498	3 100	1 403	**223 420**
08-09	51 843	35 695	30 288	11 430	11 552	7 880	12 065	42 653	13 647	4 592	3 413	1 729	**226 787**

Source: CRSC (2010), "The Autonomous Region of Catalonia, Spain: Self-Evaluation Report", p 23, *www.oecd.org/edu/imhe/regionaldevelopment.*

The focus on the university sector means that it operates at a distance from the rest of the tertiary sector, for example the vocational tertiary education institutions. Approximately 13% of the age cohort is enrolled on vocational tertiary education programmes (2004-05), primarily concentrated in the services sector (Santiago *et al*., 2009). There are some examples of good practice where universities and vocational tertiary education institutions share facilities or are proximate to each other. The Spanish Government has aimed to increase collaboration between vocational and university sectors, for example through the 2010 call for the International Campus of Excellence competition, which provided funding for the development of professional education centres within university campuses. Catalonia has been very successful in the national competitions: out of the 23 campuses of international excellence 7 are in Catalonia.[1]

In general, there seems to be little attention to the broad issues of widening participation, social inclusion or mobility within the tertiary education sector, or issues around completion rates, retention or graduate employment or absorption rates. The flip-side is that several universities suggested they had too many students, and wanted to place greater emphasis on elite education. However, it is not clear where they think the "extra" students should go. Failure to resolve these tensions will place considerable strain on the system, especially in terms of its fitness-for-purpose and future sustainability.

Reports about Spanish education consistently point to the twin and oppositional trends of growth in university participation among the middle class and continuing high unemployment (Mora, 1997; Albert, 2000). Unemployment has remained consistently high throughout the first decade of the 2000s, not falling below 12% (Table 2.2.); since the onset of the global economic and financial crisis, unemployment in the 16-24 year cohort is running at 37% with even higher rates among young males. In fact, the current crisis has reversed the trend whereby female unemployment outpaced male unemployment (Indescat, 2009c).

Furthermore, the OECD analysis shows that one-fifth of the population aged between 15-19 years are not in education, the eighth highest in the OECD – another situation which has barely changed in the 1995-2006 period (OECD, 2008a). Based on figures for participation rates, a very significant proportion of the 16-24 age cohort remains outside the education sphere (see Table 2.4.); some of the data differences may result from the sharpening impact of the economic crisis in the intervening year and some double-counting because students may also be registered in unemployment offices. Nevertheless, these figures present a very stark and challenging environment in which the widening participation agenda needs to feature much more highly on the education and policy agenda.

Table 2.2. Unemployment levels, 16-24 age cohort (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total	17.1	20.3	22.2	21.2	15.9	14.7	13.5	20.4	37.1
Male	14.7	20.4	22.4	18.9	15.8	13.2	12.3	22.2	41.2
Female	19.9	20.3	21.8	24.2	15.9	16.5	15.0	18.3	32.1

Source: indescat (2009a), "Unemployment Est. Unemployed population and unemployment rate. By age and sex".

Table 2.3. Education participation/non-participation rates, % of 16-24 yrs (2008)

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

Source: OECD (2008a) Technical Note for *Education at a Glance*, OECD Publishing.

* The Santiago *et al. (2009), Thematic Review of Spain* says that Higher Vocational Schools enrol 13% of the age cohort, p52.

**OECD (2009a), *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.

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. According to PISA results for 2006, 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.

In Catalonia, students learning outcomes have improved since 2000 and the 2009 PISA results are slightly above the national and the OECD averages in all fields (reading comprehension: Catalonia 498, Spain 481, OECD average 491; mathematics: Catalonia 495.6, Spain 483, OECD average 488.4; Science: Catalonia 497.3, Spain 488, OECD average 496.4). However, much remains to be done if Catalonia wishes to reach the levels of the best performing OECD countries (OECD, 2010a).

Education participation levels amongst the new immigrant community are low. The figures also highlight the challenges associated with a significant portion of the population coming from countries with relatively low levels of human capital development. The largest migrant groups come from Morocco (230 262), Romania (86 910) and Ecuador (84 170). Because family is a major indicator of education attainment, there are likely implications for the children of these families Calero refers to a situation in which foreign students are segregated or "ghettoised" 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" amongst other problems (Calero, 2005). In addition to the unemployment crisis, this situation could provide enormous opportunities for the post-secondary education sector, albeit clearly the issue is not completely resolvable at this level.

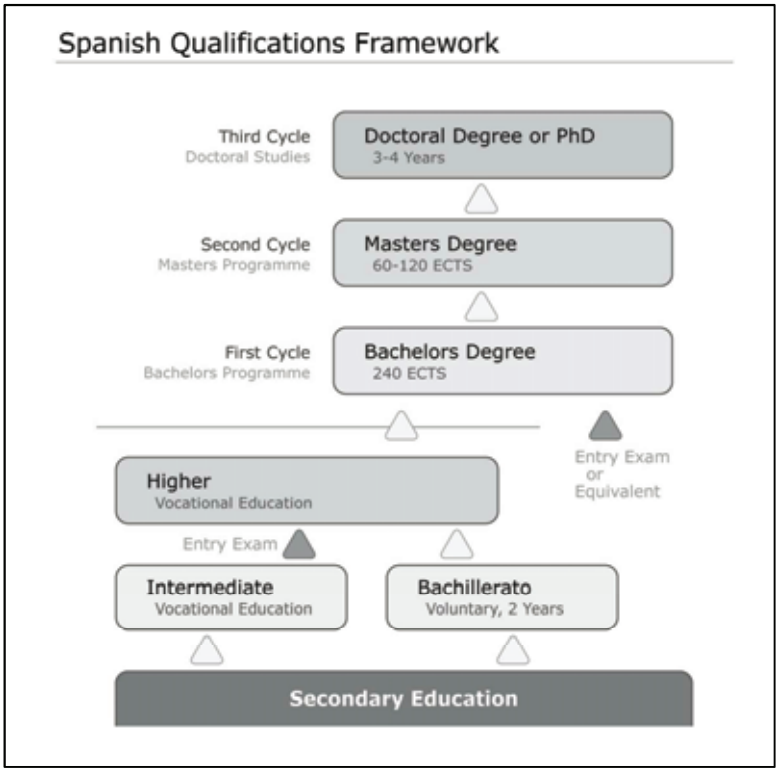
Table 2.4 Foreign residents by nationality of origin, 2008 (%)

	Barcelona	Girona	Lleida	Tarragona	Catalonia
Total European Union (EU27)	142 460	35 567	23 536	44 600	246 163
Total rest of Europe	16 575	6 055	4 390	5 817	32 837
Total Africa	169 820	53 657	25 718	41 274	290 469
Total America	243 850	22 631	10 836	23 179	300 496
Total Asia	86 041	8 358	2 155	6 246	102 800
Total Oceania	323	39	5	8	375
TOTAL	**660 254**	**126 455**	**66 746**	**121 288**	**974 743**

Source: indescat (2008), Foreign residents: by country of nationality/provinces.

One such opportunity is to establish a much stronger focus and direction for the vocational tertiary education sector and other institutions providing Tertiary 5-B programming. Training and retraining is vital but so also is the need to be build stronger relationships among the different components of the post-secondary education sector: universities, specialist institutions and vocational tertiary education institutions, so that they operate as an integrated developer of human capital potential. The Spanish Qualifications Framework does not yet seem to have made a significant positive contribution to providing clear pathways through the post-secondary or tertiary education sector.

Figure 2.2. Spanish Qualifications Framework



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

Approximately 43 500 students are currently enrolled on vocational tertiary education programmes. Most of the programmes are geared for the services sector with lesser provision in production and manufacturing, maritime or design. While the focus is on training and employment, there could, however, be opportunities for linkages with universities or with some of the private specialist institutions, for example art and design. Tourism is a traditional sector for the Spanish/Catalan economy and the University of Girona (UdG) offers degree programmes, and has a burgeoning research centre in the field. It is therefore advisable to create formal pathways between some of the vocational programmes and the universities. Similarly, the specialist art, design and music institutions could forge stronger integration with both the universities and the vocational tertiary education institutions.

Table 2.5. Pathways of access to universities in Catalonia (%), 2004-2008

	2004	2005	2006	2007	2008
Upper secondary education	80.1	79.6	78.7	79.3	78.4
Bachelors or graduates	2.4	2.4	2.3	2.1	2.1
VET	15.0	14.9	15.9	15.9	16.4
Other	2.5	3.1	3.1	2.7	3.1
Total	100	100	100	100	100

Source: CIC (2009), Oficina de Preinscripció. *Informe de la preinscripció universitària a Catalunya 2008*, CIC, Barcelona.

At the moment the vocational tertiary education institutions operate separately from the universities. There are differences in pedagogical approaches and learning outcomes among all three institutions, but the identification of similar discipline fields could provide the basis for collaboration and for blending theory and practice. For example, University Pompeu Fabra (UPF) has established some connectivity between its digital arts and media research and programmes in design and music. These pathways could operate both ways. Given the propensity for Spanish education to focus on traditional or classical education, the system is effectively cutting itself off from the emerging new industries. Many of the jobs that students will take up upon graduation are not known today.

Some small scale examples of good practice highlight how universities are making efforts to extend beyond their borders, reaching out into the community to provide pathways to tertiary education. For example the Ítaca Campus Programme launched by the Autonomous University of Barcelona reaches out to schools and non-EU migrant population to raise aspirations (Box 2.1.).

Box 2.1. Autonomous University of Barcelona (UAB): Ítaca Campus Programme

UAB, with financial assistance from Banco Santander, offers a Summer programme to local 15 yr old school students of each year for about 3-4 weeks. It began in September 2004 with a pilot plan in which 40 students took part; in 2008, 432 students from 54 secondary school centres in Catalonia participated. Ítaca Campus is targeted at students with non-EU migrant background. The programme introduces students to university and university life and aims to encourage students to continue their education once they have completed compulsory secondary education. It also aims to provide an opportunity for students from different social backgrounds to live together, and to motivate the use of Catalan as the operational language. It focuses on developing the following skills.

Communication using different languages, communicative modes and technologies. Literary, mathematical, scientific and artistic languages, communicative modes such as oral, written, gestural and graphic, and different technologies: web, radio, video clip – the idea is to become capable of expressing facts, concepts, emotions, sentiments and ideas while interacting with people who may have different ways of acting and different values, or who come from different social and cultural backgrounds.

Learning to learn to learn, especially in terms of knowing how to handle the solutions of complex problems around very diverse topics, involving the development of creative thinking, asking oneself relevant questions, identifying variables and points of view that need to be taken into account, finding relevant information, critical analysis, planning ways in which to obtain proof – all with the aim of achieving a rational and critical decision-making process.

Working individually and with others, stimulating the boys and girls to be aware of their capacities and of their limitations both on a cognitive and emotional plane. To participate in the life of the group, organise themselves, share, discuss things and reach agreements, express their own point of view in public, take the initiative in proposing plans and in drawing their colleagues.

Prospective students are identified through discussions with local schools. Approximately 30% of these students ultimately enter UAB, supported by Banco Santander. There is no special support for these students once they enter university, and the university does not track performance.

Vocational tertiary education institutions are located immediately adjacent to University Rovira i Virgili, University of Girona and University of Lleida campuses. This adjacency enables the situations to share some facilities, and provides opportunities for the students attending the

vocational tertiary education institutions to aspire to and experience university life. This partnership provides an important role model for students by opening-up pathways within the tertiary education sector, in addition to meeting the broader widening participation objectives. Moreover, these developments correspond with increasing international examples of multi-level educational campuses which bring together secondary, post-secondary and university facilities – not just to enhance efficiency but to create sustainable education and research environments (see Box 2.2.)

Box 2.2. Sharing campus facilities with vocational schools

Monash University campus at Gippsland called the Gippsland Education Precinct is a multi-sectoral "institution" formed by a partnership between Monash University, Kurnai College, Apprenticeship Group Australia (formerly Gippsland Group Training), GippsTAFE (vocational education institution) and La Trobe City. It aims to improve access equity and education and employment opportunities through integrated learning pathways from Year 11 to TAFE diploma, university degree or PhD, with strong partnerships with business, industry and all levels of government. By co-locating all four education providers on a single site, the precinct helps widen access by enabling easier transition to apprenticeships, TAFE or university.

As part of a AUD 20 million project, the Precinct offers state of the art facilities in all areas including IT, science, art, library, sport & recreation and technology – and students can utilise Monash facilities including laboratories, computers, student union and staff. The Gippsland Education Precinct provides the option to remain in Gippsland to live and work. Educational programmes are being developed in close consultation with local industry to help improve the employability in the region and hence its sustainability.

Source: Monash University (2006), Gippsland Education Precinct website, *www.gep.vic.edu.au*. See also OECD (2010b), Higher Education in Regional and City Development: Victoria, Australia, OECD Publishing.

Open University of Catalonia

An illustration of the transformation that has occurred in Spanish and Catalan tertiary education is the dramatic increase in student enrolment at the Open University of Catalonia. Like similar institutions elsewhere, it has expanded dramatically since 2000, widening participation among mature students and those who might previously or otherwise have been locked-out of the system.

The data suggest, however, that there are number of challenges arising. Today, the Open University of Catalonia recruits approximately 19% of all university students. Attraction has been on the basis of convenience, albeit the on-set of the economic crisis is driving more students into traditional university programmes. The student population is drawn primarily from amongst those who are mature students (over 26 years) and in full-time employment; 60% of the students are over 30 years and less than 5% are unemployed. Because participation is dependent upon computer access, it has been drawn predominantly from amongst the middle class. This pattern is similar to that of the Open University Australia.

Open University of Catalonia programme provision is typically focused on the social and health sciences and informational technology and related professional programmes, for example telecommunications, business, law, city and urban planning, tourism, health sciences. It is not linked to any assessment of the labour market, and arguably it simply complements existing provision already offered by the other universities. It does offer some short courses of 1-3 months duration and other sub-degree or practical programmes geared in the current time towards the unemployed but these are not accredited. Whether on these programmes or Open University's standard provision, students cannot receive accredited awards for work done unless the entire programme is successfully completed, albeit students can apply in the normal way for transfer to another university. In future, it would be useful to review the Open University of Catalonia's provision against the Spanish Qualifications Framework.

Finally, while the Open University's enrolment levels have significantly increased, the OECD Review team were told that only 60% of those entering continue past the third semester, and only 60% of that cohort go on to graduate; in other words only 36% of students actually graduate. It may be unfair to draw too strong conclusions because the percentage of students transferring to other universities is unknown. Nevertheless, this combination of issues would seem to run against the grain of what the UoC should be trying to accomplish.

Improving mobility and pathways in tertiary education

The Catalonia's university system tends to operate as a self-contained sector, with limited interaction either with other elements of the post-secondary education system. This historic arrangement makes it difficult for students to move across or into the system. The existing system also creates barriers 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. Hence, at best, the system creates disincentives for students or, at worst, it punishes them. One way of overcoming some of these institutional barriers to educational attainment is recognition of accreditation of prior learning (APL), whether that prior learning is obtained in the workplace or through other types of learning, in which case it would be called recognition of prior learning (RPL).

The Spanish government has introduced a series of initiatives for lifelong training 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, the OECD review team was repeatedly told that the tertiary system was inflexible and mobility through and across the system was constricted. Some of the difficulty may lie with the individual universities, which may be interpreting recognition of prior learning (RPL) accreditation of prior learning (APL). An RPL/APL system can provide flexible and almost seamless process by which learners can take up different learning opportunities at different stages of his/her life. One relevant example to Catalonia comes from Sweden were the City of Malmö has created a validation centre that targets migrants with secondary level foreign education. Another example embracing also higher level skills is the National Qualifications Authority in Ireland (NQAI, 2006) (see Boxes 2.3. and 2.4.).

Box. 2.3. 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 of higher education and medical professions can be done only by central state institutions.

The centre evaluates the individual's general education. The results of the validation of the secondary and upper-secondary school curriculum provide the individual with suggestions of which further education and training are most suitable.

Box. 2.3. Validation Centre in Malmö (continued)

Local upper-secondary vocational and technical schools in Malmö collaborate in the evaluation of work competencies and experiences against the Swedish vocational education curricula. Immigrants receive a "competencies portfolio" that makes their competencies transparent and understandable in the Swedish labour market. The portfolio is a structured, comprehensive summary of work experience, education, training and other merits. It is the key document for job applications and the basis 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 Publishing, pp. 219-238.

Box. 2.4. National Qualifications Agency of Ireland

The National Qualifications Agency of Ireland (NQAI) was established in 2001 to *i*) 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, *ii*) 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 and *iii*) 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; Murphy A. (2010), RPL Matters in the DIT. Policy and Practice Guide for DIT Staff, Dublin Institute of Technology.

Affordability

A significant number of students work while studying, because of poor student support. Perhaps as a consequence, the drop-out rate is estimated at 30% by some institutions and students are taking longer to complete. This issue was raised by various participants in the OECD review and by the students, who commented on how the lack of financial assistance affected the studies. The OECD Thematic Review of Spanish Tertiary Education (Santiago *et al.,* 2009) pointed to the need for financial assistance to needy students to facilitate access and success in tertiary 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 a student support system to help those students who might, in better economic times, have been able to work while studying – however disadvantageous that has been.

A greater degree of cost sharing in tertiary education needs to be considered, whether through means-tested scholarships, income contingent loans or other funding packages. In general, the issue of affordability needs to be considered, so as not to price tertiary education attainment beyond the reach of most students. At the regional level, there is a need to strengthen the role of AGAUR, the Regional Agency for Management of University and Research Grants that complements the scholarships provided by the Spanish government.

Talent attraction

In sharp contrast to the challenges of unemployment and widening participation, 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 ICREA initiative, operating in consort between the universities and the Catalan government, 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. Unlike similar schemes in other countries, the positions are for permanent full-time positions funded from the public purse. Despite a salary differential of approximately 20% more than a university professor, the OECD review team was told there was little animosity or tension within the academic community. Rather there was a strong view that the salary differential created a “healthy tension between academics”.

In addition to universities 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. To what extent are they meeting both obligations? To what extent is the teaching-research nexus being enhanced or disaggregated by the way the scheme is being operationalised? How are the needs of undergraduate students being met? And, to what extent does the scheme enable the human capital development of the academic staff itself? While this is an enviable scheme – one which many countries including the EU itself have adopted – an evaluation of the impact that the scheme is having on the universities and on Catalan society would be helpful (see Box 2.5).

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

The Catalan Institution for Research and Advanced Studies (ICREA) is a foundation supported by the Catalan Government and guided by a Board of Trustees. It was 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. 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 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. The ICREA researchers collectively attract more than their costs in research funds from outside the region. ICREA researchers have higher average publication rates than researchers in Catalonia generally. ICREA researchers have also applied for 42 patents since 2004 and launched three start-up firms.

Source: ICREA (Institución Catalana de Investigación y Estudios Avanzados) (Catalan Institution for Research and Advanced Studies), *www.icrea.cat/web/home.aspx*

The attractiveness of Catalan universities is evidenced in the share of foreign students in undergraduate and graduate studies: four out of seven public universities in Catalonia are among the top ten Spanish universities in

terms of the share of foreign students in both cycles. Barcelona has taken many innovative steps to enhance international visibility. For example the "Barcelona, Research & Innovation" Programme works to increase the international visibility of Barcelona's potential and current achievements in research and innovation, by highlighting the strengths of the Barcelona's research and innovation capabilities and results. The framework agreement for the programme (2009) between four public universities (UB, UAB, UPC and UPC) and one private university (URL), the Barcelona Chamber of Commerce and the Barcelona City Council highlight their commitment to promote the development of a "Knowledge City". One of the main outputs of the programme is the "Research and Innovation Map" of the Barcelona metropolitan area (www.bcn.cat/innovacio) which is a user-friendly web tool that allows an easy access to research and innovation capabilities of the region. In addition, the "Barcelona, Research & Innovation" Programme promotes a wide range of initiatives to attract talent to Barcelona including accommodation services, legal support and welcome services for postgraduate students and young researchers. The accommodation services are offered through the Barcelona University Centre which is a joint initiative of nine public and private universities, the regional government and the Barcelona City Council. The programme also offers the participating universities the opportunity to use the network of the "Sea Consulates" (*Consulats de Mar*) in order to attract postgraduate students, researchers and entrepreneurs to Barcelona.[2] Recently efforts have been made by the City of Barcelona to build a "Barcelona Higher Education Cluster" to attract also international master's students.

2.2. Aligning education and skill development with regional labour market needs

Despite Catalonia's reputation for knowledge-based innovative industry, there is evidence that the region is losing ground in labour productivity and therefore, in building knowledge-intensive human capital. The reasons for this shortfall are complex. They originate both in the expansion of a less educated and lower skilled workforce, and in the inability of firms in major Catalan industries, such as textiles and chemicals to move up the value chain via product innovation. University initiatives can help address the productivity gap through both educational initiatives and research and development aimed at product innovation and commercialisation.

Productivity in Catalonia was at 115% of the OECD average in 1995, but dropped to only 91% by 2005. GDP per worker and per hour worked remain above the Spanish average but below some other Spanish regions (such as the Basque Country and Madrid). The average annual growth rate

of GDP per worker over the ten-year period is therefore negative for Catalonia (-0.6%) (OECD, 2010c).

Given the strong expression of "University of Catalonia" initiatives to focus on science, especially bio-science, and technology as sources of economic development, one would expect to see a concomitant shift in undergraduate programmes to reflect those priorities yet that is not the case. Only 6% of undergraduates in Catalan universities major in science subjects while 58% are in social sciences or humanities and 27% in engineering or architecture. At the doctoral level, there is an indication of more strength in the fields that have been identified by the universities as a priority for innovation. For example, Catalonia has a higher share of doctoral students in sciences and engineering than OECD member countries generally, where the shares are 9.8% and 11.4% respectively.

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 responsive to evolving labour market needs and *iii)* provide students with labour information that can guide their educational choices. This is not to suggest that university academic programmes should be designed specifically to meet regional labour force needs. Universities are pre-eminently engaged in a broad and diverse education effort. However, there should be a conscious and consistent effort to obtain and provide knowledge about the regional economy and to use that knowledge to help make academic programme investments, and to inform students of job and career options.

With respect to knowledge about trends in the regional economy, Catalan 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. For example, the well developed services of Porta22 in Barcelona Activa,[3] the local development agency of the City Council of Barcelona appears to have limited connections to the university training and education function except to meet with university rectors occasionally to inform them about supply-based activities.

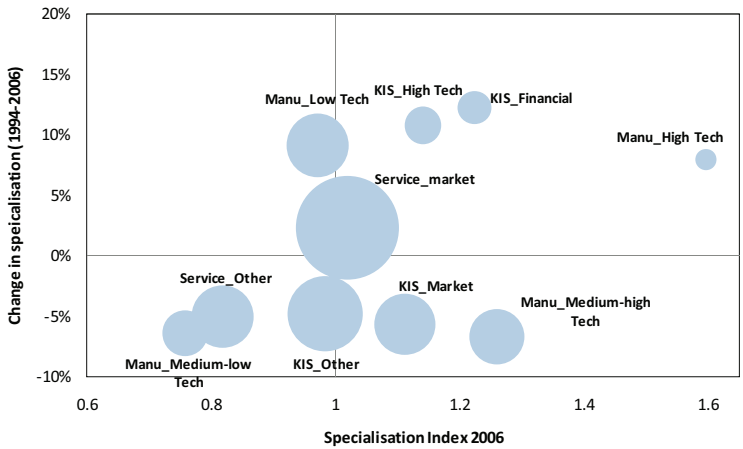
Overall, the region has a poorly integrated system for forecasting demand and determining ways to raise overall labour productivity. Labour market systems are almost solely supply oriented and organised around individual employability, for example, providing help on resume preparation. Porta22 in Barcelona Activa, for example, has a data-based

labour observatory but no on-going mechanisms for determining changing skills needs in regional firms and industry groups. This problem is particularly acute with small- and medium-sized enterprises (SMEs), where productivity increases could substantially change the regional labour productivity profile.

Although one university need not be responsible for regional knowledge of changing labour demand, this kind of knowledge can play a role in university strategic planning. The knowledge encapsulated in the ”bubble chart” below, for example, depicts industry specialisation (relative to Spain), size (share of employment in sector), and focus (share of sector’s employment in the region’s employment). This analysis demonstrates that Catalonia has a diversified economy and is specialised in a number of sectors by comparison with other Spanish regions.

Figure 2.3 Sectoral dynamics by technology level: Catalonia relative to Spain

Change in specialisation, 1994-2006



* Note: 1. Manu=manufacturing, and KIS=Knowledge-intensive services, 2. Bubble size denotes sector size in terms of employment in 2006. 3. Specialisation is measured as the quotient of employment in the sector in Catalonia in relation to employment in the sector in Spain, corrected for total employment shares in Catalonia. A score of 1 means that a sector in Catalonia has a similar employment share as would have been expected on the basis of working population (that is: not specialised); a higher score indicates a sector in which Catalonia is specialised; a lower score indicates under specialisation.

** Note: OECD calculations based on Eurostat data and classification by technology level.

Source: OECD (2010c), *OECD Review of Regional Innovation. Catalonia, Spain.* OECD Publishing

Catalonia has, for example, increasing specialisation in the chemical industry (10% of manufacturing employment), clothing, electrical, paper, and machinery manufacturing sectors. An analysis of Catalan industry specialisations relative to European regions, for example, shows that Catalonia is specialised in food, finance and transportation. There are also several other industry groups with a specialisation above one and a size of over 3% within Europe, notably chemicals, agricultural products and biopharma (OECD, 2010c).

The presence of specialisations indicates an opportunity for knowledge-based value contributions to regional industries with a national or European comparative advantage. Demonstrating this opportunity, value-added embodied in manufacturing goods has risen, reaching 25-30% of total output in some countries by the mid-1990s. To some extent Catalan universities are responding to opportunities to increase productivity in industries demonstrating regional comparative advantage – in bio-pharma, for example, through regional research and development efforts and incubators, at the University of Lleida in research on agricultural product innovation, and at the University Rovira i Virgili in joint research and development and human capital development initiatives with the chemical industry.

The University Rovira i Virgili's (URV) focus on the chemical industry indicates a particularly relevant choice given the evidence that 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 extensive integrated research and human capital development activities related to the chemical industry by URV are a model for effective application of university resources to increase the productivity of a key regional industry (see Box 2.6).

Box 2.6. University Rovira i Virgili (URV) as a model of university industry–region collaboration around research-based human capital development

The University Rovira i Virgili has established a long-term co-operative relationship with the chemical industry in Tarragona that incorporates both research and human capital development programmes that are relevant to the industry needs. 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 coop 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 small and medium-sized enterprises, a public sector intermediary is being developed along the lines of those operating through regional development agencies in the United Kingdom. Most important to the success of this integrated initiative is the strong support from the University leadership, including the Rector.

Another arena in which regional productivity increases are achievable is that of specialised business services related to manufacturing. 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 manufacturing sectors suggests an opportunity to develop educational programmes aimed at high-skilled services, which are already an important aspect of the Catalan economy and build industry productivity.

With respect to providing citizens and students with timely and useful information about labour market opportunities, Catalonia appears to have significant resources in the Barcelona Activa programme and Porta 22. The Porta 22 programme has capacity for research on labour market trends and provides an extensive outreach services to schools and individuals to assist them in assessing job opportunities. The challenge is a more systematic and integrated role as a potential intermediary between industry and the regional tertiary education institutions. A move towards closer integration among industry and institutions of tertiary education can also be supported by better inter-connections among tertiary education institutions, particularly those spanning the vocational tertiary education and university sectors. The goal of this integration should be to provide clearer career paths and bridges between vocational and university educational systems.

Overall, there is considerable variation among the Catalan 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. For many others, the connection is more tenuous.

The OECD review team did not have an opportunity to evaluate the current learning models in the Catalan Universities. However, it is widely acknowledged that traditional modes of teaching and learning dominate the Spanish universities: education is teacher-centred and focused on disciplinary knowledge with a basic theoretical approach. Full advantage should be taken of the ongoing Bologna process to improve the quality and relevance of education. There were some encouraging examples which combined for example internationalisation and practical case studies in business fields (see Box 2.7).

Box 2.7. ESADE learning through business cases

ESADE is a non-profit, independent, academic higher education institution, which has formed part of Ramon Llull University since 1995. It was founded by a group of businessmen and the Society of Jesus in Barcelona in 1958, and is oriented towards promoting human qualities and academic and professional excellence. ESADE is part of the global environment with campuses in Madrid, Buenos Aires, Barcelona-Sant Cugat and Barcelona-Pedralbes, and also has global centres in São Paulo and Munich. It has 1 000 international students from 82 different countries, 5% of faculty are international, coming from 15 countries and 15% of administrative personnel are international, coming from 18 countries. The majority of ESADE students embark on an international career. Furthermore, a number of international students remain in Spain joining major Spanish or international companies.

ESADE's curriculum has been developed to anticipate the changes in the global business context through innovative learning methods, such as case studies that take into account national and regional conditions. Case studies enhance learning and the development of a set of professional competencies by analysing real-life situations, organisations and environments. ESADE case studies deal with 55 economic sectors and 28 different knowledge areas. Half of these case studies are international. Some of them reflect specific local condition for example in Mexico, China, Bolivia, Morocco. The case study approach provides an opportunity to analyse international management scenarios. For instance, the ESADE portfolio includes a case study of a Spanish multinational's Corporate Social Responsibility in Argentina. From a faculty perspective, case studies enhance international professional networking and professional development.

Source: ESADE, I*website www.url.edu*

In recent years, there has been an increase in agreements between universities and companies to increase work-based learning opportunities, but no robust data is collected about this activity and, in general, only a small proportion of students benefit from innovative approaches. Examples include the University of Barcelona's long-term Firms-University-Society programme (EUS) that allows high-achieving students to pursue their last years of their degrees in business and economics in parallel with work placements. The implementation of the Bologna process provides an opportunity to make progress in this domain. International examples of close industry-university collaboration in educational programmes come for example from Canada where the University of Waterloo is running the largest co-op programme in the world with more than 11 000 students and 3 000 employers (see Box 2.8.).

Box 2.8. The Co-operative Education Programme at the University of Waterloo, Canada

The Waterloo Region in Ontario, located about 100 km west of Toronto, has a the strong factor advantage of 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 solidified the university's relations with local industry.

Today, the University of Waterloo 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. Extensive co-op programme offerings are available in all faculties and departments and in over 100 different programmes. Many of local and global firms have strong links with the co-op programme. At Sybase, an enterprise software company that spun-off from the original WATCOM Corporation, with over 250 employees in its Waterloo campus alone, 15% 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: The programme provides 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. Students transfer tacit knowledge and know-how and act as a critical source of knowledge circulation within the local high-technology cluster, effectively transferring knowledge between different firms as they undertake different placements over the course of their integrated work-study programme.

Box 2.8. The Co-operative Education Programme at the University of Waterloo, Canada (continued)

Furthermore, the relationship between the university and local industry allows the curriculum to keep up-to-date with the changing technological frontiers of industry. Finally, industry supports the acquisition of technology to enhance classroom learning.

This awareness of the crucial link between commercialisation and entrepreneurialism is also underscored and supported by the Enterprise Co-op Programme, which 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 principal 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. The key lesson to be drawn from this experience is that the investment of resources in a programme such as this can pay dividends to the local economy over a long period of time.

Source: OECD (2010d), Entrepreneurship, SMEs and Local Development: Andalusia, Spain, OECD Publishing.

In 2009, the unemployment rate for the population in Catalonia with tertiary education qualifications was less than 5%, and 2% for PhDs, compared with 14% for the population with primary education and 27% for those with no formal education. In Catalonia, Catalan Agency for Quality (AQU) and many universities carry out studies on graduates' labour market outcomes. Data from the survey in 2008 indicate that 93.5% of graduates had a job three years after graduation, while 3% remained unemployed. However, only 63% of the students graduated in 2004 were performing tasks in line with their degrees, while 15% were under-employed. 88% were employed with full-time contracts (95% in the case of the graduate in technological and health fields). Graduates identified greatest skill deficits in languages, computing, decision making, problem solving and leadership (see Table 2.6.). Soft skills, work-based learning and international experience play an important role in the student-centred learning model at the technical school of chemistry engineering of the University Rovira i Virgili. This model, which is based on 150-200 training agreements with

industry, has resulted to measurable improvement and for example reduced failure rates among first year students.

Table 2.6. Skills deficit of the graduates of Catalan universities, 2008

	Humanities	Social Science	Experimental Sciences	Health	Technical studies	Total
Theoretical education	0.52	0.31	0.59	0.22	0.44	0.38
Practical education	0.43	0.41	0.08	0.26	0.34	0.34
Written communication	0.19	0.46	0.84	0.50	0.85	0.56
Oral communication	0.68	0.78	1.07	0.90	1.04	0.87
Team work	0.79	0.55	0.80	0.74	0.69	0.65
Leadership	0.91	0.84	1.10	0.81	1.38	0.99
Problem solving	1.19	1.06	0.94	1.09	0.91	1.03
Decision making	1.22	1.11	1.29	1.25	1.42	1.23
Critical thinking	0.11	0.49	0.68	0.80	0.79	0.57
Creativity	0.67	0.83	1.04	0.76	0.77	0.80
Management	1.01	0.80	1.14	0.93	1.21	0.97
Documentation	0.28	0.49	0.75	0.75	0.57	0.54
Languages	1.02	1.17	2.17	1.45	1.90	1.45
Computing	1.79	1.37	1.30	1.49	0.95	1.32

Source: AQU in CRSC (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE, www.oecd.org/dataoecd/49/19/44899776.pdf

2.3. Research as a human capital development and economic development vehicle

An important way in which universities contribute to human capital development is by fostering research and development activities. The efforts of the Catalan government (through the ICREA programme, for example) to attract high-skilled researchers to the region and potentially attract funded research exemplify the Catalan University approach. In conjunction with incubators and science parks, these activities can increase the number of highly qualified researchers in the region, building its brand as a region that is fostering a knowledge intensive economy. The University of Catalonia initiative particularly stresses the role of research and development as a stimulus to high value added production in the region but also a strategic vehicle to attract and retain a very highly skilled workforce.

There are a plethora of science and technology based initiatives in the region, most of which are connected to universities. Recent assessment of these initiatives indicates that there are 25 science and technology parks either existing or planned in Catalonia; 17 of these are university linked. The Catalan government is evaluating and potentially rationalising these centres (see Chapter 3 for more details).

The share of the Catalan workforce in research is an indicator of the significance of R&D investment in the region and its labour force impact. All R&D personnel (in full-time equivalents) is only 1.2% of the labour market, and that of the researchers specifically is 0.7% (Government of Catalonia, 2008a). These rates are higher than the EU27 averages (1.0% and 5.8% respectively but only a fraction of the Catalan workforce (OECD, 2010b). The proliferation of R&D centres can be partly related to the higher than EU average proportion of advanced doctoral degrees in the sciences and engineering in the Catalan universities. However, the main cause has been an explicit research policy in Catalonia to develop an alternative system to the Spanish CSIC Centres and bypass universities.

A question that could be raised is whether the types of investments being made in R&D are effective in producing results in terms of job creation (beyond the research community) and economic development. While publicly funded R&D and university-funded initiatives to attract researchers are important, efforts by and within firms are more likely to produce productivity gains and new product innovation, and to foster the development of new industries. Thus, universities also need to pay attention to those activities through which they interact with local industries and firms to increase their managerial capacities, technical skills and general knowledge regarding market opportunities. This interaction is particularly important for small and medium-sized enterprises (SMEs) which frequently lack the managerial skills that could help them specialise and increase productivity. That an SME orientation might provide a fruitful arena for university activity is demonstrated by data that show that local production systems made up of SMEs accounted 30% of Spanish patents. In terms of patents per employee, industrial districts had a rate 47% above the national average and 31% more than that of the licenses and patents of large manufacturing firms (Boix and Galletto, 2008).

There does not appear to be a systematic effort to connect the activities of these R&D centres to regional efforts to increase the overall skill base of the region or to connect with industries that could move up the value chain and provide more technically demanding and skilled jobs. Instead the R&D Centres appear to be primarily organised around sectors, such as biotech. that are primarily oriented toward short-term development of Intellectual Property. Few of the R&D centres have developed capacity for or interest in

knowledge development and transfer within the existing industries in the Catalan economy. The exception is those research centres with a commitment to '"translational research", although, in these cases the extension to practical results is understood in terms of improved patient care in regional hospitals.

2.4. Governance framework

Education is governed through complex and over-lapping legislative and policy agendas, at the national, regional and sub-regional level. Catalonia has a plethora of strategic plans at the regional level and by universities individually and now through ACUP but there appears to be little coherence across the plans or between the plans the rest of society/region. At the same time, issues of equity, widening participation, social inclusion/exclusion are poorly understood and articulated. Essentially the tertiary system is focused on the universities with little connectivity between universities, vocational tertiary education institutions or specialist institutions. Hence, the tertiary education frame is narrowly conceived and understood. Thus, high levels of expenditure/investment for international science parks are potentially leaving a gap between these activities and the rest of the tertiary system from which – depending on which part of the region – up to 70% of the population are excluded (*e.g.* University of Girona says it recruits approximately 30% of the local cohort).

Financing is likely to be an issue in the future. The data suggest that the unit cost of provision has risen steeply in recent years, as the number of academic staff has risen in proportion to the number of students. While this might have been sustainable in good economic times, the current difficult financial scenario raises concerns as to how the system will be able to compete globally. Reducing the number of university students, suggested by some universities, is neither socially nor politically desirable. Therefore, a new business model will need to be considered.

Catalan Association of Public Universities's (ACUP) efforts to build a strategic approach in order to globally position Catalan university education are to be commended. The University of Catalonia brand is imaginative and worth replicating in other jurisdictions as an example of good practice. Getting beyond the limitations of individual capacity to build Catalonian capability is very much in keeping with the strategy being adopted in some jurisdictions (*e.g.* Australia, Ireland, Norway) of move beyond the narrow and unrealistic focus on concentrating resources into a few universities. In other words, policy preference should be directed towards building a world-class tertiary education system.

The ACUP governance model, embracing representation from the universities' social councils, is an important development and an indication that the organisers understand that university education has an important role to play within the Catalan region. It would be important to develop the concept further so that a tertiary education council (TEC) is created. This new TEC should embrace both vocational tertiary education institutions and universities (public and private), as well as other key external stakeholders. It should also include regional representation, from the public and private sector. The challenges of unemployment and widening participation, financing and costs and internationalisation and competition require tertiary education institutions to work together in partnership with their regions in order to build human capital potential and successfully compete.

Outside of ACUP's efforts, there was some evidence of on-the-ground collaboration, but it is unclear to what extent the University of Catalonia concept and brand is actually being embraced by the individual universities. There were some examples of universities sharing facilities with each other, for example the science park between the Polytechnic University of Catalonia (UPC) and the University of Barcelona (UB) and examples of joint initiatives with the Barcelona City Council or other regional councils (*e.g.* University of Girona). There were also joint undergraduate and postgraduate programmes, particularly at postgraduate level, with Catalan universities or with national or international institutions. At the same time, however, it appeared that each university was building its own high-tech science park or research facility, and this individualist strategy was partially being endorsed by the government – possibly because of the complex overlapping jurisdictional roles.

Two examples from Ireland are worth reviewing: The Dublin Regional Higher Education Alliance (DRHEA) brings together eight tertiary educational institutions in four strands of activity: enhancement of learning, graduate education, internationalisation and widening participation. For example, the graduate education strand offers a wide range of modules to research students attending any of the partner institutions; these students can attend, as part of their structured PhD programme, any module on offer and hence broaden their educational experience, while ensuring greater efficiency amongst the institutions. The Dublin Creative Alliance is a partnership between Dublin City Council, tertiary education institutions and the Chamber of Commerce. It aims to create a strategic plan for the city region as a national gateway for Ireland. Although its formation pre-dated the current financial crisis and economic recession, the alliance has helped foster recognition for greater policy alignment across the different stakeholder groups, and a requirement for improved co-ordination of resources in response to the challenging environment (see Box 2.9.).

Building upon the work to date, the regional and national governments should embrace the collaborative approach and widen its agenda. There is a mythology that individual universities can all aspire to be highly ranked according to indicators that fail to measure what is important to society and the economy. By focusing on classical academic outputs, commonly used indicators focus too much attention on peer publications and citations and neglect social and economic impact factors, the contribution of policy papers and technical reports, input into framing international standards, the number of licenses and high-performance start-ups (HPSUs), or engagement and employability measurements. Moreover, for a region that has an international reputation in design and the arts and an important tourism sector, remarkably little attention had been given to these disciplines by any of the universities.

Box 2.9. Dublin Region Higher Education Alliance (DRHEA) and the Creative Dublin Alliance

The DRHEA is an alliance of eight tertiary education institutions in the Dublin Region which, supported by government funding, to "further strengthen the contribution which the higher education sector is making to the establishment of the Dublin city-region as an internationally recognised centre of knowledge creation and innovation." There are four strands of activity: Enhancement of Learning, Graduate Education, Internationalisation and Widening Participation. It is governed by a Board, with and independent chairperson and external stakeholder involvement. There is also a Management Committee with institutional representation. The Graduate Strand aims "reposition the Dublin region as an international centre for graduate education, and PhD education in particular, by combining the strengths of five participating institutions."

The Dublin Creative Alliance is a network of diverse urban leaders including senior management of local government, universities, business, state agencies and the not-for-profit sector in the Dublin City Region, under the chairmanship of Dublin City Council. Its objective is to help identify, discuss, recommend, distribute and implement solutions in response to the challenges that Dublin faces as an International Competitive City Region. Its aims are to: *i*) create a clear vision that unifies the strengths and future potential of the city of Dublin and the region; *ii*) continue to grow an internationally renowned higher education and research sector; *iii*) build a city region that is supportive of innovation and enterprise through education, business and civic leadership; *iv*) develop strong, accessible transportation and information and communications technology (ICT) networks and *v*) Encourage an open, merit-based, tolerant and inclusive society that promotes societal well-being.

Source: DRHEA, www.drhea.ie/; Creative Dublin Alliance, *www.dublincity.ie/PLANNING/ECONOMICDEVELOPMENT/Pages/TheCreativeDublinAlliance.aspx*

Conclusions and recommendations

In Catalonia, the universities understand many of the historic and structural challenges of the system, such as reliance on classical knowledge, limited mobility geographically or between universities and limited dialogue with the vocational tertiary education sector. However, there appears to be limited recognition of the complex set of human capital development issues, such access, participation and educational attainment, or equity and social inclusion. Most of the interviewees felt that either the equity issue had been "solved" or were unfamiliar with the issues. This was evident not only by the lack of dialogue around such issues and the lack of data but also the lack of awareness as to how the current global financial crisis was/could impact on young people and prospective students or graduates and employability. Is this lack of awareness due to the fact that university graduates tend to be less affected by unemployment? In other words, is this a reflection of the middle-class focus of the university education sector?

Many of the issues raised in this chapter have been commented upon in other reports: *OECD Review of Tertiary Education: Spain* (Santiago *et al*., 2009), *Equity in Higher Education* (Calero, 2005) and *Review of Regional Innovation: Catalonia* (OECD, 2010c) in addition to the *Self-evaluation Report 2010*. Bringing the issues together highlights the necessity of adopting an integrated approach to policy-making.

The knowledge economy is unforgiving of individuals – and their communities – who do not have the required education and skills. The OECD team recommends that the following measures are taken to address the challenges in human capital development in Catalonia.

Recommendations for the Spanish government:

- *Improve affordability of education.* The issue of affordability should be taken up in the national agenda in order not to price tertiary education attainment beyond the reach of students from low socio-economic backgrounds. The national government should develop the forms of cost sharing in tertiary 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 improve financial assistance to low income students.

Recommendations for the regional (Catalan) government and Catalan universities:

- *Improve evidence-based decision making.* The regional government in collaboration with the Catalan universities should develop a wider portfolio of robust data to support evidence-based decision-making and support targeted efforts to address human capital development needs. 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 to come together and students to move into employment. Efficient systems also use data strategically to identify regional priorities and at an institutional level, to respond to the data in terms of course provision and the provision of employer specified skills. The US National Centre for Public Policy and Higher Education produces useful indicators which might help establish some benchmarks for assessing educational attainment.

- *Create a Strategy for Human Capital Development.* The Catalan universities and key stakeholders of the economy and society should work together to develop a long-term Strategy for Regional Human Capital Development to: *i*) define region-wide goals, policies and priorities extending from primary to tertiary education and beyond and *ii*) develop strategies to reach currently under-served population groups. With a large number of young people outside of tertiary education, the strategy should focus on developing pro-active mechanisms to ensure social-inclusion and equity beginning in the early years. Widening access to tertiary education will require multi-stakeholder collaboration between tertiary education institutions, schools and government including pathways between vocational and university sector through development/implementation of a qualifications framework and recognition of prior learning. Stronger efforts are necessary to increase the enrolment and success of first generation students by improving academic, social and financial support. Universities' and other tertiary education institutions' lifelong learning activities should be strengthened and they should improve their capacity to provide up-skilling and re-skilling for the adult population who combine work and study or are unemployed. Policymakers and university leaders should look at initiatives being proposed by the Lumina Foundation, USA, for widening participation and ensuring more adults successfully complete tertiary education.

- *Improve learning and employment outcomes and relevance of education.* Significant multi-stakeholder public-private efforts should be made to boost entrepreneurship, business formation and business development. Tertiary education institutions should focus on strengthening the regional employability and entrepreneurial skills of all graduates. Creating ties between students in fields of critical importance to the region and regional employers through internships and co-op programmes should be made a priority. Work- and problem-based learning methods and programmes to build entrepreneurship skills should be developed to improve the productivity of local production systems, for example in traditional sectors such as textiles.

- *Strenghten sectoral orientation in workforce development.* The industry or sectoral orientation should be extended to human capital development in order to galvanise technical and managerial training around cluster-based manufacturing and manufacturing services. The workforce development system should be adapted to the needs of small firms and to the development of companies in place.

Notes

1 Barcelona Knowledge Campus (2009), UAB CEI: *Apuesta por el Conocimiento y la Innovación* (2009), Campus ENERGÍA UPC: *Energía para la Excelencia* (2010), Campus UPF - *Icària Internacional* (2010), *Health Universitat de Barcelona Campus* (HUBc) (2010), *Campus de Excelencia Internacional Catalunya Sud* (2010), *CAMPUS IBERUS*: *Campus de Excelencia Internacional del Valle del Ebro* (2010).

2 The *Consulats de Mar* promote Barcelona as a business destination and has a network of 14 offices in the most developed areas of the world (New York, London, Paris, Copenhagen etc.), in the emerging economies (Hong Kong, Singapore, Shanghai, New Delhi, Dubai etc.), South and Central America (Buenos Aires, Mexico) and the Mediterranean area (El Cairo).

3 . Barcelona Activa (est. in 1986), is the local development agency of the City Council of Barcelona that supports entrepreneurs, innovation, professional improvement and job creation. Barcelona Activa offers its

services to over 100 000 clients who visit the centre every year. It supports approximately 1 000 new projects every year. More than 115 companies are based in its Business Incubator and Technology Park. Over 30 000 clients have benefited from the Porta 22 job search services and 1 000 unemployed are learning a trade while working.

References

Albert, C. (2000), Higher Education Demand in Spain. The Influence of Labour Market Signals and Family Background, Higher Education, 40, pp. 147–162, Accessed 24 April 2010, from *http://0-web.ebscohost.com.ditlib.dit.ie/ehost/pdfviewer/pdfviewer?vid=3&hid=106&sid=360b9286-da03-43bf-8f56-3a07a800b7d9%40sessionmgr114.*

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, pp. 219-238.

Calero, J. (2005), Equity in Education Thematic Review. Spain.

CIC (Consell Interuniversitari de Catalunya) (Interuniversity Council of Catalonia) (2009), Oficina de Preinscripció. Informe de la preinscripció universitària a Catalunya 2008, CIC, Barcelona.

Creative Dublin Alliance (2010), *www.dublincity.ie/PLANNING/ECONOMICDEVELOPMENT/Pages/TheCreativeDublinAlliance.aspx.*

CRUE (Conferencia de Rectores de las Universidades Españolas) (Conference of Spanish University Rectors) (2006), "La Universidad española en cifras, 2006", (Spanish Universities in Figures), *www.crue.org/export/sites/Crue/Publicaciones/Documentos/UEC/UEC2006.pdf.*

CRSC (Catalonia's Regional Steering Committee) (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE*, www.oecd.org/dataoecd/49/19/44899776.pdf.*

DRHEA (Dublin Region Higher Education Alliance) (2010), *www.drhea.ie/.*

ESADE, website www.url.edu.

Eurostat (2010), "Euro area unemployment rate up to 10.0%", News release Euro indicators. 8 January 2010. *http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/3-08012010-AP/EN/3-08012010-AP-EN.PDF*.

ICREA (Institución Catalana de Investigación y Estudios Avanzados) (Catalan Institution for Research and Advanced Studies) *www.icrea.cat/web/home.aspx.*

idescat (2008), "Foreign residents. By country of nationality. Provinces", Accessed 18 May 2010, from www.idescat.cat/pub/?id=aec&n=272&lang=en.

idescat (2009a), "Unemployment Est. Unemployed population and unemployment rate. By age and sex", Accessed 19 May 2010, from *www.idescat.cat/economia/inec?tc=3&id=5704&dt=200900&x=8&y=7*

idescat (2009b), "Unemployment rate. By age groups and sex", Accessed 18 April 2010, from *www.idescat.cat/pub/?id=aec&n=320&lang=en.*

idescat (2009c), "Registered unemployment. By academic level. Counties, areas and provinces", Accessed 18 April 2010, from www.idescat.cat/pub/?id=aec&n=330&lang=en.

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

Lumina Foundation website, *www.luminafoundation.org/our_work/student_success/student_success.html.*

Monash University (2006), Gippsland Education Precinct website, www.gep.vic.edu.au, accessed 16 April 2010.

Mora, J. G. (1997) "Equity in Spanish Higher Education", Higher Education, 33:3, pp 233-249. Accessed 23 April 2010, from *http://0-web.ebscohost.com.ditlib.dit.ie/ehost/pdfviewer/pdfviewer?vid=3&hid=106&sid=ebf0dc60-5de3-407b-9b53-aa93fbeb68f2%40sessionmgr104.*

Muprhy A. (2010), RPL Matters in the DIT. Policy and Practice Guide for DIT Staff, Dublin Institute of Technology.

National Qualifications Agency of Ireland (2006) Principles and Operational Guidelines for the Recognition of Prior Learning (RPL) in Further and Higher Education and Training, Ireland. Accessed 24 April 2010, from www.nfq.ie/nfq/en/documents/NFQ-principles06brown.pdf.

OECD (2007), *Higher Education and Regions. Globally Competitive, Locally Engaged*. OECD Publishing.

OECD (2008a), Technical Note for *Education at a Glance 2008*. OECD Publishing.

OECD (2008b), *Thematic Review on Recognition of Non-formal and Informal Learning*, OECD Publishing.

OECD (2009a), *Education at a Glance,* OECD Publishing.

OECD (2009b), *Designing Local Skills Strategy*, OECD Publishing.

OECD (2010a), *PISA 2009 Results: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science* (Volume I), OECD Publishing.

OECD (2010b), *Higher Education in Regional and City Development: State of Victoria, Australia*, OECD Publishing.

OECD (2010c),. *OECD Reviews of Regional Innovation: Catalonia*, OECD Publishing.

OECD (2010d), Entrepreneurship, SMEs and Local Development in Andalusia, Spain, OECD Publishing.

Osborne, M. (2003) "Increasing or Widening Participation in Higher Education? — a European overview", European Journal of Education, Vol. 38, No. 1, p13; Accessed 21 April 2010, from www.ugr.es/~temcu/Recursos/bibliografia/Documents/participation%20in%20higher%20educ.pdf

Regional Government of Catalonia (2008), The Strategic Agreement to Promote Internationalisation of the Catalan Economy 2008-2011, Barcelona.

Santiago, P. et al., (2009), *OECD Review of Tertiary Education: Spain,* OECD Publishing.

SIC (Statistical Institute of Catalonia) (2008) Immigration, Here and Now. Catalonia 2008. Statistical data. Generalitat of Catalonia, p19. Accessed 18 April 2010, from *www.idescat.cat/cat/idescat/publicacions/cataleg/pdfdocs/immigracio08en.pdf*

US National Centre for Public Policy and Higher Education, Measuring Up, Accessed 21 May 2010, http://measuringup2008.highereducation.org/

Chapter 3.

The regional innovation system in Catalonia[1]

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

Catalonia's complex innovation system has developed thanks to, and partially in spite of, universities. The region's universities play an important role in educating the labour force and in producing knowledge. And most of the public researchers in the region are found in universities. However, governance and regulatory issues concerning universities have resulted in the creation of many institutions that bypass them, such as a distinct network of research centres, albeit often affiliated in some way to a university. Universities have themselves taken the initiative to create many separate institutions – foundations, research centres, science parks with incubators – to overcome institutional rigidities and to contribute to the regional innovation system.

Universities are increasingly encouraged to fulfill their third mission engagement in the region's innovation system. However, the dominant innovation model has a science and technology focus which limits the mobilisation of tertiary education institutions for social and cultural innovations. There is also a need to balance the current strong focus on commercialisation with long-term university-industry collaboration and to measure success in terms of the sustainability and transformation of regional industry and employment growth.

Introduction

Catalonia has a long tradition of active regional government policies to promote its innovation system, even before Spain's integration in the European Union. The approach has been influenced by many factors, including: *i)* devolution from the Spanish State to the regions, *ii*) EU policies, *iii*) political and governance trends within Catalonia itself and *iv*) an increasing recognition of the impacts on research and innovation for economic competitiveness and citizen well-being.

Catalonia's science, technology and innovation policy approach has been focused more on knowledge generation than exploitation, but the latter is gaining increasing prominence. Over time, the region has had successive research plans that focused on the "academic" route by providing funding for universities and research centres (Sanz-Menéndez and Cruz-Castro, 2005). The first plans focused on research only (1993-96, 1997-2000). From 2001-04, both research and innovation plans were developed. The 2005–08 Plan was the first to combine science, technology and innovation support in one plan and incorporate both supply and demand side policies. The same applies to the new 2010-13 plan.

In the context of worsening economic conditions, this chapter examines the following three dimensions to assess the effectiveness and coherence of innovation and R&D policies and practices in Catalonia 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?

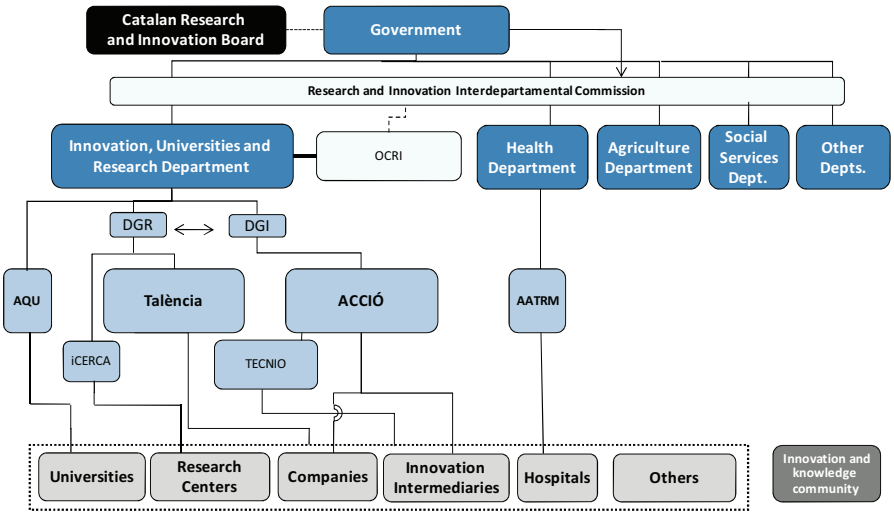
3.1. Catalan science, technology and innovation policy: evolution and governance

Catalan level

The governance of the regional innovation system in Catalonia has been diagnosed as highly complex (Government of Catalonia, 2008a; OECD, 2010). This complexity is due in part to the proliferation of research entities, networks, science parks etc. over the last several years. To better manage

this complexity, the regional government has taken a number of measures recently. ACCIÓ, the lead agency responsible for innovation support, is the result of a merger of the former Regional Agency for Innovation and Business Development (CIDEM) (innovation support) and COPCA (internationalisation support). Talència is the product of a merger of the former AGAUR (Agency for Management of University and Research Grants), ICREA (for recruiting high quality researchers) and FCRI (foundation to promote S&T, innovation and advisory services as well as scientific talent). New structures have also been created to manage the proliferation of actors, such as CERCA for the Catalan Research Centres and the Catalan Technology Centres Network (TECNIO) (serving in a first phase as a consortium) for the different technology transfer entities. Another governance change is the creation of a Catalan Council for Research and Innovation (CCRI) to provide high-level policy guidance and the reattribution of the other roles of the former CIRIT (Inter-ministerial Council for Research and Technological Innovation) to this Council, the Inter-ministerial Research and Innovation Commission (CIRI) and a technical secretariat named the Research and Innovation Co-ordination Office (OCRI).

Figure 3.1. Catalonia innovation system actors



AQU: University Quality Agency
AATRM: Technology Evaluation and Medical Research Agency
iCERCA: Catalonia Research Centres Agency
Innovation Intermediaries: Technology and/or Scientific Parks
Talència: Catalan Research Agency
ACCIÓ: Innovation and Internationalization Agency
TECNIO: Catalan Technological Network
OCRI: Research and Innovation Coordination Office

Source: Government of Catalonia, Research and Innovation Coordination Office (OCRI).

Universities have been integral to Catalonia's research (now research and innovation) strategies but have been less of a focus for regional research grants. However, university researcher salaries are paid by the regional government given the devolution of university funding. In fact, these amount to a considerable share of the total funding spent by the region on research and innovation (approximately 36% of total R&D and innovation expenditure by the Catalan Government in 2006).[2]

Catalonia has focused its research grants on building capacity in a separate network of Catalan Research Centres (CRCs). As of 2009, there were 37 centres with six in the process of creation. These CRCs are separate entities from other research centres located in the region. These centres are subject to an individual performance contract with the Catalan government. Other centres include the Spanish government CSIC (*Consejo Superior de Investigaciones Científicas*) research centres, of which there are 24 located in Catalonia, including four service centres. There are also major scientific installations, hospital research centres and university centres. Many of these different research centres or scientific installations have mixed affiliations; universities are frequently associated with the non-university centres. However, the relationships between universities and outside centres have sometimes faced difficulties.

Catalonia's research funding strategy has been a success but has some clear disadvantages. The notable success has been to focus resources in a way that attracts additional research funds to the region from Spanish and EU sources. One disadvantage is that the thematic research prioritises are set by outsiders, leaving less flexibility for the region to orient research towards regional needs. Furthermore, inter-disciplinary research is increasingly part of the innovation process. Universities are generally better positioned to support inter-disciplinary research than autonomous research centres in specific fields.

Universities are increasingly becoming integrated as stakeholders in the policy development process for the Catalan economy and research system, albeit there is still much room for improvement. The region has engaged in a number of "agreements" to bring actors together in support of a strategic vision, for the economy overall as well as special themes such as education and immigration. The first of these agreements is the *Strategic agreement for the internationalisation, employment quality and competitiveness of the Catalan economy*. In the first iteration, 2005-08, universities were not actively consulted as part of the process, with signatories being the regional government, employer organisations and trade unions. The second iteration of the plan for 2008-11 recognised that universities are important actors to achieve the region's economic transformation goals and assigned them

regional performance targets. However, universities were only marginally consulted in the development of these goals and performance indicators.

In contrast, the process to develop the Catalan Agreement on Research Innovation (CARI) actively involved universities in its development, despite some challenges. Universities were signatories to the agreement, along with the three political parties in parliament, trade unions and employer associations. The CARI sets the vision through 2020 of what the region should do through a series of 131 commitments. Many of these commitments explicitly engage universities to work towards the objectives set for addressing each of the eight challenges (see Box 3.A1.1. in Annex, p 141). This agreement sets a precedent for more active dialogue and clarity with regard to the university role in knowledge production, and increasingly, technology transfer. The process helped to build consensus on a vision. However, it did not prioritise commitments nor the complementarities across different commitments.

The Catalan Research and Innovation Plan 2010-13 is the instrument to implement the CARI priorities. The plan is structured around 10 objectives, 19 policies, 29 action lines and approximately 200 actions (see Table 3.A1.1 in Annex). It indicates an increasing need for all public research actors to be held accountable to higher standards as well as to orient part of their research towards regional needs. The plan also promotes a broader view of innovation - including the role of social sciences and the public sector. It also advocates a greater territorial approach, including seven sub-regions within Catalonia.

With respect to universities, there is a stated goal in the Catalan Research and Innovation Plan of ensuring that universities are locally engaged but globally competitive and serve their "third mission". In the past, Catalonia's focus has been predominantly on the global competitiveness of universities in terms of research. While, the current plan also focuses on global competitiveness, it makes a stronger case than in the past for a broader third mission role within the region. The tools to achieve this include changes in financing (of research projects and research groups), the evaluation and accreditation of researchers and the promotion of entities to support knowledge transfer from universities (see Box 3.1.).

Box 3.1. Catalan Research and Innovation Plan 2010-13: select actions affecting universities

Increased resources for attracting or developing talent in universities

- Objective 1, Action 28: increases the number of ICREA researchers that universities compete for. The number will grow to 270 by 2013, with 40-60% of new contracts focused on priority areas.

- Objective 1, Action 31: doubles by 2013 the number of postdoctoral students supported by the Catalan Government.

- Objective 1, Action 32: develops an initiative to better incorporate technicians for research in Catalan universities.

Increased accountability for quality and orientation of research

- Objective 2, Action 3: uses the current evaluation system to promote the strengthening of the competitive excellence for university research according to the priorities of the current Plan, using existing as well as new financing sources.

- Objective 2, Action 11: makes an objective for 2013 that contracts with public universities include a system of accreditation and quality management standards based on international best practices.

- Objective 2, Action 31: develops a policy for accreditation and recognition of research groups, hospital innovation centres and XIT network innovation centres under standards of excellence similar to those required of other major research structures funded mainly by the Catalan government through instruments such as long-term contracts.

- Objective 8, includes a goal to ensure, via incentives in programme contracts, that at least 40& of research objectives and technology transfer activity has an impact on the focus areas.

Box 3.1. Catalan Research and Innovation Plan 2010-13: select actions affecting universities (continued)

Reinforce the third mission and technology transfer through financing and evaluation

- Objective 1, Action 23: modifies the current criteria for evaluating scientific disciplines. The new criteria includes technology transfer in a broad sense (patents, R&D&I projects with firms or for social goals, promotion of science), with emphasis on mobility between the public and private sector. There would also be a change in management of research and innovation through different levels of accreditation.
- Objective 2, Action 1: seeks to implement a new financing model for universities starting in 2011 that would incorporate in the calculation of base funding a significant growth in the role of research and its transfer, especially the indirect costs generated by intensive scientific activity.
- Objective 2, Action 13: builds an incentive system such that research management is a factor considered in the evaluation system of academic staff and thus an element of professional development.
- Objective 3, Action 7: promotes Centres of Support for Technological Innovation, formed by university research groups with experience in technology transfer, with the aim of facilitating the direct transfer of knowledge from Catalan universities to firms.
- Objective 9, Action 10: incorporates the third mission of universities (especially those that have this as a core mission) in the new model of university funding with contracts by objectives beginning 2011, as well as promoting their strategic role in shaping the knowledge regions of Catalonia.
- Objective 2, Action 17: promotes knowledge transfer with a broad perspective that includes the potential of the humanities and social sciences and various forms of dissemination of knowledge, by incorporating it as a relevant element of the evaluation criteria of university professors.

Source: Based on the Research and Innovation Plan of Catalonia 2010-2013.

Universities themselves have also been promoting the third mission as a common goal. The Association of Catalan Public Universities (ACUP) produced a White Paper that includes 64 strategies and 73 projects under 10 different themes. This new model proposes that the university be "research-intensive and stand at the heart of the scientific, technological and cultural system." Ways of achieving this goal, beyond stronger university governance, include improved research management skills, science and technology parks, and promoting a culture among staff and students in support of this objective. Other aspects of the White Paper include stronger universities and regional engagement more generally (see also Chapter 5).

Spanish and EU influence

Catalan policy for research and innovation has developed with a goal to maximise resources from Spanish and EU levels through the competiveness of its research assets. While the strategy has focused to a large extent on research centres outside of universities, the region's approach has also benefited some universities that have been able to build capacity to apply for such funds. EU research funding sources continue to increase. Spanish funding sources, which have shown considerable growth rates over the last several years, are under pressure due to the economic crisis which has resulted in recent funding cuts.

At the Spanish level, two key plans direct the R&D and innovation strategy. INGENIO 2010 is an initiative in the National Reform Plan. Among the programmes, CENIT most directly involves universities by promoting partnerships for R&D projects between firms and universities or research centres. The National Plan for Scientific Research, Development and Technological Innovation also includes objectives to promote public-private collaboration that involve universities. To address the problem of researcher mobility between the public and private sectors, the Torres Quevedo programme offers financing for the hiring of R&D personnel by firms. Another measure to promote mobility, albeit separate from these two plans, is a recent national reform of the University Law. It allows university professors a leave of up to five years to create research-related spin-off firms.

The EU Research Framework Programmes (FP) are the guiding plans for EU research policy funding. Catalonia has been able to capture a growing share of Spain's total FP receipt over time, from 14.7% in the Third FP to 23% in the Sixth FP. This growth rate is higher than EU increases overall, so the region is capturing an increasing share of these funds relative to Europe as well. Within the Seventh FP is the new European Research Council (ERC), and Catalonia's researchers have successfully accessed its

funding streams (ERC Starting Independent Researcher Grants and ERC Advanced Investigator Grants). While the funding amounts are not at the same scale as the other EU programmes, they are strategic for Catalonia's goal of building its high quality science research base. The benefits of Catalonia's researcher attraction policies, as supported by the ICREA Foundation, are evidenced in the region's recent success in these programmes. ICREA researchers accounted for 4 out of 18 Starting Independent Research Grants in Spain and 4 out of 12 ERC Advanced grant projects. Furthermore, the European Institute of Innovation and Technology selected Polytechnic University of Catalonia (UPC) and University Ramon Llull (URL) (ESADE business school) to be a hub within the Knowledge and Innovation Community InnoEnergy.

3.2. Innovation system performance

The region's innovation system should be analysed in the context of broader economic trends. While Catalonia, like Spain, has had strong GDP growth over the last decade, much of it has been driven by population increases due to immigration. While there has been some inward migration of high-skilled labour, Catalonia has a higher than average share of immigrants with little or no education relative to Spain overall. Productivity (GDP per worker) for Catalonia, like Spain overall, has been slipping relative to the rest of the OECD (from 115% of the OECD average in 1995 to only 91% by 2005).

Catalonia remains a region in the OECD with a higher than average share of manufacturing employment. At 20% of GVA and 20.8% of employment in 2006, this is higher than Spanish and EU-15 average shares. Manufacturing and market-related production services combined account for more than half of the region's employment and Gross Value Added (GVA). The technology level of that manufacturing is higher than Spanish averages but about average for OECD regions, with almost two-thirds of that employment in medium-low or low-technology industries. Catalan industry is characterised by a high degree of diversity. Among manufacturing sectors, metal products and food are the most important activities in terms of employment, accounting for 26%. Chemicals, vehicles and machine/equipment manufacturing also contribute an important share to the total industrial employment and gross value added. The other 79.2% of employment is in the tertiary sector (66.8%), construction (10.2%) and agriculture (2.2%). Small and medium-sized enterprises (SMEs) represent 93.2% of GVA in the primary sector, 91.8% in construction, 66.2% in services and 56.2% in industry (PIMEC, 2008). There are a number of local

production systems throughout Catalonia (see Figures 3.A1.1. and 3.A1.2. in Annex).

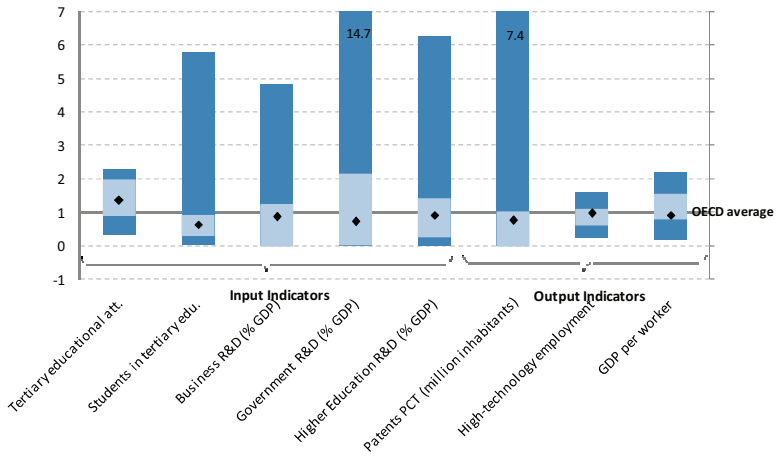
With respect to traditional innovation indicators, Catalonia is a leading region within Spain but performs below average for OECD regions generally. This is due in large part to the lower R&D intensity and patenting activity common in Spain (see Figure 3.2.). One area where the region clearly stands out relative to OECD averages is the share of the labour force with tertiary education. While the static picture shows average performance, there have been great efforts in Spain and Catalonia to increase research and innovation spending. For example, R&D spending in the region has increased in absolute values over four-fold from 1996-2008, reaching an overall R&D intensity of 1.61%.

While Catalonia is not always the top-performing region in Spain on several innovation-related indicators, given its size it accounts for a large share of Spain's innovation activity and resources. Catalonia is responsible for 21% of Spanish research and development (R&D) investment and 33.7% of its patents. Catalonia contains 22.5% of Spain's innovative firms, a far greater share than other regions, the next highest shares being Madrid (15.6%) and Andalusia (15%). Given its scale and performance, Catalonia is often the largest or second largest recipient region of R&D and innovation-related programme funds from the Spanish government and the European Union (EU) Framework Programme.

While Catalonia's knowledge generation sub-system has consistently improved, its knowledge diffusion sub-system continues to be the weaker link. There are several reasons for this. Within the policy mix of research and innovation support, research has traditionally been given the priority. The low absorption capacity of firms, notably SMEs, limits their ability to adapt and absorb knowledge from universities, other tertiary education institutions and other research institutions. A number of technology transfer institutions and mechanisms have been created in recent years, but often strongly driven by public sector entities and the proliferation has led to confusion and varying degrees of quality. The private sector appears to take a less active role than it should in supporting technology transfer.

Figure 3.2. Catalonia's innovation performance summary

2005



Notes: The outer band in dark grey represents the range of values for OECD regions. The inner band in light grey represents the range for regions in Spain. The diamond represents the value for Catalonia. The values of each variable were normalised to the OECD regional average for available regions. Information on all OECD regions is not available for each indicator.

Source: OECD (2010), *OECD Reviews of Regional Innovation: Catalonia, Spain* using calculations based on data from the OECD Regional Database.

Among the region's main strengths are its strong research infrastructure and regional attractiveness, Catalonia being one of the top regions in Spain. The main weaknesses concern regulatory issues and rigidities with respect to universities and long-term researcher mobility, the fragmentation of public action (within Catalonia and in co-ordination with programmes from other levels of government), and the lack of innovation culture, as manifested in the lower patenting rates and R&D intensity relative to other leading OECD regions. While there are threats to the system, including increased competition from emerging economies and a lack of productivity growth in the region, there are also opportunities. Catalonia may capitalise on its attractiveness and broad-based innovation approach to address emerging market opportunities raised by social challenges in the region and the world. The public sector itself can be an important driver of innovation, particularly for social challenges, through services for health, education and the aging population. The region could also better engage its SMEs in innovation strategies and global value chains.

3.3. The contribution of universities to knowledge generation

The share of R&D spending conducted by universities is one indicator of the weight of universities in the region's knowledge generation. Universities accounted for 22% of R&D investment in 2008, approximately 0.36% of GDP.[3] Given that private universities in Catalonia are relatively small in scale, this research is performed over 90% in public universities (CRSC, 2010). The growth of R&D in absolute value terms in universities of Catalonia is far lower than that at national level (see Table 3.1.). For example, between 2005 and 2008, Catalonia's total R&D expenditure increased about the same rate as Spain (30% versus 31% respectively in current prices). However, in Spain the amount performed by universities increased by 85%, versus only 20% in Catalonia. In contrast, the increase in spending through public research centres was much higher in Catalonia (53%) than in Spain overall (35%). Incentives to build up research and knowledge generation skills in universities should therefore be strengthened.

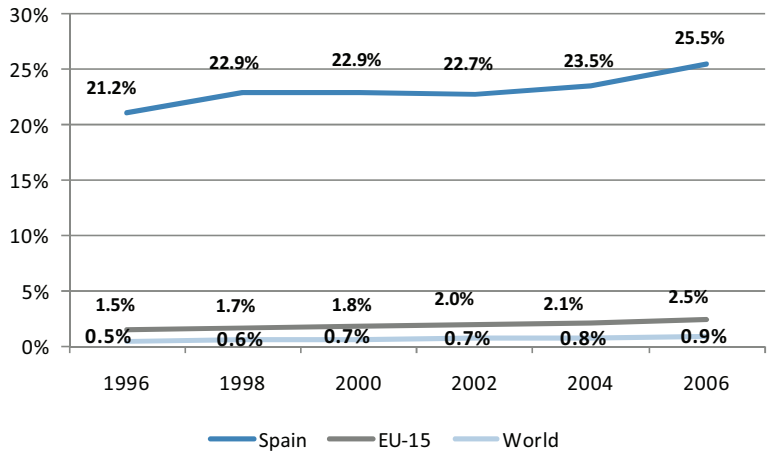
Table 3.1. R&D expenditure by sector of performance

	Spain				Catalonia			
	2005 (millions EUR)	2008 (millions EUR)	Change (%)	Share 2008 (%)	2005 (millions EUR)	2008 (millions EUR)	Change (%)	Share 2008 (%)
Total	10 197	14 701	31	100.0	2 302	3 286	30	100.0
Government (public research centres)	1 738	2 672	35	18.2	263	555	53	16.8
Higher education institutions	579	3 932	85	26.7	579	724	20	22.1
Enterprises and non-profit institutions	5 499	8 097	32	55.1	1 461	2 007	27	61.1

Source: Calculations based on data from INE, the Spanish Statistics Institute, *www.ine.es/.*

Note: EUR in current prices.

Figure 3.3. Catalonia's scientific production



Source: Rovira, L., R.I. Méndez-Vásquez, E. Suñén-Pinyol and J. Camí (2007), "Caracterització bibliomètrica de la producció científica a Catalunya, 1996-2006", Informe AGAUR-PRBB, Barcelona.

Scientific production has experienced a clearly positive trend, thanks mainly to Catalonia's universities. During the period 1996 to 2006, the region's share of Spanish production grew from 21.2% to 25.5%, and of world production from 0.5% to 0.9% (1% today) (see Figure 3.3.). Most of those publications are coming from the province of Barcelona (87%), reflecting the concentration of university faculty of the region in that location (Rovira *et al.,* 2007). Catalonia therefore accounts for 25% of Spanish total production. Universities are responsible for 60% of the region's scientific production. The region has areas of particular excellence in general, like in biomedical and clinical research (50% of scientific publications) (Garcia-Quevedo *et al*, 2010). However, international rankings such as the Shanghai rankings, based mainly on criteria associated with knowledge generation like publications and research, do not rank the Catalonian universities amongst world class universities. There is only one university in the top 200, the University of Barcelona (UB) and two others in the top 500, the Autonomous University of Barcelona (UAB) and the University Pompeu Fabra (UPF).

Talent attraction policies for high level researchers, managed by ICREA (recently brought under the Talència umbrella) have proven effective. The programme brings to the 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). In 2010, there were about 250 ICREA researchers, who collectively attracted more than their costs in research funds from outside the region. ICREA researchers 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 (see also Box 2.5. in Chapter 2).

The quality of individual university researchers and research groups are evaluated by the Catalan government. AQU (the Quality Assurance Agency for Catalan Universities) performs assessment, accreditation and certification for universities with respect to teaching, research and programmes. The agency began its operations in 1996 focussing on quality assurance, but its role expanded in 2003 to include certification and accreditation. Talència (the portfolio formerly with Agency for Management of University and Research Grants (AGAUR) evaluates research groups, in universities and in other research institutions (research centres, scientific installations and hospitals). They classify such research groups into three types based on evaluations: *i)* emerging, *ii)* consolidated and *iii)* singular. In 2009 there were 1 078 in the consolidated category, and 360 in the emerging category (out of 1 518 applicants).

While universities account for a large share of Catalonia's over 26 000 researchers, R&D expenditure per researcher is very low. Universities account for 22.0% of R&D performance in 2008, they account for 32.1% of R&D personnel and 42.3% of research personnel. Whilst, some of these researchers may be engaged in low R&D intensive sectors, it implies a much lower average spending per researcher among universities relative to other actors within Catalonia, and internationally. It also reveals a somewhat skewed ratio with low levels of other R&D personnel (technicians) relative to researchers, contributing to the low overall ratio in the Catalan innovation system.

Table 3.2. R&D expenditure and personnel by type of institution 2008

	Catalonia			Spain		
	R&D Expenditures	R&D Personnel	Researchers	R&D Expenditures	R&D Personnel	Researchers
Government	16.9	14.6	16.4	18.2	19.1	17.2
Higher education	22.0	32.1	42.3	26.7.	36.6	47.1
Enterprises and non-profit institutions	61.1	53.3	41.3	55.1	44.4	35.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Calculations based on data from, website *http://www.ine.es/*

Several major scientific installations in the region are also associated with universities. Polytechnic University of Catalonia (UPC) participates in the Barcelona Supercomputing Centre and Autonomous University of Barcelona (UAB) with the Synchrotron Light Laboratory (CELLS). The Centre of Supercomputing of Catalonia (CESCA) has affiliations with all public universities and one private university. UPC is also affiliated with the Maritime Research and Experimentation Channel. Several other installations under construction in biological fields and engineering are associated with the region's universities. This strong presence of scientific infrastructure is also helping to attract researchers to the region and as a result its universities.

3.4. Universities: knowledge transfer and exchange

There are several institutional vehicles through which Catalan universities are engaged in technology transfer, via public programmes and other institutional mechanisms. These include technology transfer offices, Catalan networks, public-private R&D partnership programmes and science and technology parks. One of the main challenges for promoting universities' regionally relevant research and technology transfer activities is the lack of incentives for individual researchers (let alone institutions). As previously mentioned, initial attempts to address this incentive problem are found in the new Catalonia Research and Innovation Plan 2010-13.

OTRIs. Universities in Catalonia are promoting technology transfer through specialised units. The technology transfer offices are known as OTRI for the Spanish acronym (*Oficina de Transferencia de Resultados de Investigación*), and there is one in each public university and one private university, where the vast majority of university researchers are located. A prior evaluation of these technology transfer offices noted their mainly administrative (as opposed to strategic) functions, the lack of critical mass for more sophisticated tasks, and low technology level of contracts (CICYT, 2007; OECD and FECYT, 2007). A prior network entitled Knowledge Transfer Consortia was created in 2005, but given insufficient firm involvement was stopped in 2009. The Catalan government has, however, committed to identifying a new instrument to support knowledge transfer for knowledge generators (universities and research centres).

Catalan networks. The regional government (mainly through the ACC1Ó agency) has created several networks to promote technology transfer and dissemination. In general, the infrastructure of technology centres and technology transfer centres is public-sector driven, with insufficient private sector involvement. Several different networks have been created over time, although centres are more independent entities

acting under a common label than functioning as a network. Two of the networks most relevant for universities are: *i*) the Springboard Network (XTT) created in 2000 to promote spinoffs and *ii*) the Technological Innovation Network (XIT) created in 1999 for technological innovation support. XTT centres seek to support spinoff creation in universities through a range of services (legal, commercial, marketing etc.) The XIT centres have an external accreditation for high quality research but have financing incentives to support technology transfer. The majority of the 77 centres are found in universities (see Table 3.3.). In 2010, these different technology centre networks are being merged under one umbrella network TECNIO.

Table 3.3. Results of the XIT Network 2006-2008

	2005	2006	2007	2008
Centres	73	73	80	77
New centres	9	6	7	7
Excluded centres	3	6	0	10
Total invoicing (EUR millions)	**58.15**	**58.38**	**59**	**65.48**
R&D contracts with firms (EUR millions/ %)	43.32 (74%)	35.63 (61%)	33.48 (62%)	42.03 (64%)
Public R&D funds (EUR millions/ %)	11.74 (20%)	19.77 (34%)	17.48 (32%)	20.14 (31%)
Training (EUR millions/ %)	3.10 (5%)	2.88 (5%)	3.38 (6%)	3.3 (5%)
Number of R&D project contracts	578	508	551	680
Number of patent applications	52	35	37	31
Spin-offs created	6	7	9	3
Personnel	1 720	1 788	1 786	1 605

Source: ACC1Ó (Agencia Catalana para la Competitividad) (Catalan Agency for the Competitiveness), website, *www.acc10.cat/ACC1O/cat/*

Public-private R&D partnership programmes: Beyond the different formal networks, there are policies promoted by the Catalan government, mainly through the agency ACC1Ó. The agency has increasingly oriented its R&D funding away from individual firms towards public-private partnerships that include research centres and universities with firms. One example is the High-Tech Nucleus Programme, modelled in a similar way to the Spanish CENIT programme. It offers funds for large-scale joint research projects between firms with universities and/or separate research centres. The goal of this programme is co-operation that enhances the production of new processes, products or technological improvements that would be difficult to achieve individually or by the private sector alone. Projects receive partial financing from the programme and have total budgets in excess of EUR 600 000 (30 in 2008).

Science and technology parks. Catalonia now has 25 science and technology parks, many of which are under the banner of the Catalan Network of Science and Technology Parks. The region is very unusual for strong European regions in that most parks have been created in the last decade. Spanish government financing has contributed to the recent and significant proliferation, with possible concerns about the true demand for so many simultaneously. The oldest science park, created by the University of Barcelona (UB), only dates back to 1997. Of these parks, 17 are classified as being led by universities (see Table 3.4. and Figure 3.4.). Many of the science and technology parks have incubators for university spin-off firms and other high-technology start-up firms.

Table 3.4. Science and technology parks in Catalonia

	University-linked	City/region-linked
UB	Parc Cientific de Barcelona	Parc Tecnològic des Vallès, S.A.
UAB	Parc de Recerca UAB	TecnoCampusMataró (TCM)
	Parc Salut Sabadell	Parc Tecnològic de la Catalunya Central (Manresa)
UPC	Parc Tecnològic de Barcelona	Biopol (Bio cluster)
	Parc Cientific iTecnològic de Vilanova I la Geltrú	22@Barcelona
	Parc Cientific iTecnològic de Terrassa	B_TEC Barcelona Innovació Tecnològica
	Parc Mediterrani de la Tecnologia	Ciutat Aeroespacial I de la Mobilitat (Viladecans)
UPF	Parc de Recerca Biomèdica de Barcelona	
	Parc Barcelona Media	
	Parc Ciències socials (in progress)	
UdG	Parc Cientific iTecnològic de Girona	
	Parc Cientific iTecnològic Agroalimentari de Lleida	
URV	Parc Cientific iTecnològic de Tarragona	
	Parc del Turisme I Oci de la Costa Daurada	
	Parc Cientific iTecnològic de la Indústria Enològica	
	TecnoParc- Parc Tecnològic del Camp (Reus)	
URL	Parc d'Innovació La Salle	

Source: Regional Government of Catalonia (2008), *Catalan Agreement on Research and Innovation – Framework Document*, Barcelona.

Incentives to universities and faculty

There are currently few incentives for universities to engage in regionally relevant research, although some have taken pro-active measures to engage with the region. It is reported that the use of firm contracting to universities for R&D is on the rise and higher than OECD averages. Of total contracts for R&D and consulting services, those to regional agents, both public and private, accounted for 86% of University Rovira i Virgili (URV)

contracts and 71% of University of Lleida (UdL) contracts (CRSC, 2010). As is the case in most countries, professor evaluations for salary and access to research grants do not consider research or consulting with firms as they are based mainly on publications. This is the case with both Spanish-level evaluations (from the National Commission of Evaluation of Research Activities-CNEAI) and Catalan level evaluations (from Catalan Agency for Quality (AQU) and Agency for Management of University and Research Grants (AGAUR).

However, the incentive structure is beginning to change at the Catalan level at least. The latest Catalan Research and Innovation Plan 2010-13 proposes to put in place several actions to change the incentives for professors, research groups and universities (see previous Box 3.1.). These incentives concern evaluations of professor performance as well as considerations for research grants and programme contracts with research groups and universities that would require an orientation of a certain share of resources towards regional priorities. Furthermore, Objective 8 of the plan has a focus on territorial engagement of research as an axis of the plan which could help reinforce this regional engagement.

Patents and spinoffs

Universities and their researchers have incentives for patenting, and there has been a generally positive trend in patenting activity. While the growth is not linear, the average number of national patent applicants by universities in Catalonia from 2000-04 was around 45 per year, but in the period 2005-08 that average was notably higher at around 66. Polytechnic University of Catalonia (UPC) accounts for the largest share of university patents in any given year. In 2008, for example, of the 83 patents, 32 were from Polytechnic University of Catalonia (UPC), 19 from University of Barcelona (UB), and 16 from Autonomous University of Barcelona (UAB). Other universities had fewer than 10.[4] While universities own the intellectual property, individual universities may decide the share of benefits. Researchers generally receive around 40-50%, the university 30-35%, most of the balance goes to the department of the university researcher, and a negligible amount to the associated research group. The income from licenses remains low (CRSC, 2010). These statistics underestimate university involvement in patenting because they do not take into account corporate patents have a university inventor.

Universities are increasing their number and share of Patent Cooperation Treaty (PCT) patent applications. PCT patents give a sense for the quality of the invention since application implies protecting the invention in multiple countries. The absolute numbers have grown over four-fold from 7 in 2000,

to 14 in 2004 and 29 in 2007. As a share of PCT patent applications, universities and hospitals accounted for 3.7% in 2000 and 3.6% in 2004 but a much higher 7.1% in 2007. This growth in share is due in part to a decline in the absolute number of applications by firms.[5]

There has been a focus among universities and the regional government on creating university spin-offs. While these are attractive firms for universities and the region to promote, there are challenges for growth. Many of them have a culture of research and not business. They hire other PhD researchers and do not necessarily seek to develop into large commercial enterprises. While many spinoffs are not destined to become high-growth SMEs given the risky nature of such enterprises, the prominence given to these incubators in terms of resources and regional/university strategies alludes to perhaps inflated expectations on their potential impact for the regional economy. Creation of a spinoff with university ownership can also be very cumbersome: administrative delays for creating a company with university ownership can take up to two years instead of two days without university ownership, as reported to the OECD review team in interviews.

Another way boosting knowledge-based businesses is to mobilise students to identify technologies developed by the university that can be successfully put on the market and lead to new business formation. For example 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 (see Box 3.2.)

Box 3.2. 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.

Box 3.2. The Technology Ventures programme at the University of Illinois at Chicago (continued)

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.

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

3.4. Universities' engagement strategies

The ways that different universities contribute to the regional innovation system in Catalonia include a diversity of strengths. These are based on different missions (in part a function of location), size, number of years since creation and university leadership. While some have strengths in areas

that are observable in the traditional statistics related to technology transfer (see Table 3.5.), there are many other strategies for building university engagement of benefit to the regional innovation system.

- Given their scale and history, the Autonomous University of Barcelona (UAB) and the University of Barcelona (UB) are among the top universities in the region in terms of research faculty and hence provision of R&D contracts and services. Both have important science/research parks and other associated programmes to support spinoffs, intellectual property *etc.* The Autonomous University of Barcelona (UAB), for example, chose to use the university's own resources to finance the development of its own multi-disciplinary centre in environmental research. The University of Barcelona (UB) also has strong alliances with key hospitals and research centres that strengthens university research and teaching, such as August Pi i Sunyer Biomedical Research Institute (IDIBAPS). The University of Barcelona's science park was the first in Spain.

Box 3.3. University of Barcelona's Barcelona Science Park (PCB)

The Barcelona Science Park was established in 1999 with the aim to: *i)* foster quality research with the support of a wide range of technologies, *ii)* revitalise the relation between university and business, *iii)* promote the creation of new companies and institutions and *iv*) foster the science-society dialogue and encourage careers in science. The park is home to 4 research institutes, 75 companies, an incubator for biotechnology companies, more than 70 research groups and a wide range of research support technology. It organises more than 120 activities for the promotion of scientific culture and new careers in science attracting an audience of close to 6 000 people each year. The research carried out at the Barcelona Science Park is multidisciplinary and covers a wide range of areas in the experimental, human and social sciences. PCB is home to the Institute of Biomedical Research of the PCB (IRB-PCB), the Nanobioengineering Laboratory and companies and spin-offs from the pharmaceutical and fine chemistry sectors. Occupying an area of 5 000 m2, the technological facilities available include leading-edge infrastructure and specialised services which provide support to researchers. These facilities are also available to external institutions and companies. PCB enhances Barcelona's position as one of the four bioclusters in Europe. Thanks to the Nanotechnology Platform and Nanobioengineering Laboratory at the PCB, Barcelona has also been identified by the Nano2life Network of Excellence as one of the five European clusters in nano-bioengineering.

Source: CRSC (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", *OECD Reviews of Higher Education in Regional and City Development*, *www/oecd.org/imhe/regionaldevelopment*

- The Polytechnic University of Catalonia (UPC), as a polytechnic university, has an institutional culture and programmes that are more conducive to applied research and engagement with firms. The university is the most active in patenting among Catalan universities, and one of the most active in Spain. This orientation also explains in part the large volume of R&D contracts. UPC's INNOVA programme is one of the oldest programmes within the region, having developed a strategic plan 16 years ago, before the Catalan government supported such initiatives. The programme promotes a spirit of innovation and entrepreneurship throughout the university and offers a number of programme services (valuation policies, identification of technological opportunities, assessments for intellectual property and firm creation *etc*.). The programme reports 1 700 new jobs created since 1999 (mainly upper level degree positions) and between 2006 and 2008 over 430 projects were assessed and 66 technological firms were created (see Box 3.4).

Box 3.4. UPC's INNOVA Programme

The INNOVA programme was created to enhance knowledge transfer from the Polytechnic University of Catalonia (UPC) in order to create new services and products and to promote a culture of innovation and entrepreneurship within the university community. It offers a wide range of services to develop and define evaluation policies for technology and innovation, to identify technological opportunities, to assess intellectual property rights and research in general, to support the creation and expansion of enterprises and to prove training in research management, technology transfer and the creation and expansion of enterprises. Between 2006 and 2008, over 430 projects were assessed and 66 technological enterprises were created. Since 1999, over 1 700 new jobs were created, from which 96% required high qualifications: 80% of entrepreneurs hold a university degree, 10% hold a doctoral degree and 6% are university professors.

Source: CRSC (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", *OECD Reviews of Higher Education in Regional and City Development*, IMHE, *www/oecd.org/imhe/regionaldevelopment*

- The University Pompeu Fabra (UPF), while not as large a university as some of the others, has been very proactive in attracting research talent to the region. UPF has received a disproportionately high share of ICREA researchers given its active recruitment efforts.

UPF is also strong in developing curriculum and new programmes to support labour market needs. UPF is involved in several leading facilities, such as the PRBB (Barcelona Biomedical Research Park).

- The universities in the sub-regional capitals – the University Rovira i Virgili (URV), the University of Girona (UdG), and the University of Lleida (UdL) – tend to align their study programmes and research more directly with the needs of their local areas. For example the University Rovira i Virgili (URV) has been particularly active with the chemical industry, a very important economic sector in Catalonia. (see Box 2.6). In 2005, University of Lleida (UdL) created the Agro-food Technological and Science Park to support the region's economic activity (Box 4.10). It is also an innovation centre to attract technology-based companies. And the University of Girona (UdG) has set up a scientific and technological park with several research centres in fields relevant to the local economy along with incubation facilities. The University of Girona (UdG) has adapted faculty to regional needs (such as tourism) and promoted a wider approach to research and innovation, with around half of its 117 research centres in the social sciences. There are also leadership examples whereby the university has been able to get around the regulatory barriers that provide disincentives for regional engagement, such as through annual agreements with professors at the University Rovira i Virgili.

- Among the private universities, Ramon Llull University, for example, has a world-renowned business school (ESADE). It is part of a European Knowledge Innovation Community for InnoEnergy with the Polytechnic University of Catalonia (UPC). Another interesting contribution to the innovation system is that of Creapolis, an innovation centre to promote open innovation through a multi-sector business park with services to support the entire innovation process.

- Much of the expansion in student enrolment numbers in the region are due to an active marketing department and rising student enrolment of the Open University of Catalonia. The flexibility and rapidity of change, as well as access, offers it a unique position for meeting very particular kinds of innovation system needs outside of technology and science-related disciplines. It is one of the most active universities to support lifelong learning given the distance learning approach, as a large share of current students already have full-time employment and are over 30 years of age. However, students cannot receive accredited awards for work done unless the

entire programme is completed. Only 60% of those entering continue past their third semester and only 60% of that cohort graduate (see also Chapter 2).

Table 3.5. Technology transfer activities of Catalan universities 2008

University	Faculty	Technician	R&D contracts (1000s)	Services (thousands of euro)	National Patents	PCT Extensions	Licences (EUR K)	Spin-off
UAB	2 836	26.0	14 200.0	4 745	26	9.0	100.0	5
UdL	589	9.0	2 276.2	452	2	3.0	2.5	1
UdG	838	15.0	3 531	610	3	0.0	2.0	0
UPC	1 889	29.0	39 863.0	3 473	35	12.0	133.0	9
UPF	470	11.0	6 475.0	0	4	2.0	165.9	1
URL	567	28.5	7 816.0	750	6	2.0	0.0	1
UB	3 758	22.0	15 621.0	1 816	20	11.01	118.0	0
URV	249	17	6 701.9	901	8	1.0	0.0	2
Total	11 196	157.5	96 484.1	12 747	104.0	40.0	521.4	19.0

Source: RedOTRI (Red de Oficinas de Transferencia de Resultados de Investigación de las Universidades Españolas) (Spanish Network of Universities), *Report of the Survey RedOTRI 2008 www.redotriuniversidades.net/index.php?option=com_docman&task=doc_download&gid=848&mode=view.*

Barriers to university engagement and responsiveness

While there are successes, the ease of interface between the universities and firms in the innovation system faces several barriers. Effective engagement is more complicated in Barcelona province given the large number of actors concentrated in that part of Catalonia. There is a need for institutions to facilitate the university-industry interface, such as cluster associations. The engagement was more obvious among universities in the other sub-regional capitals of Catalonia.

The social council of the university is the formal body for interfacing with the community. However, this governance body does not typically take measures to support greater university contribution to the innovation system. Members of the council are drawn in part from the local business community which offers an opportunity to support university engagement with regional firms, but this vehicle is poorly utilised in university governance.

Furthermore, firms in the region do not have the culture of working with universities or even ideas to promote within universities. Experience in other OECD regions illustrates that the effective interface between universities and firms (notably SMEs) is time consuming and requires active brokers.

There are also a number of barriers to the development of new programmes in universities for meeting human capital needs of regional firms. And there are impending labour supply needs with major losses in enrolment for engineering, physics, sciences and chemistry. While in large universities, one barrier may be the rigidity of the professors themselves, in newer and or smaller institutions this has been reported to be less of a challenge. Another problem is that a university does not get funds until three years after a programme is created, so universities are required to invest in development of new programmes, yet for resource management purposes this is difficult given the democratic as opposed to managerial approach to university governance.

Another barrier is the regulated fee structure. For study programmes that have a particularly higher cost to implement, the programme is not officially recognised by the state and therefore it may be necessary to have it managed by a foundation so that higher fees may be charged. One example of a new programme successfully developed based on a need identified by Biocat is the Management of Business Aspects of Science and Technology, managed by a university foundation.

International experience in knowledge transfer/exchange models

Universities in Catalonia have their own technology transfer offices focusing on commercialisation of research through intellectual property out-licensing and, in some cases, the formation of spin-outs. There is room for improvement in this area, with most of them unable to cover their costs and raise sufficient revenues from the commercialisation of research outputs.

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. Localised supply networks are therefore critical to the process through which innovation is transferred to enterprises and to create new innovation that transforms and upgrades existing industries. A well-functioning regional knowledge transfer model is based on ongoing relationship with 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).

Some of the more enterprising universities worldwide have addressed the weaknesses in commercialisation. For example, the University of North Carolina at Chapel Hill identified a number of factors hindering the start-up of new firms, including: *i*) excessive demands for equity in Intellectual Property (IP), often exceeding 15%, *ii*) royalties being required to exceed cash flows, *iii*) the expectation of external financing and unpredictable or unreasonable licensing terms and *iv*) concerns that the process of launching a company involved competitive, rather than collaborative, negotiations between faculty and the university. In response to these challenges, the Carolina Express License Agreement was designed to reduce barriers to firm formation, addressing the issues of universities taking substantial equity position in start-ups and unhelpful royalty structures (PACEC, 2010).

Also leading research-intensive universities are moving to a more holistic approach in knowledge exchange. For example the University of California reformed its commercialisation infrastructure in 2004 to achieve a more holistic approach to industry collaboration in recognition that in many cases there is no need for a discussion over Intellectual Property (IP). The new office has seen a reduction in cultural and negotiation biases, an increase in industry and foundation funding as well as collaboration types and number, a reduction in barriers to giving donations to the university and a formation of greater numbers of contracts and strategic alliances (see Box 3.5).

Box 3.5. The University of California, Berkeley and knowledge exchange

The University of California Berkeley reformed its commercialisation infrastructure involved with industry contracting in 2004 to adopt a holistic approach to research commercialisation. It recognised that industry could approach the university from many different directions, some of which require contracts while others do not. By merging the activities of the Office of Technology Licensing and Industry Alliances Office into the Intellectual Property and Industry Research Alliances (IPIRA) office, Berkeley was able to streamline industry transactions and increase corporate sponsored research. IPIRA identified the following programmes:

- Philanthropy (no strings attached to gifts).

Box 3.5 The University of California, Berkeley and knowledge exchange (continued)

- Open collaboration model where firms undertake research alongside academics and students with an open dissemination framework.
- Industry Affiliates Programme where firms pool resources to fund common research around particular expertise.
- Corporate sponsored research (large and small) including the establishment of large scale cross-disciplinary university-industry research institutes where the results are taken up and commercialised by industry research, including through start-ups.
- Socially responsible Intellectual Property Rights management to promote widespread availability of technology and healthcare in developing countries.

Source: PACEC (Public & Corporate Economic Consultants) (2010), The Higher Education Knowledge Exchange System in the United States. A report to HEFCE by PACEC and the Centre for Business Research, University of Cambridge.

Conclusions and recommendations

Given the complex nature of university regulation and governance in Spain, policy recommendations are required for national and regional governments as well as the universities themselves. These recommendations are designed to give incentives for universities to play a more active role in the innovation system. There are opportunities for the universities to compete more effectively internationally, but also for greater regional engagement to ensure local spillovers from their activities.

For the Spanish government:

- *Accelerate curriculum reform:* There is a massive effort underway already in curriculum reform with the Bologna Process. Remaining barriers for universities to adapt curriculum to meet innovation system needs should be tackled.

- *Embark on a university governance reform:* Some of the barriers to university engagement relate to the democratic selection process of several layers of hierarchy. The unintended consequences of this system are an inability for universities to make decisions that could promote engagement in the regional innovation system but are "unpopular" or require flexibility to set aside resources.

For the regional (Catalan) government:

- Increase efforts to organise and stimulate firm demand for knowledge to better interface with universities. This brokering role is costly and complicated for universities when the private sector itself has not been organised. The success of BioCat proves this point. In the sub-regional capitals of Girona, Lleida and Tarragona, it can be easier for universities to identify the right firm groups for effective dialogue.
- Make effective use of performance indicators: The regional government has taken a positive step to require performance indicators in the funding mechanisms for universities. While knowledge generation is a primary goal for universities, a wider concept of innovation should be adopted and there should be a caution on focusing only on university patents and spinoffs as indicators. This illustrates a narrow approach the university role in a regional innovation system.
- Provide "challenge-driven" research grants for universities. Regional challenge-driven research grants should be made available for areas of importance to the region, in science-based research or other forms of social innovation. Generally universities are better placed for inter-disciplinary research needs than a separate research centre structure. Increased research grant funding for universities is anticipated in the 2010-13 Plan.
- Promote greater territorial specialisation in S&T and innovation: Such support would help orient the role of different actors, including universities, in their regional engagement. Again, the 2010-13 Plan should help as it has added a new focus on this territorial dimension. Strengthening this approach could help clarify sub-regional strategies and priorities as well as firm needs.
- Improve university-government interface for policy design: Identify ways to improve university-regional government relations through existing councils linked to the Catalan Ministry of Innovation,

Universities and Enterprise (DIUE) but also through other government initiatives. There are a number of strategic agreements that either directly concern universities or address areas where universities could play a stronger role.

- Improve data reporting and analysis: There are some platforms in Catalonia and Spain for universities to report on statistics related to their "third mission" activities. But standardised reporting is not occurring consistently and on a sufficiently wide range of indicators. Common definitions and consistent collection of such data is essential both for analysis of progress and as the basis for possible performance incentives in funding.

For the Catalan universities:

- Take action despite constraints: Many universities have already taken action in different areas that impact the regional innovation system, depending on the culture of the institution.
- Further integrate the entrepreneurship/firm perspective: There are attempts to inform students in different degree programmes, particularly PhDs, about entrepreneurship, but currently only a small proportion of students benefit from these activities. More joint efforts are required in this area.
- Map university expertise to better interface with productive sector. Mapping of different departmental areas of expertise can be challenging, but it is needed for helping firms access information. There are some marketing efforts focused on patented areas of expertise in science and R&D intensive areas, but this needs to be expanded.
- Promote PhD mobility to firms: This is a challenge in Spain generally, and there are national programmes that also support this goal. Universities could take more action as well, not only in hard sciences but also in other fields such as social sciences.
- Build opportunities for more inter-disciplinary linkages: Given the governance challenges in universities, it is difficult to formally develop new curriculum or research agendas. There are also unexploited opportunities in the region, such as bringing together multiple disciplines to work with researchers in the science parks, including business schools.

- Develop regional knowledge transfer model that is based on ongoing relationship with industry: 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. Localised supply networks are therefore critical to the process through which innovation is transferred to enterprises and to create new innovation and transforms and upgrades existing industries. The development of a well-functioning regional knowledge transfer model requires ongoing relationship with industry to determine what innovations have the best opportunities for adoption and commercialisation and the creation of an industry-university learning environment. It requires support for the human capital development required to adopt and apply process and product innovations and collaboration with SMEs as well as large corporations. It measures success in terms of the sustainability and transformation of regional industry and employment growth.
- Reform degree programmes to improve employment and entrepreneurship outcomes by integrating work-based, problem-based and co-op models.

Notes

1 This chapter draws significant content from OECD (2010), *OECD Reviews of Regional Innovation: Catalonia, Spain*, OECD Publishing, Paris.

2 Per Table 2.7, *OECD Reviews of Regional Innovation: Catalonia, Spain*, based on data from CIRIT, the region's Interministerial Research and Innovation Commission.

3 Data from INE, the Spanish Statistical Agency.

4 Data from the Spanish Patent and Trademarks Office.

5 Data was extracted from the OECD REGPAT Database, January 2010. The allocation algorithm of patent applications to type of patent applicant (Individuals, including by owners of small firms, Companies, HEIs and University, Private Non-Profit institutions, and Government) and is not able to allocate all applicants. In the region of Catalonia, that non-allocated portion was less than 5% in all three years.

Annex A

Table 3.A1.1. Catalonia Research and Innovation Plan 2010-2013 (strategic objectives and policies)

1. The best scientific, creative, innovative and entrepreneurial talent	
	1. To educate and train people for creativity, innovation, science and entrepreneurship
	2. To improve strategic training profiles
	3. To incorporate, develop and retain talent
	4. To encourage mobility of talent and ideas
2. Strong public research system, connected to value creation	
	5. To reinforce funding and capacity for management, transfer and internationalisation
	6. To improve the structure, organisation and alignment of public research agents
	7. To promote RDI infrastructure and projects
3. Companies that systematically innovate and are internationalised	
	8. To boost business capacity for innovation and international
	9. To cultivate intermediaries for innovation and knowledge-intensive services
	10. To boost technological and non-technological RDI in business
	11. To access and adapt to new markets
	12. To create and launch knowledge- and innovation-intensive companies and activities
	13. To attract and retain RDI-intensive business activities
4. Innovative public sector	
	14. To foster innovative capacity and activities in public services
	15. To encourage innovation in Government ministries
	16. To use public procurement, regulations and policies within the sectors as promoters of knowledge and innovation
5. Society and citizens involved in scientific and innovative progress	
	17. To ensure the socialisation and prioritisation of science and innovation
	18. To have citizens that are active in creativity and innovation
6. Internationalisation and knowledge and innovation communities	
	19. To form knowledge and innovation partnerships
	20. Catalan presence and influence in RDI worldwide
7. Improving the governance of the RDI system	
	21. To deploy the organisations and instruments of the new model of governance of the Catalan research and innovation system
	22. To increase capacities in the design, implementation and assessment of RDI policies

8. Focusing RDI on challenges	
	23. To orient RDI policies towards the PRI challenges
	24. To accelerate the system's capacities to generate effective synergies based on PRI challenges
9. Environments and regions with the capacity to incorporate knowledge and innovation	
	25. To support innovative areas and synergies between regional agents
	26. To implement a regional approach in PRI lines of action
10. Mobilising more resources for RDI more efficiently	
	27. To make RDI a strategic, structural policy of government ministries and actions
	28. To work efficiently and capture resources for the development of RDI policies
	29. To access competitive RDI investments and resources from Spain and the EU

Notes: RDI=Research, development and innovation; PRI= Research and Innovation Plan

Source: Government of Catalonia (2010) *Pla de Recerca I Innovació de Catalunya 2010-2013* (Catalonia Research and Innovation Plan, 2010-2013), Barcelona.

Box 3.A.1.1. Catalan Agreement on Research and Innovation

*Challenge 1. **Talent**. To have the best scientific, innovative and entrepreneurial talent*

1.1. To have an education system and a professional environment that provides, promotes and maximises scientific, innovative and entrepreneurial skills.

1.2. To attain a critical mass of a sufficient number of qualified professionals with creative, scientific-technical and knowledge and innovation management profiles.

1.3. To recruit, recuperate and retain more and better scientific and innovative talent in the research and innovation system and to promote the mobility of this talent.

*Challenge 2. **Push**. To develop and maintain a high capacity for generating and valuing cutting-edge knowledge*

2.1. To strengthen the public research system.

2.2. To attain and profit from leading scientific and technological infrastructures.

2.3. To reinforce the capacity of research agents to value knowledge.

Box 3.A.1.1. Catalan Agreement on Research and Innovation (continued)

3.2. To generate favourable contextual conditions for innovation.

3.3. To encourage the growth of an innovative and knowledge-intensive business ecosystem.

3.4. To have an innovative public sector and administration that drive innovation.

Challenge 4. ***Internationalise****. To think, be and act globally in research and innovation*

4.1. To orient and implement a joint coordinated action to internationalise research and innovation.

4.2. To strengthen the role of Catalonia as an international player in research and innovation.

4.3. To establish international strategic alliances and platforms for research and innovation.

Challenge 5. ***Socialise****. To ensure that Catalan society be infused with science, technology and innovation*

5.1. To orient and implement a joint coordinated action for the socialisation of science, technology and innovation.

5.2. To bring science, technology and innovation into close contact with the people.

5.3. To place science, technology and innovation in the foreground of the political, social and economic arenas in Catalonia.

Challenge 6. ***Focus****. To focus and prioritise research and innovation*

6.1. To define the strategy for focusing on research and innovation in Catalonia.

6.2. To design and develop the regional strategy for specialisation in science, technology and innovation.

Box 3.A.1.1. Catalan Agreement on Research and Innovation (continued)

6.3. To specify which fields will be strategic priorities for research and innovation in the coming years.

6.4. To direct instruments and resources towards the areas focusing on and prioritising research and development.

Challenge 7. ***Facilitate****. To adopt a governance of the research and innovation system that is intelligent, efficient and effective*

7.1 To establish a solid organisation and link among the agents in the Catalan research and innovation system and to strengthen cooperation therein.

7.2 To develop a dynamic model of governance that strengthens strategic capacity and coherence in decision making and in the design and implementation of research and innovation policies.

7.3 To maximise the efficiency, the effectiveness and the learning capacity of the research and innovation system.

Challenge 8. ***Invest****. To make more and better investments into research and innovation in the public and private sectors*

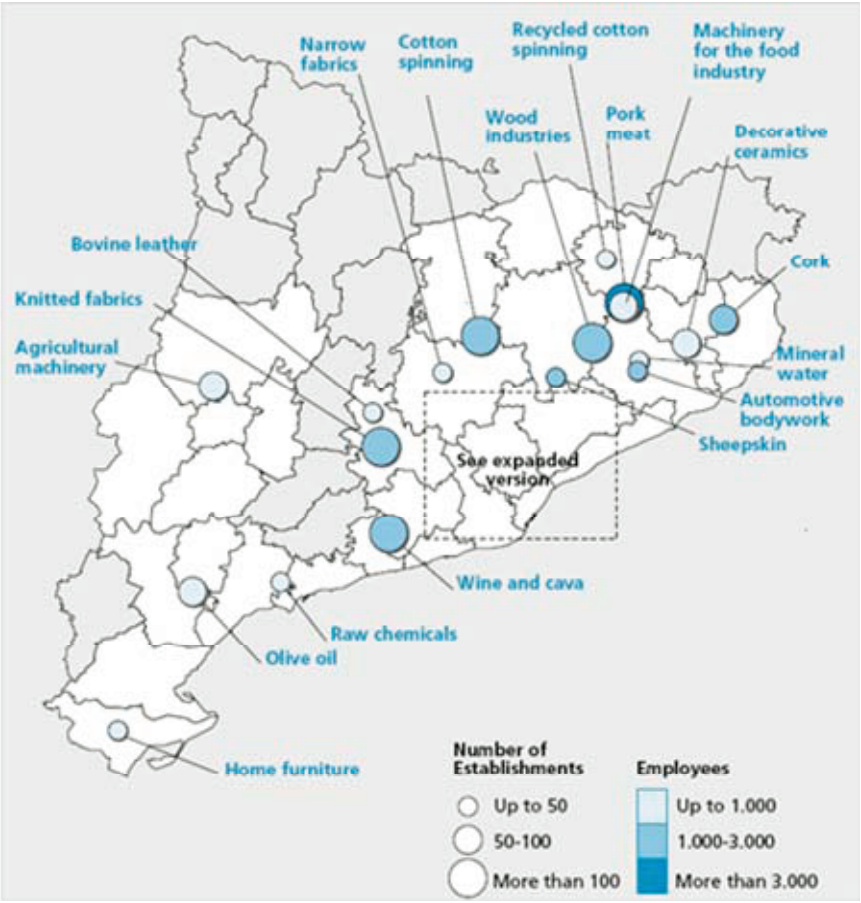
8.1. To dedicate 2% of the GDP to R&D costs and 3.75% to business spending on RDI in 2010, with the aim of reaching 3% and 4.5%, respectively, in 2017.

8.2. To focus public spending on R&D and on supporting innovation for the objectives of the Catalan Agreement on Research and Innovation.

8.3. To improve the economic and taxation framework for RDI spending in Catalonia.

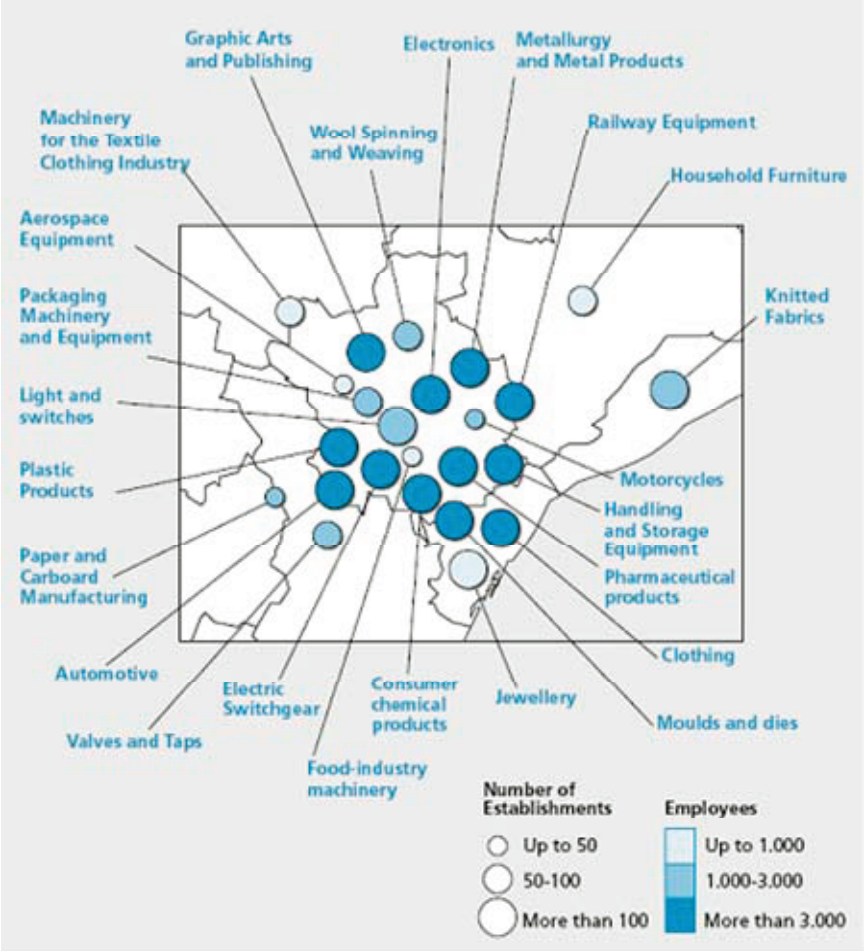
Source: Government of Catalonia (Generalitat de Catalunya) (2008), *Catalan Agreement on Research and Innovation*, Barcelona.

Figure 3.A.1.1. Map of Catalan local productive systems (outside Barcelona)



Source: Hernández Gascón, J. M. *et al*. (2005), *Map of Local Industrial Production Systems in Catalonia*, Catalan government, Ministry of Labour and Industry, Secretary of Industry, Barcelona.

Figure 3.A.1.2. Map of Barcelona area local production systems



Source: Hernández Gascón, J. M. *et al*. (2005), *Map of Local Industrial Production Systems in Catalonia*, Catalan government, Ministry of Labour and Industry, Secretary of Industry, Barcelona.

References

ACC1Ó (Agencia Catalana para la Competitividad) (Catalan Agency for the Competitiveness), website, *www.acc10.cat/ACC1O/cat/*

Christopherson, S. (2010), *Technology transfer models improving the potential for business establishment and job creation*. Presentation at OECD Roundtable on Higher Education in Regional and City Development, 15 September 2010, Paris, OECD. *www.oecd.org/document/39/0,3343,en_2649_35961291_45073703_1_1_1_1,00.html*

CICYT (*Comisión Interministerial de Ciencia y Technología*) (2007), *The Spanish National Plan for Scientific Research, Development and Techological Innovation, 2008-2011*.

CIRIT (2005), *Pla de Recerca i Innovació de Catalunya 2005-2008* (Catalan Research and Innovation Plan, 2005-2008), Government of Catalonia, Barcelona.

CRSC (Catalonia's Regional Steering Committee) (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", *OECD Reviews of Higher Education in Regional and City Development*, IMHE, *http://www.oecd.org/dataoecd/49/19/44899776.pdf*

CYD Fundación (Fundación Conocimiento y Desarrollo) (2008), *Informe CYD* 2008, Fundación CYD, Barcelona.

Hernández Gascón, J. M. *et al*. (2005), *Map of Local Industrial Production Systems in Catalonia*, Catalan government, Ministry of Labour and Industry, Secretary of Industry, Barcelona.

INE (Instituto Nacional de Estadística) (Spanish Statistics Institute), *www.ine.es/*.

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

OECD (2010), *OECD Reviews of Regional Innovation: Catalonia, Spain*, OECD Publishing.

OECD/FECYT (2007), *R&D and Innovation in Spain: Improving the Policy Mix*, Fundación Española para la Ciencia y la Tecnología, Madrid and OECD Publishing.

PACEC (Public & Corporate Economic Consultants) (2010), The Higher Education Knowledge Exchange System in the United States. A report to HEFCE by PACEC and the Centre for Business Research, University of Cambridge.

PIMEC (2008), *Anuari de la pime catalan: Resultats economics in financers: 2002-2006*, PIMEC, Barcelona.

RedOTRI (Red de Oficinas de Transferencia de Resultados de Investigación (OTRI) de las Universidades Españolas) (*Spanish Network of Universities*), *Report of the Survey RedOTRI 2008 www.redotriuniversidades.net/index.php?option=com_docman&task=doc_download&gid=848&mode=view.*

Regional Government of Catalonia (*Generalitat de Catalunya*) (2010), *Catalan Research and Innovation Plan, 2010-2013*, Barcelona.

Regional Government of Catalonia (*Generalitat de Catalunya*) (2008a), *Catalan Agreement on Research and Innovation – Framework Document,* Barcelona.

Regional Government of Catalonia (*Generalitat de Catalunya*) (2008b), *Catalan Agreement on Research and Innovation,* Barcelona.

Regional Government of Catalonia (*Generalitat de Catalunya*) (2008c), "*Strategic Agreement to Promote Internationalisation of the Catalan Economy, the Strengthening of its Competitiveness and the Quality of Employment, 2008-2011",* Ministry of the Economy, Barcelona.

Rovira, L., R. I. Méndez-Vásquez, E. Suñén-Pinyol and J. Camí (2007), "Caracterització bibliomètrica de la producció científica a Catalunya, 1996-2006", *Informe AGAUR-PRBB,* Barcelona, *http://bibliometria.prbb.org/ncrcat06*.

Sanz-Menéndez, L. and L. Cruz-Castro (2005), "Explaining the Science and Technology Policies of Regional Governments", *Regional Studies* 39 (7), pp. 939–954.

Chapter 4.

Cultural, social and environmental development in Catalonia

The universities in Catalonia play an important role in representing and preserving the distinctive culture and language of the region. They can also help address the significant environmental and social problems facing the region and its constituent communities.

This chapter focuses on how the universities in Catalonia can contribute to three areas of critical importance to the region by: i) responding to the demographic transition in the region and the needs of a new immigrant population which will compose a large portion of future students in Catalan universities, ii) contributing to the region's internationally recognised "creative economy" and iii) addressing the region's future environmental sustainability within the context of strengths in agriculture and renewable energy industries.

The chapter ends with recommendations for furthering goals to change the research and teaching culture in order to reach the ambitious goals laid out in the University of Catalonia plan.

Introduction

Universities in Catalonia have the distinct advantage of operating in a diverse social and cultural environment, where creativity and

innovation are manifested throughout the region – in the private sector and in civic society. For example, because of Barcelona's prominence as a centre of urban and architectural design, the city-region has been able to attract international expertise in land use design, making the city-region an international model for creative environmental planning.

The challenge for the universities in Catalonia is to identify critical social, cultural and environmental issues and gaps in knowledge and action where they can make individually and collectively contributions to build regional sustainability – socially, culturally and environmentally. The advantage that the universities bring to the region is the ability to address (through research and outreach) issues that have long-term implications and which require institutional capacity.

Catalonia and its universities are faced with three key challenges and opportunities. First, Catalan universities need to engage with the broader population of the region to confront the major demographic challenge facing the region. In the next ten years the age cohort entering Catalan universities will be largely composed of the children of new immigrants who, in many cases, will be the first in their families to aspire to university degrees. These students face significant problems in reaching for tertiary education because of the economic situation of their families and community expectations regarding their potential. This chapter highlights activities undertaken by Catalan universities that may make higher education more accessible to this generation.

Second, Catalan universities can address and contribute more strongly to the critical role that creative and cultural industries play in Catalan economy and society. This strength is, in part, related to the opportunities provided by a distinctive regional identity and language.

Third, Catalan universities can respond to environmental challenges, broadening the scope of regional strengths beyond those in environmental design. 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. Catalan universities have an important role to play in: *i)* demonstrating how major institutions can become more energy efficient, *ii)* training the workforce that can build new innovative energy and efficiency technologies and *iii)* exploring ways in which the manufacturing industries that are an important part of Spain's economy can achieve energy efficiency gains.

In the context of these challenges and opportunities, this chapter examines the following questions:

- What is the contribution of universities to Catalonia's cultural, social and environmental development, particularly in terms of social cohesion and integration of new immigrants, cultural and creative industries and sustainability and urban development?
- Are the university activities appropriately targeted to address the key challenges in Catalonia? Are there gaps in delivery and are resources and incentives aligned with the objectives?
- What lessons can be learnt from international experience?

4.1. Catalonia and the demographic transition: socio-economic inclusion of new generation Catalans

The demographic transition in the region has had important implications for human capital development (see Chapter 2). Catalonia has received many waves of immigration and has included these generations into the labour market, education and even higher education. More recently, between 2001 and 2008 due to foreign immigration, Catalonia has experienced its largest period of population growth. By 2008, foreign residents accounted for 85% of the growth rate with 60% of new immigrants in Catalonia living in the Barcelona metropolitan area; they represent over 1 million inhabitants or 15% of Catalonia and 21% of Spain's total population (SIC, 2008). The largest portion of these migrants come from the Latin America (Bolivia, Ecuador, and Colombia), but there is also a significant migration stream from North African and Sub-Saharan African countries.

The new migrants themselves are in the prime working age, 14-55 years, but they marry at a younger age than the Spanish population as a whole and so, have more children (SIC, 2008). The children with migrant backgrounds are currently in primary and secondary schools, but will constitute a significant portion of the population available to fill skilled jobs. Collaborative efforts are needed at schools to ensure success and access to tertiary education. The new wave of immigration may pose social and cultural challenges with respect to integration and the potential problem of social exclusion. Since many Catalan universities have a central mission to preserve and develop of Catalan culture, educating immigrants and celebrating their cultural contributions poses a challenge. The Catalan universities are gradually

taking on both research and outreach programmes to address the societal challenge of immigrant integration. The mechanisms range from traditional means of research and small scale widening access programmes.

Widening access

There is an important untapped potential for students in Catalonia among the migrant population. Some universities have programmes addressing the needs of immigrant students and/or geared towards cross-cultural issues. Examples include the Itaca Campus and the scholarship programme for immigrants of the Autonomous University of Barcelona and the Children's university programme run by ACUP in all the public universities that aims to increase children's interest in university education. The positive outcomes will, however, require more decisive actions to reach out to schools in vulnerable areas in order to improve the quality of teaching and to raise aspirations among migrant youth.

A small programme at the Autonomous University of Barcelona the Ítaca Campus facilitates the access to tertiary education studies for the non-EU immigrants. With financial assistance from the Santander Bank (Banco Santander), the university offers a summer programme to local 15 yr old school students each year for about three to four weeks. In 2008, altogether 432 students from 54 secondary school centres in Catalonia participated. This pre-university programme introduces students to university and university life. Its goal is to encourage students to continue their education once they have completed compulsory secondary education (see also Chapter 2, Box 2.1.).

There are also programmes aimed at more skilled foreign immigrants who compose a portion of the foreign immigrant flow into the region and are hampered in finding a place in the economy because of Catalan language acquisition and acculturation difficulties. For example the new Communications Campus Poblenou, which opened during the 2008/09 academic year, offers non-degree courses in language and technical skills open to the large educated foreign population seeking ways to acquire language skills and build new businesses in Catalonia in growing areas, such as information and communications technology.

At the current state, Catalan universities' measures in widening access remains limited in scale and impact, and without collaborative action. None of the universities have adopted a strong corporate approach to creating and enforcing mechanisms to facilitate access of

the upcoming generations of new migrants to higher education. In view of the demographic change, it would be useful for the universities and the regional government to learn from international good practice that is highlighted in the OECD review reports. One example of a comprehensive university approach to widening access 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 schools, 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, 2010a) (see Box 4.1.).

Box 4.1. Victoria University's access and success programme

Victoria University is a multi-sector tertiary education institution that 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).

Box 4.1. Victoria University's Access and Success programme

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.

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 are 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 (2010a), *Higher Education in Regional and City Development. State of Victoria, Australia,* OECD Publishing.

The Regional Government of Catalonia, City of Barcelona and the Catalan universities have focused on talent attraction, targeting at international top researchers (ICREA programme, see Box 2.5. in Chapter 2) and international students through joint marketing and services. However, there has been less focus in Catalonia on nurturing talent at home and utilising the human capital potential among the migrant community. Most of the interviewees, felt that the equity issues had been solved or were unfamiliar with the issues. In general, the needs of the low-skilled migrant population were seen as a challenge that needs to be addressed at primary and secondary education, not in tertiary education.

Integrating immigrants into education and labour market systems remains a challenge in Catalonia. 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 committed to 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. It has a broad-based strategy targeting at both low skilled and highly-skilled population. 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 4.2. and Box 2.3., Chapter 2.).

Box 4.2. 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 become an attractive place that draws in finance, production and people. Considerable investments in infrastructure were made during 1995-2005, including a bridge to connect the city with Copenhagen (DK), the development of an underground train system, new up-market residential developments in the harbour and Malmö University.

Box 4.2. City of Malmö (continued)

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. The Centre for Widening Participation at Malmö University 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. The aim is to 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.

"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 individually tailored six-month study programme includes company internships, independent project work and career advice. There are three lines of study. The first is a general option which involves refresher courses and making 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 (2009), *Designing Local Skills Strategy*, OECD Publishing, Paris, pp. 219-238.

Research

Given the nature of Barcelona as a global city with a high proportion of immigrants, it would be expected that universities in Barcelona and elsewhere in Catalonia would excel the study of

immigration, integration and the metropolis. An example of this type of initiatives can be found in Amsterdam, where the faculty in the two research-intensive universities, particularly those associated with University of Amsterdam's Institute for Migration and Ethnic Studies (IMES), as well as the Amsterdam Institute for Metropolitan and International Development Studies (AMIDSt), are engaged in internationally recognised research about Amsterdam's immigration experience, the uneven development process and public policy in a number of relevant spheres, for example in education, housing and employment. This knowledge is published in traditional outlets, but also fed through to research groups in cities with similar experiences, partly through European Commission-funded networks of excellence as well as the international Metropolis Project that embraces more than 20 countries (OECD, 2010b).

Similar types of advances have been made in Catalonia where individual academics and/or departments are taking new steps to address Catalonia's immigration experience in that direction, often inspired by simple considerations of equity. It is, however, unclear to what extent the universities in Catalonia have perceived the opportunities of making Catalonia a "living laboratory" for their research in this domain.

GRITIM (Interdisciplinary Research Group in Immigration) a multi-departmental group at the University Pompeu Fabra focuses on research and management of change processes arising from human mobility and immigration. They have sponsored a number of projects dealing with immigrant participation in the political institutions of the region. There are also research centres devoted to the study of immigrant issues at the University of Girona and at the Autonomous University of Barcelona which is home to two centres, in the departments of geography and sociology.

Some universities in Catalonia have taken concrete action to reach out towards people with immigrant background. Much of this activity is, however, driven by individuals and departments without reward or recognition from the higher education leadership. Before significant impact is felt, outreach needs to be scaled up and done in a more systematic way particularly as such efforts can produce results only over a long time period. In addition to upscaling the efforts to widen access to higher education, there is also a need to reach out to and empower migrant population to address their own challenges.

A failure to address the needs of the migrant population will manifest itself in the cost of exclusion, the bill for law enforcement,

the lack of earning power of the under-educated and unemployed, and the cost of health services and welfare benefits to population in economically distressed areas. It also means that talent is wasted.

Diversity in society is a source of innovation and entrepreneurship. This has been recognised for example in Madrid, where a campaign was launched to improve entrepreneurship environment when the authorities recognised the enterprising potential within the migrant community (OECD, 2011, forthcoming). In Canada, the city regions and their education institutions are active participants in national strategies and programmes to foster dialogue with and integrate the diverse immigrant communities that are an important part of the contemporary Canadian population (see Box 4.3.).

Box 4.3. Cities of migration: the Canadian model for recognising and integrating immigrant communities

In Canada, immigrant access begins with creating a learning environment in primary and secondary school that demonstrates a commitment to results for the children of immigrant families. In 2008, the Toronto District School Board (TDSB) was awarded the Carl Bertelsmann Prize to recognise exemplary practice in promoting social integration and providing equal learning opportunities. The TDSB has successfully closed the average achievement gap between second-generation students of immigrant origin and their Canadian peers.

Another key actor fostering immigrant integration and access is the Toronto Region Immigrant Employment Council (TRIEC). TRIEC's path-breaking work to increase immigrant access to employment through mentoring, employer training, internships and public awareness has been extended to 18 city regions throughout Canada and resulted in foundation support for a new programme – ALLIES, Assisting Local Leaders with Immigrant Employment Strategies. Among the key aspects of this comprehensive programme are technical training programmes to promote labour market attachment and bridge skill gaps.

The holistic Canadian approach to immigrant integration also has a cultural dimension. In Toronto, universities faculty participate in and act as mentors for young writers in "Diaspora Dialogues: Writing the New City". This programme, which has spawned important immigrant authors of fiction, poetry and nonfiction, connects with students in secondary school and higher education who want to write about the immigrant experience in the city.

For more information see: *http://citiesofmigration.ca/*

Community development

Tertiary education institutions in Catalonia do not have a strong community development tradition. However, the new curricula under the Bologna agreement require that the university students participate in internships as a facet of their educational programme. The development of these internship experiences is uneven across the universities and, at this juncture, the majority of the internships are for engineering students and with private sector enterprises.[1] These internship experiences could be extended to community-based organisations in the context of a university commitment to a wider range of regional needs, beyond those of the private sector.

Currently, there is a small number of programmes to reach out to urban communities and also villages in ways that bridge the gap between the university and the community. For example, the Autonomous University of Barcelona has developed a programme to help students find accommodation in the surrounding village thus bringing income to village residents in a mainly industrial area and fostering more interconnection between the university and its surrounding community. This effort has been enhanced by the provision of a small number (14) scholarships to the university especially designated for students from the surrounding community.

A notable and more extensive effort is that established by the University Rovira and Virgili in Tarragona, which has established antenna university centres in communities in Southern Catalonia under the rubric of the Tarragona Knowledge Region (Box 4.4.)

Box 4.4. Rovira i Virgili antennae as outreach vehicles

The University of Rovira i Virgili (URV) in Tarragona has established 22 university "antennae" in communities within the vicinity from which the university draws its students. These antennae connect the university to communities which otherwise would have little knowledge of the university.

Each of the antennae is a meeting point for members of the university community (students, alumni, teaching staff, administrative staff and friends) to connect with local cultural organisations, study centres and manufacturing representatives. The goal of the antennae programme is to foster the generation of common projects. The "extensive campus" programme is intended to be a point of entry and contact for URV though which the community can identify the ways in which community members want to intersect with the University. These may be through cultural programming, programmes for senior citizens or through the provision of scientific or economic expertise.

Box 4.4. Rovira i Virgili antennae as outreach vehicles (continued)

The URV antennae programme has strong university leadership because it is directed from the University Rector's office as the Tarragona Knowledge Region Programme. The antennae are also connected with the initiatives of the Institut Ramon Muntaner, a private foundation that supports 300 regional Catalan language research centres. The objective of these centres is to provide both historical and cultural programming, including workshops, exhibitions, conferences and publications. The URV antenna programme thus intersects with and builds on the capacities of a widely dispersed group of cultural institutions.

Source: Universidad Rovira i Virgili (URV), www.urv.cat/en_noticies/61/salou-now-has-a-urv-knowledge-antenna

Currently, the community development activities by Catalan universities suffer from limited collaboration between universities and small sale of interventions. One way of mobilising Catalonian universities to community development would be the establishment of neighbourhood management type of programmes, albeit there is a need to be aware of involved risk of gentrification. This type of programmes could provide a channel for universities to respond to the needs of the migrant population in a more systematic way. Universities and other tertiary education institutions could draw on the wealth of experience concerning immigration issues in neighbourhood management areas that could be considered as living laboratories for social and action research. This work would benefit the local and regional development by providing more robust data and knowledge about the development needs.

Berlin's neighbourhood management provides an example of long-term community development to empower communities to help themselves. (see Box 4.5.)

Box 4.5. Neighbourhood Management in Berlin

Quartiersmanagement (Neighbourhood Management) is a major component of the German Social City Programme which is, co-financed by the Federal government and the states, with an EU contribution of around 30% coming from the regional development fund. The programme, now in its tenth year, is well developed in Berlin where there are today 35 active city areas concerned, mostly central, as compared to just 15 at its inception (OECD, 2003). Each area is classified into one of four categories depending on a mix of socio-economic indicators that determine the level of funding. The Berlin neighbourhood management areas cover 2 210 ha (Berlin: 89 175 ha). At the end of 2008 there were nearly 392 000 inhabitants in these neighbourhoods, around 10% of Berlin's population. Whereas the Berlin average for foreigners is of 14%, in these neighbourhood management areas, it reaches nearly 29% 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%).

The principles of neighbourhood management rest on a few basic assumptions: Neighbourhood inhabitants know best what is important and what needs to be decided. This means that local people, organisations, SMEs and civil society are empowered to articulate their views with local administrations and decide on small projects that improve the quality of life and promote social cohesion in a networked fashion. 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.

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. The Berlin's tertiary education institutions have been involved in the neighbourhood management activities to varying degrees mainly through monitoring and evaluation, student internships as well as seminars and academic events. Monitoring and evaluation are strategic components in neighbourhood management.

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").

Source: SenStadt (2009), Neighbourhood Management website, *www.stadtentwicklung.berlin.de/wohnen/quartiersmanagement*, accessed 25 January 2010; OECD (2010d), *Higher Education in Regional and City Development. Berlin, Germany, OECD Publishing, www.oecd.org/dataoecd/59/6/45359278.pdf.*

Catalan universities and the creative economy

Catalonia is an acknowledged centre of creative industries in Europe with strengths in design, including textile and industrial design and architecture. However, due to a significant manufacturing sector, creative and cultural industries do not represent as large a share of the total workforce as in some European regions. Barcelona is the centre of the creative economy in Catalonia but there are also spillovers to other cities in Catalonia and evidence of indigenous development in cultural and creative industries in the provincial capitals.

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. The term "creative industries" also includes the advertising industry, the software/gaming industry etc. In this way, the commercial sections of publicly financed cultural institutions such as museum shops are also part of the creative industries. The sector contributes to the growth and development of Catalonia, 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 bringing about economic growth (Florida, 2002).[2]

Catalonia is ranked number six among the top 25 European regions with important "clusters" of cultural and creative industries (CCI).[3] This ranking is determined by total employment of 153 202. A location quotient of 1.30 (measuring employment in the industry relative to the total employment of the region) demonstrates that Catalonia has an over-representation of employment in cultural and creative industries when compared to other European regions. In general, only the larger global city-regions, such as the Ile de France, London, Rome, Stockholm, Amsterdam and Madrid have higher CCI location quotients than Catalonia (Power and Nielsen, 2010). This standing attests to the significance of Catalonia as one of the most significant regions in the field.

Table 4.1. Europe's Top 25 regions for creative and cultural industries employment

Region	CCI Rank	Employment	LQ
Île de France (Paris), FR	1	301 895	1.53
Inner London, UK	2	235 327	2.19
Lombardy (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), DE	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
Berkshire, Buckinghamshire and Oxfordshire (Oxford), UK	13	80 628	1.82
Attiki (Athens), GR	14	78 920	1.26
Oost-Nederland (Nijmegen), NL	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
Darmstadt (Frankfurt am Main), DE	19	68 238	1.23
Piemonte (Turin), IT	20	66 291	1.04
Köln, DE	21	65 341	1.28
Etelä-Suomi (Helsinki), FI	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

Source: Power, D. and T. Nielsén (2010), Priority Sector Report: Creative and Cultural Industries Europe Innova, European Cluster Observatory, EC. *www.clusterobservatory.eu/upload/CreativeAndCulturalIndustries.pdf* Accessed 20 June 2010.

Among the most important creative and cultural industries in Catalonia are those in software, television and radio and advertising. This employments strength in the regional economy is related partly to the bi-lingual character of the region and the need to provide specialised language programming in both Catalan and Spanish (see Table 4.2.).

Table 4.2. Top 15 regions by number of employees and share of European employment in four sectors of the creative and cultural industries

		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%	Lombardy (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 (Seville)	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%	Lisbon	9 217	1.33%
15	East Scotland (Edinburgh)	6 351	1.64%	Zuid-Nederland (Maastricht)	8 970	1.30%
	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%

Table 4.2. Top 15 regions by number of employees and share of European employment in four sectors of the creative and cultural industries (continued)

		Employ-ment	European share		Employ-ment	
	Artistic and literary creation and interpretation (continued)			Museum activities and preservation of historical sites and buildings (continued)		
5	Danmark	5 156	1.74%	E 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	Lombardy (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, East and West Sussex (Brighton)	3 714	1.26%	Catalonia (Barcelona)	2 102	1.23%
14	Catalonia(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 T. Nielsén (2010), *Priority Sector Report: Creative and Cultural Industries Europe Innova*, European Cluster Observatory, EC. *www.clusterobservatory.eu/upload/CreativeAndCulturalIndustries.pdf* Accessed 20 June 2010

These specialisations present a distinctive advantage to the region. They are related to the use of Catalonia's approach to integrating its cultural identity and language into an economic development framework. This approach is internationally recognised and shared with only a few other cases, most notably that of Wales (Davies, 2009) (see Box 4.6).

Building on linguistic distinctiveness

Language-based economic development strategies emphasise the importance of integrating the minority language into the world of employment and economic life. This strategy helps to "normalise" the language and insure its use in the full range of human activity. It also increases the prestige of the language. A minority language strategy

indirectly builds communications capacities in the region because radio, television, and publishing jobs cannot be "out-sourced" outside the linguistic region.

In Catalonia, Catalan speakers are needed to fill regional media demand but also can develop production capacity to create media products for a wider Spanish and international audience. The capacity to foster production is enhanced by having two television networks (broadcast and cable) dedicated to broadcasting in Catalan. This capacity is manifested in the development of television dramatic series that are rooted in Catalonia but which also can be dubbed for export to a wider Spanish market (Castello, 2010).

The Catalan linguistic community has nine million speakers and is large enough to command national resources to meet community needs for specialised programming. Universities are both participating in the preservation and celebration of the Catalan language and culture and, arguably, building on the ability that linguistic distinctiveness provides to capture what are typically national resources in broadcasting and media production at the regional scale.

The new communication campus, Poblenou, initiated by the University of Pompeu Fabra in 2008-09, recognises and builds on the ability of the region to capture media resources in a way not available to majority language regions. This capacity is critical given the importance of information and communications technology industries in Europe and globally. In this way, what might be initially perceived as a disadvantage – a minority language community – is transformed into an advantage in a multi-lingual European context.

Catalan language provides clear benefits to, but also challenges for, regional development. Evidence from the survey carried out by the Spanish Ministry of Education in 2007 shows that students who are bilingual at home achieve better learning outcomes in Castilian and English (Ministry of Education, Primary education, General assessment of the educational system). However, there are also high costs involved in the current language policy due to potential exclusion of non Catalan speakers and the translation and interpretation costs.

Box 4.6. Building on a distinctive language advantage

A distinctive regional language can be an advantage if the national policy supports linguistic diversity and the cultural heritage is expressed in a regional language. The national policy of the United Kingdom is supported the Welsh language to insure the survival of the language and its use in everyday affairs. This support has taken the form of creating media platforms in the Welsh language, such as **S4C** (Welsh: *Sianel Pedwar Cymru*, meaning *Channel 4 Wales*), which is headquartered in Cardiff. Because of investments in Welsh language broadcasting, Cardiff has the second largest media centre in the UK.

The support for the Welsh language has had secondary spin-off effects for Wales. It spawned a Welsh animation industry led by companies that produce children's programmes in Welsh. The most famous of these cartoon programmes is SuperTed, developed by Siriol animation in Wales. This Welsh-developed animated programme was distributed in the whole of the UK and internationally. The cartoon programmes that emerged from this initial experiment were a natural export product because the language used by the characters could be easily replaced. Welsh cartoons have been exported and distributed to audiences worldwide. Thus, investments in a language heritage spawned a new knowledge intensive creative industry in Cardiff.

Source: Davies, G.T. (ed.), (2009) *English is a Welsh Language – Television's Crisis in Wales,*. Institute of Welsh Affairs, Cardiff.

Enhancing the skills of the creative workforce

Various universities offer degrees and specific training in the cultural and creative industries, such as degrees in audiovisual communication (including radio, television and cinema), advertising, art studies and other training programmes in design, arts and crafts, sound and image technology etc. through their various faculties and associated schools. Furthermore, the City Council of Barcelona promotes the Media Cluster with the University Pompeu Fabra and the Design Cluster with the Barcelona Design Centre. There are prospects of creating interdisciplinary programmes in this area.

Despite the progress made, there is scope to increase the role of Catalan universities in the development of skills that support the creative industry presence in the region and particularly in Barcelona. There are hundreds of specialised design training programmes in

Barcelona, most of which are private and not connected to university degree programmes. The role of these training and certification programmes in the local economy is remarkable because they attract international students and tourists, and make possible the development of an extensive high-quality and professionalised design culture in Catalonia. At present, there is little information on the role of these programmes, their connections with universities and the effects of this education system on the creative industry sectors in Catalonia.

If the Catalan universities are to fulfil their mission as central to a regional knowledge economy, there is a need for more robust evidence and better understanding of the industries that are critical to the regional economy and of their workforces, such as the creative industries. Stronger evidence base is also important given changes in the education law which specify that a new autonomous organisation will manage the art schools, giving them a higher profile and more autonomy in the Catalan University System (CRSC, 2010).

The cultural and creative industries face industry-specific challenges and difficulties in framework conditions. The sector does not drive the creation of "traditional" jobs because the expansion of activities is often managed through co-operation and networking, not by employing new staff. The heterogeneous and small scale of the industry acts as a constraint to identify, formulate and support common interests among companies in the creative services. In addition to growth-oriented sectors, the industry also includes stagnating and declining sub-segments. For example progress in digitalisation and information and communication technologies as well as modifying recreational behaviour are changing business models in the field. Micro-entrepreneurs and small and medium-sized enterprises face specific challenges in growing their business, for example, such as the reluctance of banks to lend money, especially for small scale loans, red tape and bureaucracy which is burdensome to micro-enterprises and a lack of funds to develop outlet markets (see OECD, 2010d).

Given the high proportion of self-employment and small business in the creative sector, the universities in Catalonia should 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. Specific decisions regarding the universities' roles within this diverse sector need to be devised on the base of more comprehensive information. For this purpose the Catalan universities could jointly sponsor an observatory on cultural and creative industries.

Cultural and creative industries involve a number of challenges for human capital development. In addition to the need for entrepreneurship education, there is a growing need for further education opportunities to keep expertise up-to-date in order to meet the needs of the diverse sector, especially for freelancers. There is also a need for multi-disciplinary education courses and ICT-based programmes and co-operation between creative industries, art schools and technical universities. Cultural and creative industries are becoming more R&D-based which is evident for example in game software and new media. Collaboration is, however, often constrained by differences in institutional cultures and regulations.

Cultural and creative industries in Catalonian policies

The concept of a "creative class" links business with education and culture thereby building a powerful coalition among three major policy areas in local, regional and national politics. In Catalonia, there does not appear to be a strong awareness of the assets and opportunities in the cultural and creative fields, apart from Barcelona City Council's support for media and design clusters. This in contrast to Berlin, where the Senate has defined creative industries as a profit-oriented segment covering all enterprises, entrepreneurs and the self-employed producing, marketing, distributing and trading profit-oriented cultural and symbolic goods. Tertiary education institutions play an important role in the cluster development (see Box 4.7).

Box 4.7. Berlin and creative industries

The Berlin Senate has defined creative industries as a profit-oriented segment covering all enterprises, entrepreneurs and the self-employed producing, marketing, distributing and trading profit-oriented cultural and symbolic goods. As a joint project of the Senate Department for Economics, Technology and Women and the Department of Culture, the Cultural Industries Initiative has adopted an integrated course of action. This collaboration between public and private sector and the non-profit organisations, associations and foundations aims to enhance the exchange and value-creation relationship between the actors. Collaboration is facilitated by web communications and an information platform for businesses and artists (www.creative-city.berlin.de) as well as a museum portal, which combines e-commerce offers with qualitative information about Berlin museums.

One of Berlin's fields of competence, *i.e.* IT and Media, belongs to a large extent to the creative industries. The Berlin Senate has appointed an interdepartmental and cross-sectoral Steering Committee for the Communication, Media and Creative Industries cluster. It is led by the Minister for Economics, Technology and Women while members include political directors of relevant ministries and stakeholders in creative industries incorporating all branches of the creative industries.

It has supported the creation of a virtual platform between the various industries as well as between the commercially- and culturally-oriented facets. The goal of the Steering Committee is to increase and enhance the knowledge exchange and cooperation between the sectors and spheres and to create a coherent political strategy to support the creative economy. The board meets approximately four times a year and 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 businesses in the branch and in encouraging the development of new markets. 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. Also the Berlin Board has embraced the idea of the creative capital as one of its focus areas. The goal is to consolidate Berlin's position as an international centre for arts and culture.

Box 4.7. Berlin and creative industries (continued)

Tertiary education institutions are collaborating in the cluster development and play an increasingly important role in the cultural and creative industries through provision of education and training that produces human capital, research, outreach activities and indirectly through making Berlin an open, diverse and tolerant city attractive to Bohemians and creative and talented people. Berlin has an excellent network of publicly supported educational and training institutions for creative professions, including four internationally renowned art schools, universities, universities of applied sciences, technical colleges as well as 36 vocational schools that offer training in the creative professions. In addition, there are various private educational-training providers. These institutions guarantee Berlin's place as a centre of attraction for young creative individuals throughout Germany. Moreover, a number of centres have been established in collaboration with various higher education institutions. One such centre is the Cooperative Jazz Centre in Berlin founded in 2005 through the collaborative efforts of the Hans Eisler College of Music and the University of Arts. The State Ballet School of Berlin and the Berlin School of Acrobatic Arts have engaged in collaboration with the Ernst Busch School of Performing Arts enabling the students to train as stage performers while pursuing a Bachelor degree. The Cooperative Dance Education Centre, created in 2006 at the initiative of the Berlin Senate, is a collaboration of the Berlin University of the Arts and the Ernst Busch School of Performing Arts. This model of collaboration and form of institutional anchoring has received national recognition.

Source: OECD (2010d), Higher Education in Regional and City Development. Berlin, Germany. OECD Publishing, *www.oecd.org/dataoecd/59/6/45359278.pdf.*

Catalonia, and particularly its leading city Barcelona, are magnets for many students, researchers and artists from Europe and abroad, with direct impact on the regional economy. Barcelona is a clear leader in cultural and creative industries which form a pillar of its economic development and future prosperity. However, in contrast to Berlin, neither the City of Barcelona nor the Regional Government of Catalonia has given the cultural and creative industries a major focus in cluster development and networking, with the possible exception of media and design clusters. The positive experiences in the cultural and creative industries should be celebrated and widely disseminated to other clusters. Challenges in this domain include the lack of collaboration between art institutes and other tertiary education institutions, creation of multidisciplinary and cross-institutional education and research in creative industries, the development of

flexible further education opportunities and the enhancement of entrepreneurial skills among tertiary education students and graduates.

Environmental sustainability and "green" industries

Renewable energy research and development

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).

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 (TL3) account for 13.7% of overall green patenting[4].This geographical concentration is higher than the overall one (for green and non green technology, the ten most productive regions account for 12.1% of overall patent applications), (OECD, 2011, *forthcoming*).

Table 4.3. shows the regions with higher rates of patents applicants in 13 environmental technologies. In addition to Los Angeles, Tokyo, Oxfordshire, there are regions with lower aggregate patenting capacity that have managed to specialise in green technologies. Among Spanish regions, only Navarra features fourth in wind technology.

Table 4.3. 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

Table 4.3. Application in renewable energy technologies in OECD regions (2004-06) (continued)

Technology	Region	Patents
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
Technology	Region	Patents
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 (2008d), The OECD REGPAT Database: A Presentation, OECD STI Working Paper, OECD Publishing.

Although lagging Spain in providing its own renewable energy sources, Catalonia has been an active region in building a renewable

energy economy and also in research and development efforts that can position the region internationally as a leader in new renewable energy technologies. For example, since 2006, water systems in all new residential construction in Catalonia must be heated by solar panels. Since 2007, the Catalan government has given more than EUR 15 million in grants to homeowners to help pay for renewable energy installations.

With respect to university participation, in environmental sustainability there are several significant but distinctive initiatives.

Box 4.8. Environmental sustainability and green growth in Catalan universities

The Autonomous University of Barcelona (UAB) has a programme focused on environmental science and technology, which includes six research professors working in the arena of eco-design and sustainable technologies. The Institute of Environmental Science and Technology has a mission to carry out research, and train researchers to address the challenges in the interaction between society and the environment.

The GREA TECNIO centre of the University of Lleida (UdL) focuses its R&D in energy engineering, design and optimisation of machinery and industrial automation and control and has participated in regional efforts to build industrial capacity in renewable energy as well as international co-operative efforts with France to develop technical expertise. The University of Lleida is also engaged in projects that combine its special expertise in the agricultural industry with research on sustainable energy, for example through co-generation methods and energy efficiency in agro-industrial machinery.

The Polytechnic University of Catalonia (UPC) and ESADE Business School are jointly creating an educational and research initiative aimed at stimulating innovation in the field of sustainable energy. The project, known as InnoEnergy, is supported by the European Institute of Innovation and Technology (EIT). The two lead institutions submitted their proposal in collaboration with the energy sector companies Gas Natural – Unión Fenosa, Iberdrola, EDF, Vattenfall, ABB and Total. A total of 35 universities, companies and research centers are partners in the InnoEnergy project. The goal for the first four years is to train over 1500 students in programs aimed at producing technology leaders with a strong entrepreneurial culture, create more than 60 new patents, and launch over 50 startups. It is also anticipated that 90 new products will be put on the market in the first four years that the project is underway. The project will run until 2017

Despite these initiatives, and a set of university research centres whose activity focuses on environmental development and sustainability, the university sector in Barcelona is not as visible in the arena of renewable energy research and development as it is in bio-science. This may be a consequence of the strong presence of pharmaceutical industry headquarters in the region and the industry funding available for 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 seem warranted.

The returns from investments in green research capacity can be considerable for first movers. 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. 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 (Engel and Kammen, 2009; OECD, 2009b). 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 Ålborg and Århus 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 thus productivity and growth (OECD, 2011, forthcoming).

To benefit from the economic gains, green innovation capacities need to be unlocked in regions through cluster policies. Many OECD countries are building partnerships between government and academia as eco-innovation clusters. These clusters merge excellence in education, frontier research in environmental technologies and job creation through spin-offs, venture capital and integration of enterprises. International examples show that the universities' research specialisation and research institutes play important roles in the development of the industry in the renewable energy sector. In Denmark, 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 (Cooke, 2008). 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 (OECD, 2011, *forthcoming*).

HEIs and the 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 and process improvements for eco-efficiency of the existing industry. Catalonia has developed a cluster on energy efficiency and KIC Inno Energy work (with participation of UPC Barcelona Tech Besos campus) in this area. Despite progress made there is scope to develop 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 4.9).

Box 4.9. 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 programs 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.

Box 4.9. Design programmes for sustainable urban growth (continued)

- The Centre for Sustainable Design, University College London, 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 Regional Development. For Stronger, Cleaner and Fairer Regions, OECD Publishing, Forthcoming.

Tertiary education institutions in Catalonia 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 and other tertiary education institutions could help these agencies acquire the specialised skills to advice firms on the cost-effective ways to reduce emissions. 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. 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 enterprises (SMEs). Within these public schemes, the contribution of universities can be channelled and upgraded according to what local businesses value (OECD, 2011, *forthcoming*).

Sustainability in rural and agricultural areas

The contribution of tertiary education institutions to sustainable production can be effective in rural areas. For example, university

research on sustainable food systems is making rapid progress. Much of this research is developed through applications and testing in the proximity of the universities. The main areas of progress have been: *i*) lifecycle analysis of key food products, enabling measures to correct market failures and support modeling of the impacts of policy interventions throughout the food system, *ii*) measurement of the effectiveness of innovations and agricultural techniques in different climate conditions, *iii*) collection and processing of information on ecosystems, especially the quality and condition of soils. Foot-print assessments and technological improvements can help avoid the need for painful structural "corrections" (*e.g.* drastic cuts in the support to the highly emission-intensive diary sector).

In Catalonia, the University of Lleida is engaged in a wide range of projects, funded primarily by the European Community and the Spanish government, that contribute to environmental sustainability in the region and globally. These research efforts are particularly extensive in the fields of agriculture but extend to initiatives in sustainable energy development and, in the social sciences, on the legal and socio-economic institutional frameworks required to promote sustainability in rural regions. Two projects in agriculture that have implications for advancing environmental sustainability in Catalonia's agricultural sector include integrated pest management and post-harvest organic fruit production processing. Furthermore, projects in organic animal production and swine management are also important contributions to the rural economy of the region. The University of Lleida has several projects address how to make more efficient use of the existing limited water resources in rural Catalonia. They include a project on the hydrology of irrigation systems and one on the economic impact of water use and management. These two projects have significant implications for Catalonia, whose agricultural productivity depends on the efficiency and sustainability of its irrigated agricultural land. Many of these projects are carried out in the Agro-food Technological and Science Park in Lleida.

Box 4.10. Agro-food Technological and Science Park in Lleida

The Agro-food Technological and Science Park of Lleida was created in 2005 as a joint effort of the City Council of Lleida and the University of Lleida with the intention to become one of the main science and technology platforms in the field of agro-food in Spain and also to become an innovation centre that is able to attract technology-based companies, boost knowledge transfer and improve local competitiveness of the agro-food sector in Lleida. The park has 18 companies, 1 incubator with 21 companies and 3 spin-offs. Innopan, Fruitcentre, Maqcentre, ITL, Incafust, IRB Lleida, Agroaltic are high profile technological centres linked to the park. Around 750 graduates and researchers work there. The University of Lleida and the City Council of Lleida are the founding members and share an equal stake in the park's consortium. The park has been supported by the European Regional Development Fund and the Spanish Ministry of Science and Innovation and is located in the former military compound.

Source: CRSC (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", *OECD Reviews of Higher Education in Regional and City Development*, IMHE, *www/oecd.org/imhe/regionaldevelopment*

Despite commendable progress made, more structured research, development, dissemination and commercialisation efforts targeted at the local agricultural and agri-business production structure are needed to reduce emissions related to agriculture and diary production, and to ensure food security and sustainable rural development.

Tertiary education institutions and skill creation for green growth

Many national and regional governments in the OECD area are adjusting their skill strategies to take into account 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. Creating highly skilled human capital is critical for improving the opportunities for wider market penetration of renewable energy and low carbon technologies. Emerging green occupations will require the creation of new industry-recognised credentials and training programmes, and modifications of training packages for workers in traditional occupations (OECD, 2011, forthcoming).

Skill creation for "green jobs" can be more efficiently organised at the regional level by pooling learning resources of educational institutions and industries. 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. Catalonia should take steps to anticipate what the employment effects and labour re-allocation are needed across industries.

There is also need to collect labour market information about the green jobs in demand. Forecasting future trends in employment in the clean energy economies is difficult, as uncertainties remain regarding technological patterns (*e.g.* future upgrading of solar panel technologies) and policy developments (carbon pricing, adjustments in industrial policies and regulations). Stronger partnerships between universities, other tertiary education institutions and industrial associations would stimulate innovation in the modes of delivery of education and training.

Urban development

Some of the most important environmental contributions made in Barcelona and Catalonia have taken place in the development of urban planning and in the transformation of the city to an international model of environmentally sensitive, innovative urban design.

Catalonia is known for the quality and ambition of its physical planning, for environmental and urban planners' ability to integrate the old with the new, and for innovative approaches to enhancing an environment with advantageous location. At the regional level, the Institute for Territorial Studies (IET) of the Pompeu Fabra University (UPF) and the regional government supports the development of territorial information, planning and strategy with the focus on the resolution of territorial and urban planning problems. At the local level, Barcelona has developed a public cycle hire network that is integrated into its public transport network of buses, metro, tram and train. In this endeavour, the universities have been partners with the private design schools and the public and private sector to create a distinctive and enviable urban environment. This co-operation should be extended to a broader agenda to make Barcelona and Catalonia an urban model for energy efficiency and the use of renewable energy. For example, individual university sustainability plans could be

emulated across the Catalan University system within a University of Catalonia agenda for sustainability.

The City of Barcelona has an innovative approach to urban development in Barcelona through transforming old industrial and/or distressed areas into multi-functional urban areas (see Box 4.11.). While tertiary education institutions are key elements in the Barcelona urban renewal efforts, the drivers are much broader. Critics have referred to many real estate developments where the university facilities are being used as an anchor. There is also controversy around these developments because of the potential displacement of immigrant communities and lower socio-economic groups. However, there are clear socio-economic benefits in the Barcelona's urban regeneration model which is based on the idea of developing vibrant and safe multi-functional urban areas by combining creativity, social cohesion and economic development.

Box 4.11. City of Barcelona and urban regeneration

The City of Barcelona has an innovative approach to urban regeneration, transforming old industrial and/or distressed areas into multi-functional urban areas, with mix of living space (including social housing), business and knowledge-intensive activities. Part of the strategy is to bring in or relocate universities as early movers.

One of the examples is the 22@Barcelona innovation district, an urban renewal model that offers modern, technologically advanced and flexible spaces for the top economic activities. The initiative that involves 2 km^2 nearby the downtown waterfront is also a way of revitalise its industrial heritage and an economic development project aimed to stimulate the creation of a scientific, technological and cultural pole. There are 25 000 students in the area who study at tent university faculties and centres that have moved to 22@Barcelona District. These include communication campus of the University Pompeu Fabra. The university, in partnership with the Barcelona City Council and 14 companies have established the Barcelona Media Research Centre aimed to perform applied research in the area of communications and the media.

Box 4.11. City of Barcelona and urban regeneration (continued)

The concept has been measurably successful Between 2000 and the end of 2009, over 1 500 companies have established in the district, 45% new businesses. About 75% of the 45 000 new employees are linked to 22@Barcelona activities.

The model is being reduplicated in a contiguous area under the project of the Diagonal-Besòs Campus. This aims to revitalise a distressed area with immigrant population and high levels of delinquency.

Source: *www.22barcelona.com* and *www.barcelonamedia.org*.

Conclusions and recommendations

The broad agenda for the University of Catalonia has aimed to create a university system in which the whole is greater than the sum of its parts contains concepts that lay the foundation for change in each university in the collaboration. Within the Catalonia University plan, the third mission of the Catalan universities extends beyond applied research intended to foster innovation and economic development to social innovation to promote equity, cultural expression and responsiveness to societal needs through dialogue and action.

The opportunities for extended third mission activities in Catalan universities lie in connecting more directly to the region's internationally recognised "creative economy", building the region's reputation as a model of environmental sustainability and, most importantly, addressing the demographic transition in the region and the needs of an immigrant population. All three of these areas should be recognised in the region as important to its future. University engagement in these arenas could strengthen support for the universities and emphasise their critical role in social and well as economic leadership. Fully engaging in these arenas will require the fostering of new research initiatives, re-conceiving incentives for faculty and staff responsibilities, and developing new approaches and metrics to measure progress and participation.

Catalan universities have taken significant steps to implement "third mission" initiatives. However, the present agenda is technology-focussed with the emphasis on the application of scientific research to

develop new technologies and spin-off firms. The other dimensions of third mission activities have developed tentatively and inconsistently across the regional universities, although there are important examples on individual campuses. As a result, there are fragmented and non-co-ordinated initiatives, limited resources are spread thinly and there is a lack of critical mass to generate projects which will have real impact at the local and regional level and generate multiplier effects. Collaborative mechanisms among universities and other tertiary education institutions and between tertiary education institutions and their stakeholders to build capacity and foster joint efforts for regional development remain limited in scope and representation.

Catalonia has activities underway for the promotion of the cultural and creative industries, renewable energies and integration of migrants with high hopes for success. These initiatives need to be better co-ordinated, institutionalised and profiled, within and beyond Barcelona and Catalonia and on a European and global scale. To continue to deepen the universities contribution to the social, cultural and environmental development in Catalonia the OECD review team recommends:

Recommendations for the regional (Catalan) and local governments:

- Boost green growth and eco-innovation. Collaboration between tertiary education institutions and industry should be enhanced, for example through targeted innovation vouchers for small and medium-sized enterprises and collaborative platforms for eco-innovation. Skill creation for green jobs should be more efficiently organised by pooling learning resources of educational institutions and industries in Catalonia and providing flexible pathways between educational institutions.
- Support cultural and creative industries. In cultural and creative industries regional government should, in collaboration with educational institutions and the public and private sector, increase its efforts to support entrepreneurial skills among students and graduates and better further education opportunities. Multidisciplinary collaboration across tertiary education sectors and different institutions should be encouraged through and encouraging the establishment of joint institutes, departments and institutions.

- Reach out to migrant population. Regional and local governments should, in collaboration with tertiary education institutions, schools and the private sector, reach out to migrant populations to ensure social and economic cohesion. Current activities need to be scaled up in a systematic way, including long-term multi-stakeholder collaboration with schools to raise aspirations among migrant youth and to improve the quality of teaching. Tertiary education institutions should also reach out and empower the migrant population to address their own challenges through community development programmes.
- Connect university research to community research by supporting challenge-driven research. 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 campus 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.

Recommendations for the Catalan universities:

- Develop a forum for social, cultural and environmental development. A systematic exchange of information and experience should be put in place between tertiary education institutions in terms of environmental sustainability, eco efficiency and green growth, urban regeneration and integration of migrants, and cultural industries facilitated by ACUP, the regional or city government(s) in order to bring greater efficiency and balanced coverage and to avoid fragmentation and reduplication. There is a need for a tracking of various initiatives and an exchange forum where different initiatives would be identified and best practices publicised for urban policy fine-tuning and for widening access to tertiary education institutions. Such a forum could organise thematic events, with regular information retrieval and exchange facilitated by a dedicated website.
- Capitalise on Catalonia's attractiveness to immigrants. The universities of Catalonia should take a leadership role in regional initiatives to develop strategies to integrate

immigrants, including those from families with low educational attainment. The universities of Catalonia would also benefit from an active role in international study of immigration, integration and the metropolis and to help build regionally relevant integration plans. Catalan universities could raise public officials' and other stakeholders' awareness of labour market and educational strategies and encourage positive action.

- Contribute to the cultural and creative industries. Given the high proportion of self-employment and small business in the creative sector, the universities in Catalonia should 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. For example, the university of Catalonia could sponsor an observatory on cultural and creative industries.

Notes

1 Also many of the social science and technical (UPC) programmes have internships integrated into their programmes, even before the Bologna Process. Examples include audiovisual communication, public relations, advertisement, journalism, translation and interpretation, political science, sociology.

2 According to Richard Florida (2002), 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.

3 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.

4 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.

References

ACUP (Associacio Catalana D'Universitats Publiques) (*The Catalan Association of Public Universities*), *Executive Summary, White Paper on the University of Catalonia, Strategies and projects for the Catalan University*, no date. The University of Catalonia. See: www.*acup.cat.*

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

Castello, E. (2010), "Dramatizing Proximity: Cultural and Social Discourses in Soap Operas from production to reception". *European Journal of Cultural Studies*, Vol. 13, No. 2, 207-223.

CRSC (Catalonia's Regional Steering Committee) (2010), *The Autonomous Region of Catalonia, Spain: Self-evaluation Report*, OECD Reviews of Higher Education in Regional and City Development, IMHE, *www/oecd.org/imhe/regionaldevelopment.*

Cities of Migrations (2010), *http://citiesofmigration.ca/* accessed 3 June 2010.

Cooke, P. (2008), "Green Clusters: Green Innovation & Jacobian Cluster Mutation", *International Journal of Innovation and Regional Development.*

Davies, G.T. (ed.), (2009), *English is a Welsh Language – Television's Crisis in Wales*. Institute of Welsh Affairs, Cardiff.

De Laurentis, C. (2006), "Digital Knowledge Exploitation: ICT, Memory Institutions and Innovation from Cultural Assets." *The Journal of Technology Transfer* Vol. 31, Number 1 (January), pp. 77-89.

Engel E. and D. M. Kammen (2009), "Green Jobs and the Clean Energy Economy." *Copenhagen Climate Council Thought Leadership* Series No. 4.

Florida, R.L. (2002), *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*, Basic Books, New York.

Lund C., P. Monsour and S. Giffard, W. Miller and T. Berrill (2000) "Plug Them In, But Will They Work? - The Need for Flexible Post Secondary Renewable Energy Training", www.solis.lappeenranta.fi/arkisto/ISREE2000/homepage/lund2paper.doc last accessed on February 20th, 2010.

London Development Agency, (2006), *Strategies for Creative Spaces: Barcelona Case Study*. London: LDA.

Ministry of Education, Primary education, General assessment of the educational system, *www.institutodeevaluacion.educacion.es*

Mota Moya, P.(2007), "Migrations and Health: interrelations in the foreign immigration in Catalonia", PhD Dissertation, Department of Geography, Autonomous University of Barcelona.

OECD (2008), "The OECD REGPAT Database: A Presentation" OECD STI Working Paper, OECD Publishing.

OECD (2009a), Designing Local Skills Strategy, OECD Publishing.

OECD (2009b), "Competitive Cities and Climate change", OECD Publishing.

OECD (2010a)*, Higher Education in Regional and City Development. State of Victoria, Australia*, OECD Publishing.

OECD (2010b), *Higher Education in Regional and City Development: Amsterdam, The Netherlands*, OECD Publishing, *www.oecd.org/dataoecd/37/22/44691317.pdf*

OECD (2010c)*, SMEs, Entrepreneurship and Local Development in Andalusia*, LEED Programme report, Paris

OECD (2010d), *Higher Education in Regional and City Development. Berlin. Germany*, OECD Publishing, *www.oecd.org/dataoecd/59/6/45359278.pdf.*

OECD (2011), *Higher Education in Regional Development. For Stronger, Cleaner and Fairer Regions*, OECD Publishing. Forthcoming.

Power, D. and T. Nielsén (2010), *Priority Sector Report: Creative and Cultural Industries*, Europe Innova, European Cluster Observatory, EC. *www.clusterobservatory.eu/upload/CreativeAndCulturalIndustries.pdf* accessed 20 June 2010.

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.

SenStadt (Senatsverwaltung für Stadtentwicklung) (Senate administration for city development) (2009), Neighbourhood Management website, *www.stadtentwicklung.berlin.de/wohnen/quartiersmanagement*, accessed 25 January 2010.

SenWTF (Senatsverwaltung für Wirtschaft, Technologie und Frauen) (2008), Creative Industries in Berlin: Development and Potential, SenWTF, Berlin.

SIC (Statistical Institute of Catalonia) (2008), Immigration Here and Now. *www.idescat.cat/cat/idescat/publicacions/cataleg/pdfdocs/immigracio08en.pdf*, accessed 20 June 2010.

Spanish Ministry of Industry, Tourism and Trade (2008), *www.mityc.es/energia/balances/Balances/LibrosEnergia/ENERGIA_2008.pdf*, accessed 20 June 2010.

Chapter 5.

Capacity building for regional development

Interaction between universities and the city and the region in which they are located can be beneficial to both parties. For this interaction to happen in a constructive way, a co-ordination of efforts is needed among stakeholders. This chapter highlights the current policies, strategies and tools used by regional and local stakeholders and universities in Catalonia for regional and local development. It identifies the barriers for added-value collaboration and suggests a way forward.

The key message is that the impact of the regional engagement of universities is reduced by the fragmentation of policies and complexity of Spanish and Catalan university governance system. In order to balance the strong focus on science and technology transfer, the Catalan universities should embrace a more holistic approach to regional engagement. To mobilise universities for local and regional development targeted policies and incentives for both institutions and their faculty and staff are needed. There is also a need for direct involvement and leadership of the university rectors in regional and local development. Due to the current budget cuts at the national and regional level on research, development and innovation and tertiary education there is an increasing need for consensus building between the universities, public administration and private sector.

Finally, reforming the university governance system and strengthening institutional can unleash the potential of universities for regional and local socio-economic development. For this to happen, appropriate incentive and accountability regimes need to be put in place.

Introduction

Catalonia is one of the 17 autonomous communities of Spain and embraces four provinces: Barcelona, Tarragona, Girona and Lleida. Under the Spanish Constitution, Catalonia is a nation with legislative, budgetary, administrative and executive powers and three governing structures: *i)* the central government delegation, which is responsible for justice and ports, airports and train services, *ii)* the regional government – *Generalitat de Cataluña* – which is responsible for education (funding of tertiary education included), economic policies and trade, social affairs, transit and public facilities (universities included) and *iii)* the local government which is divided into municipalities and provincial councils. Research and development policies are shared between central (Spanish) and regional (Catalan) levels.

In March 2009, Spanish university education, which was formerly under the responsibility of the Ministry Science and Innovation, was moved under the responsibility of the Ministry of Education. There are 75 universities (50 public and 25 private), 12 of which are in Catalonia. The Spanish university system is characterised by a high degree of regulation with many co-ordinating bodies (OECD, 2009). These include: the General Conference on University Policy (*Conferencia General de Politica Universitari*a, CGPU), the Council of Universities (CU), the Conference of Rectors of Spanish Universities (CRUE) and the University System Board, with the representation of all university rectors. At the regional level, there are several other association such as the Conference of Public University Rectors of Madrid (CRUMA), the Andalusian Association of Public Universities (AUPA) or the Catalan Association of Public Universities (ACUP). There is also the Conference of Social Councils of the Spanish Public Universities which was established in 2004.

The General Conference on University Policy (CGPU) is chaired by the minister responsible for the tertiary sector and includes the person responsible for universities and research in each of the autonomous communities. Its responsibilities include the setting up of directives for university policy and the promotion of collaboration between universities and the business world. The Minister of Education together with the CGPU establishes the national level regulatory framework for tertiary education including general laws and royal decrees; additional regulation may be established by the autonomous communities. The Council of Universities (CU) is also chaired by the Minister of Education and has university rectors as members. Within its remit are the promotion of the collaboration among universities and the co-ordination within the university system.

There are currently no formal mechanisms in place to identify the regional needs or to measure the universities' or other tertiary education institutions' impact on the economic development of their regions. The CyD Foundation has published an analysis of the contribution of Spanish universities to economic development that includes figures for each autonomous region. Furthermore, the Catalan Association of Public Universities (ACUP) is in the process of undertaking an analysis that embraces the public universities in Catalonia, but does not include the private university sector or the vocational tertiary education sector. Notwithstanding the difficulties in measuring universities' and tertiary education institutions' regional impact, it is necessary to do it in a way that involves the stakeholders and enhances their mutual learning and collaboration. At an institutional level, four universities have carried out analysis of their impact in the region. These are the University of Lleida (UdL), the University Rovira i Virgili (URV) in the province of Tarragona, the University of Vic and the University of Girona (UdG).

In the context of organisational and institutional thickness and a lack of clear local and regional mission for universities, this chapter examines the following questions:

- Does the Regional Government of Catalonia have a clear strategy for the development of tertiary education and capacity to steer the system to meet the needs of Catalonia?
- Do the current structures and mechanisms for co-ordinating the universities' and other tertiary education institutions' activities help?
- Do the current structures and mechanisms support and incentivise regional and civic engagement of the universities and other teriary education institutions of Catalonia?

5.1. Strategy for regional development: instruments at regional and provincial level

Catalonia has no overarching strategic plan for regional development which would highlight the contribution the universities can make. However, a number of development plans at different levels have been launched. Despite some overlap and unclarities in evaluation mechanisms they are important mechanisms to promote a shared vision for local and regional development, identify strengths and weaknesses and mobilise relevant stakeholders to drive regional development.

At the regional level, there is a number of key strategy documents that have a strong focus on internationalisation and regional development. These

include: *The strategic agreement for the internationalisation, employment quality and competitiveness of the Catalan economy 2008-11* (from now on referred to as the Agreement 2008-11) and *The Catalan Agreement on Research and Innovation*, CARI (2009). At the provincial level, there are strategy documents for Barcelona metropolitan region and for Tarragona: *The Strategic Metropolitan Plan of Barcelona* (PEMB) and *The Strategic Plan of the Camp of Tarragona*. There is no clear mechanism of articulation among the different strategies, plans and other instruments. In order to maximise the return on investment there is a need for better co-ordination between the strategic plans and their implementation.

The strategic agreement for the internationalisation, employment quality and competitiveness of the Catalan economy, 2008-11

The Agreement 2008-11 has the advantage of representing continuity in regional development in Catalonia: it followed the first agreement which was promoted by the Catalan government in 2005-08 and involved employer organisation and trade unions. The second iteration of the agreement for 2008-11, specific goals for universities were added for universities as important actors to achieve the region's economic transformation goals. However, universities were only marginally consulted in the development of these goals and performance indicators as the agreement was prepared with the collaboration of university faculty members but not of universities as institutions. The involvement of universities in the implementation has also been marginal. The universities' role in strategy development has been limited to consultancy-type collaboration rather than a deeper partnership with the region.

The Agreement 2008-11 has sought to promote university engagement with regional needs through the creation of a funding stream linked to knowledge transfer activities. The funding was allocated through the Directorate General for Research and ACC1Ò, which is a public agency for business development and external promotion of the Catalan Ministry of Innovation. The responsibility of articulation with the university sector has been left to these bodies. The regional government should consider whether a more competitive way of allocating these funds would bring better results in driving regional engagement of universities. The Agreement 2008-11 also advocates the rationalisation and specialisation of the science and technology parks. However, it is not clear through which mechanisms this aim will be achieved and how the university sector will be engaged. Most science and technology parks (25) in Catalonia are university-linked (OECD, 2010).

The Agreement 2008-11 has a special line of action (line 7) devoted to university policy. This action line stresses the importance of developing a university model that focuses on excellence, the implementation of the Bologna reforms and the improvement of the university-industry relations. However, the scope of the actions to achieve these goals vary from very general in terms of the excellence and implementation of Bologna reforms, to very narrow in terms of the improvement of university-industry relations (for example, the establishment of administrative mechanisms to enable university lecturers to participate full time in the technology centres). The responsibility of implementation rests with the Directorate General for Universities.

The Agreement 2008-11 identifies the need for re-composition of the universities' social councils as a success factor for the improvement of university-industry links. While steps should be taken to develop and enhance the role of social councils, more drastic measures are needed to modernise the university sector in Catalonia and to mobilise it for industry and local and regional engagement. Improving the collaboration between the regional government and the university sector would be the first necessary step forward in building bridges between tertiary education sector and the region.

The Strategic Metropolitan Plan of Barcelona (PEMB)

The Strategic Metropolitan Plan of Barcelona (PEMB), established in 1990 as the first strategic plan of Barcelona, has gone through several reiterations. It evolved into the Strategic Metropolitan Plan by 2003, which was revised in 2007. Finally, a new model was put forward in 2008 until 2020. The plan is promoted by the Barcelona City Council and its mission is to identify and promote support strategies for the socio-economic development of the metropolitan area of Barcelona. PEMB is a private non-profit organisation that brings together the 36 municipalities of the metropolitan area of Barcelona together with government administrations (Regional Government, Barcelona Provincial Council and other regional councils) and key economic and social bodies, including the University of Barcelona. The plan builds on the achievements so far and was developed on a basis of an analysis identifying strengths and weaknesses, threats and opportunities. The plan proposes goals to facilitate the transition from an international city to a global metropolitan area.

Catalan Agreement on Research and Innovation (CARI)

The Catalan Agreement on Research and Innovation (CARI) is the main framework for the definition of research and innovation policies in Catalonia. It actively involved the Government of Catalonia, three political parties with parliamentary representation, Catalan universities, employer associations and trade unions. The CARI sets a vision through 2020 of what Catalonia should do through a series of 131 commitments. Many of these commitments explicitly engage universities to work towards the objectives set for addressing each of the eight challenges (see Box 3.A1.1. in Annex to Chapter 3). This agreement has a strong focus on world class excellence and lacks an explicit regional focus and dimension. The CARI is implemented via the region's research and innovation plans. The 2010-13 plan has a more explicit axis for supporting local development.

The Strategic Plan of the Camp of Tarragona

The Strategic Plan of the Camp of Tarragona is an initiative of the Regional Government of Catalonia and the University Rovira i Virgili (URV) which has led the strategy work. The strategic plan is a result of close stakeholder collaboration, mainly with business associations, trade unions and chamber of commerce. This plan emphasises sustainability, economic and social cohesion and creativity as key elements for the progress and social welfare. Strong engagement with local stakeholders and responsiveness to their needs is a key priority for the University Rovira i Virgili (URV) and its leadership and the university enjoys support from the local and regional stakeholders and business.

Another interesting initiative is the Institute for Territorial Studies which is a consortium between the Regional Government of Catalonia and the University Pompeu Fabra. This institute focuses its research on regional and urban planning and development, and supports the local and regional authorities. It would be useful to develop a network with similar research centres in other universities in Catalonia.

5.2 Universities as partners in regional development

Catalonia's tertiary education is dominated by universities, albeit the vocational tertiary education sector is growing. There appears to limited number of links between the university and vocational education sector which has a negative impact on regional and local development.

The Catalonian university system consists of eight public and four private universities. The Open University of Catalonia is a public institution

under private management. Eight universities are located in Barcelona, including four public plus four private institutions. Each of the provinces of Tarragona, Girona and Lleida has a public university. Since 1985 the jurisdiction for the universities has rested with the Regional Government of Catalonia. The Association for Catalonian Public Universities (ACUP), and the Interuniversity Council of Catalonia are the co-ordination bodies for the university sector.

According to the Spanish Law, universities provide a public service through research, teaching and collaboration with society. While most Catalan universities embrace regional engagement in their strategic plans, there is a narrow "technology and science push" approach to regional engagement and innovation. Universities focus on knowledge and technology transfer through their own science and technology parks. The Catalonian government has recognised the need for rationalisation and specialisation of the science and technology parks. Here universities, through their associations, could play an important role.

Universities in Catalonia, as in many other regions and countries, have a limited tradition of inter-institutional collaboration. Instead they compete for students, staff and research grants and often find it easier to co-operate with non-Spanish universities than with the universities next door. Catalan universities are also locked in a supply-driven system where there is a lack of rationalisation in the offer, many universities offering identical degree programmes. The case of the Barcelona Institute for International Studies (Institut Barcelona d'Estudis Internacionals, IBEI) is a good example of co-operation among universities to create critical mass in a given domain with an international impact.

Box 5.1. Barcelona Institute for International Studies (IBEI)

In 2004, the Institut Barcelona d'Estudis Internacionals (IBEI) was established as a private foundation through joint efforts of the five public universities of Barcelona and the CIDOB Foundation with the aim to educate high profile professionals in politics and international relations. Later on, the Regional Government of Catalonia, the Barcelona City Hall, the Barcelona Provincial Council, the Association of Barcelona Metropolitan Area Municipalities and the Ministry of External Affairs and Co-operation joined the steering committee. Within a short period of time, IBEI has gained international prestige. One of its major programmes, the master course in international relations has increased the student number to around 100 per academic year (2009-10). The IBEI graduates have a high employability rate: 86.8% of the graduates have found a job after finishing the master programme.

Box 5.1. Barcelona Institute for International Studies (IBEI) (continued)

IBEI has also focused on creating a strong academic group that are linked to the institute and undertake research on three main areas: international security, global governance and political economy.

Source: CRSC (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE, www/oecd.org/imhe/regionaldevelopment.

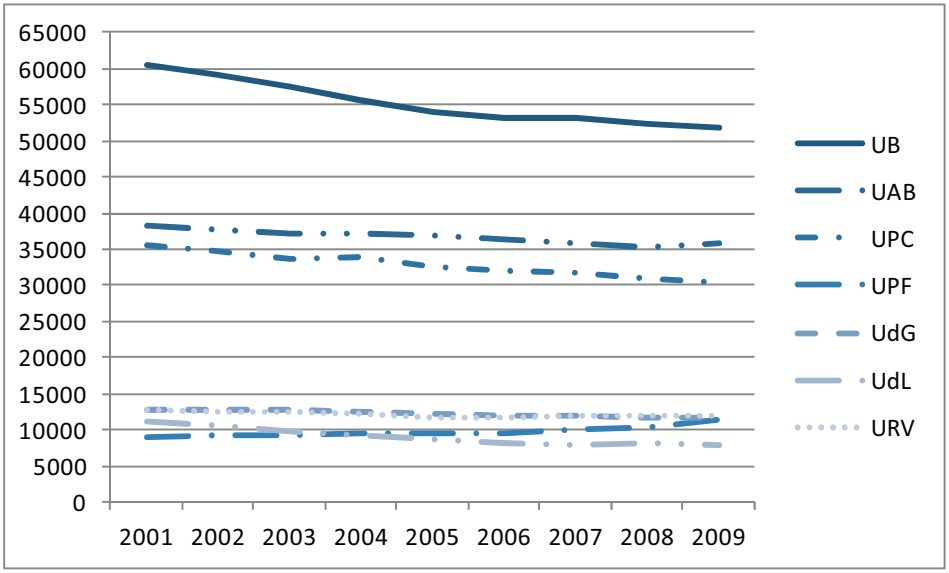
The Association of Public Universities in Catalonia (ACUP) has addressed the need for a stronger co-operation among the public universities in its strategic document *White Paper on the University of Catalonia*. This white paper advocates the creation of the University of Catalonia brand and has a strong focus on internationalisation. It would be useful for ACUP to address the need for rationalisation and networking in order to exploit synergies and maximise the use science and technology competences for the benefit of regional development in Catalonia.

Funding and incentives

Funding of the public universities in Catalonia combines formula-based funding that covers teaching and research activities with project-based target funding (programme-contracts). Both input and output based formula are included in the criteria while the corresponding block grant covers salaries for teaching and research staff. Level of project-based funding started at 2% in 1997 and increased to 13% in 2010. The contracts include four strategic areas: *i)* teaching (learning process), *ii)* research and technology transfer, *iii)* university-society relations (third mission) and *iv)* internal management. Here, the "third mission" activities are separated from the two key missions of the university – teaching and research – and also from the knowledge and technology transfer area which is often the case. Universities also compete for funds usually linked to R&D projects at the national or European level. The Regional Government of Catalonia agreed to increase funding in the period 2007-10 by EUR 454.5 million (65% of which were to be linked with objectives). The fact that this commitment has not been implemented together with the current budget cuts at a national and regional level on RDI and tertiary education has led to a critical situation in the university sector which is faced with a growing need to diversify its funding sources.

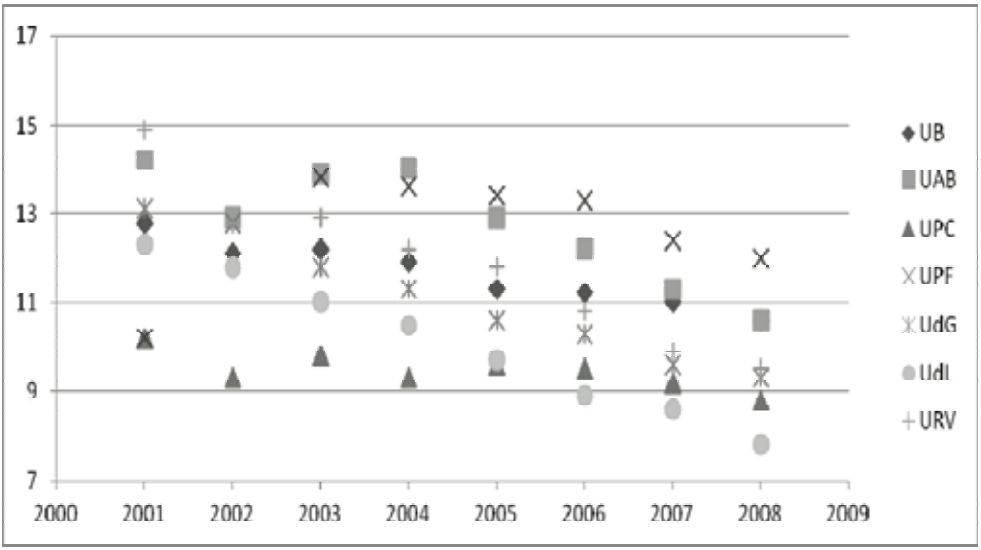
The number of students at the public universities, excluding the Open University of Catalonia (UOC), has decreased by about 10% in the last eight years. The reduction took place in all the universities with the exception of the University Pompeu Fabra in Barcelona, where the student enrolment increased slightly and the University of Girona which maintained the number of enrolments (Figure 5.1). The decrease in student enrolment has not been reflected on the budget. The student/academic staff ratios have become more favourable and are now around 10 to 1, *i.e.* ten students per one academic staff member, below the Spanish average of 14 to 1 (Figure 5.2). According to the interviews, there is a push to remove disciplines where the student/academic staff ratio is below 15 to 1. The favourable student-staff ratio also provides an opportunity for the university management to mobilise faculty for "third mission" activities. In the absence of incentives this is, however, a challenging task.

Figure 5.1. Number of students in public universities in Catalonia



Source: CRSC (2010), OECD Reviews of Higher Education in Regional and City Development: The Autonomous Region of Catalonia, Spain. Self-Evaluation Report, *www.oecd.org/edu/imhe/regionaldevelopment.*

Figure 5.2. Ratio students per academic staff in the public universities in Catalonia



Source: CRSC (Catalonia's Regional Steering Committee) (2010), OECD Reviews of Higher Education in Regional and City Development: The Autonomous Region of Catalonia, Spain. Self-Evaluation Report, *www.oecd.org/edu/imhe/regionaldevelopment*

The rigid rules governing civil service and the fragmentation of staff into non-permeable categories have become obstacles to the diversification of tasks, salaries and duties that characterise universities in a modern, fast-changing and competitive society (Catalonia's Regional Steering committee, 2010; Santiago *et al*., 2009). For teaching and research staff, the recruitment, pay and promotion are nearly exclusively determined by research performance, measured primarily by publications. Management and leadership functions are poorly rewarded and "third mission" activities are absent from the list of factors that have an impact on faculty career development. The lack of incentives is a common feature in many universities and countries where regional engagement is perceived not only as a secondary role for universities when compared with research but also as a detracting activity.

In (research-based) universities worldwide promotions and reward system for faculty is largely based on the publication or research in peer reviewed journals. Universities tend to set promotions and tenure criteria based on the system-wide norms, which do not usually accept other forms of outputs. Academics are also being asked to perform more tasks including teaching and administration which places pressures on their time to

undertake research and publish. Combined, these factors have resulted in tensions among faculty that reduces their interest to undertake activities that do not contribute to their research publications which remain the primary method for their assessment and reward (PACEC, 2010).

There is a need for national, regional and institutional policies to improve the incentive structures to support the regional and local engagement of universities and their faculty and staff. Specific policies are required to address this issue. Left to themselves, many academics would be re-occupied with research (and teaching), the activities upon which most are assessed.

Transforming attitudes and mindsets of the academics and creating an engagement agenda that embraces academic enterprise and engagement with local and regional stakeholders require strong university leadership and a planned strategy initiated by the university senior management. In Catalonia, a good example of an institutional strategy and policy driven by the university leadership can be found in the University Rovira i Virgili (see Box 5.1.). However, while this is an excellent example, system level steering is required to mobilise the whole university sector.

Universities face a series of challenges when they aim to expand the scope of their activities beyond teaching and research into the "third mission" activities, such as community development, technology transfer or translational research. One major challenge is the creation of incentives to encourage faculty contributions beyond the conventional arenas of research and teaching. A second challenge is to find appropriate methods to evaluate those contributions.

Box 5.2. Rovira i Virgili: creating incentives for faculty participation in third mission activities

The University Rovira i Virgili in Tarragona has an active third mission agenda, including entry points for small and medium-sized enterprises (SMEs) to the university knowledge base, social and cultural programming in 22 cities in southern Catalonia and active participation in fostering a knowledge based petro-chemical industry cluster in the sub-region.

Contracts for the university faculty recognise the importance of and give value to faculty participation in these outreach efforts. The university faculty contract has been re-organised around a system with a ten-point base.

Box 5.2. Rovira i Virgili: creating incentives for faculty participation in third mission activities (continued)

All faculty are expected to undertake research and to teach, with the minimum contractual obligations constituting six of the expected ten points. To reach the expected ten points, faculty can contribute in a variety of ways, according to their interests and expertise. For some faculty, this may mean giving presentations in programmes in which the university is developing a presence. For others, it may mean working with a small and medium-sized enterprise (SME) to implement a technology transfer or technology commercialisation project. For other faculty, reaching the ten points may mean additional research and publication.

The goal of this governance strategy is to set a base expectation for faculty performance in core activities. This evaluation method also creates the flexibility to allow faculty to contribute in arenas related to the university's goals to expand its third mission activities. All of the criteria for performance constitute a unit contributing to the ten-point base are publicly available and the activities of each faculty member toward achieving the base standard are available to all members of the department. The goal of the university in developing this evaluation programme is to create a more transparent and accountable university. In future, it would be useful to give better visibility for the university expertise.

The role of universities in regional development is linked to their role in regional decision making. In the case of Catalonia participation of universities in regional government bodies is not mandatory. A key factor to enhance the role of the institution in the regional development policies and decision making is the direct involvement of the leadership of the university. Since it requires a corporate response and multidisciplinary approach that only the rectorate team can facilitate, regional engagement should be a task of the head of the institution.

Reflecting the importance attached to region-wide economic and community development, universities will also need to establish leadership positions dedicated to develop and implement the third mission and regional and local engagement. This position should be backed up by resources and infrastructural development to help the university to support region-wide economic and social development. In the Catalan context, this would mean setting up an appropriately staffed interface structure, not just a technology transfer office that reports directly to the university rector and/or is steered by a pro-rector.

5.3 Governance, autonomy and accountability

Catalan universities perform under a system of shared governance which is decentralised and "democratic". The decision-making powers are shared between all the potential stakeholders, which may result in a lengthy, unclear and often cumbersome decision-making process. A recurrent concern of interviewees during the OECD review visit was the lack of autonomy of public universities and the slow pace of decision making.

University autonomy is linked with the ability of universities to respond to the expectations and needs of the society. The autonomy requires accountability as a counterbalance and a accountability framework in which the universities can operate. Autonomy refers to the relations between the state and tertiary education institution and the degree of control exerted by the state. There are four areas were the degree of control by the state influences the performance of the universities: *i)* organisational autonomy, *ii)* staffing autonomy, *iii)* financial autonomy and *iv)* academic autonomy.

Organisational autonomy refers to the ability to determine institutional strategies and to establish internal academic and administrative structures, governing bodies, university leadership and management procedures. In most cases national legislation contains guidelines for the formation or structure of the decision-making body/bodies within universities, as well as the groups represented in them and the selection of their members. Universities are often relatively free to decide on administrative structures and to shape their internal academic structures within the legal frameworks.

There is a trend towards the inclusion of external members in the university decision-making processes, especially where universities have dual governance structures. This is regarded as an important form of accountability but also serves other, strategic purposes since external stakeholders are often selected to help build links for multiple purposes with other sectors and industry. Their role, however, remains controversial: external stakeholders may be either seen as having far too little interest in and commitment to university affairs, or having excessive control over academic issues. Finding the right balance and providing an efficient and appropriate way of engaging external stakeholders would form a crucial part of current and future reforms on governance. In terms of leadership, the shift towards CEO-type rectors in some western European countries appears to go hand in hand with a greater autonomy in university management. At the same time, a significant number of more traditional models exist where the rector is an academic *primus inter pares* and is selected by the internal academic community amongst the professors of the university in question. Dual governance structures appear to be gaining ground with a varying

degree of division of power between bodies, usually comprising a board/council and a senate.

In Spain, the public university governance is regulated by law, which prescribes in detail the internal organisation of the university with a number of collegial bodies: social council, governing council, university assembly (*Claustro)*, school and faculty councils and individual roles: rector, vice-rector, secretary general, manager, dean, director of school, institute and department. The governance model in Spanish and Catalonian universities represents a unitary model, albeit the existence of the social councils with a majority of external members. As a result, it is the academic faculty that is in control of governance, management and running of Spanish and Catalonian universities.

Box 5.3. University governance in Spain

The governing council, is chaired by the rector and has up to 50 members, includes the secretary general, the manager, the vice-rectors, representatives of Deans and Directors and representatives of the university community.

The university assembly (Claustro) has a membership of up to 300 people, and is chaired by the rector and comprises the secretary general, the manager, and representatives of all the groups within the university community. It is responsible for the election of the rector, a professor from within the university and the approval of the statutes of the university. The University Act in 2007 also opened up the possibility of the rector being elected directly by the university community.

The social council is the body that has been tasked to represent the public interest in the university. Majority of members (in Catalonia 9 out of 15) are external to the university and represent cultural, professional, economic and social interest of the region, one of them chairs the council upon the nomination from the autonomous community. Internal members include the rector, the secretary general, the manager, a representative of the academic staff, a representative of the student plus a member appointed by the governing council. Despite the fact that the mechanism is in place, there are concerns whether the external members are playing or have the capacity to play their intended role. External members of the social councils identified the lack of time and the lack of pertinent and timely information about the university business as major constraints for a more active role.

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

The university act in Spain does not stipulate the maximum size for all the governing bodies and how the faculty, departmental and school leaders are identified, leaving some room for manoeuvre. However, most Catalan universities have opted for relatively complex structures for their governing bodies, with maximum number of members for the senate and governing council. There is also a burdensome election process to identify the university leaders. It is questionable whether this is the best process to identify competent leadership.

During the last five to ten years throughout Europe there has been a strong movement to change university governance and management and at the same time make the institutions more autonomous, but also more responsive and accountable to their stakeholders. The aim is to endow universities with governance mechanisms capable of taking the right decisions and ensuring that they are implemented in a timely manner. Hence, governance models inspired by the corporate industry are becoming common for universities in many European countries. The new governance models typically include three levels of organisation: *i)* the board, including participation of stakeholders, which has competences for strategic decision and responsibility for choosing and appointing the rector or president whose competences and responsibilities are those of a chief executive officer, *ii)* the management council, which is presided over by the rector, and whose membership is limited to a few number of appointed members, chosen by the rector and *iii)* deans and heads of departments, who are nominated by a search committee reporting to the rector and appointed by the rector.

This is a model that centralises decision power on the rector and her/his team. It leaves to the rectorate the responsibility of finding necessary synergies, by establishing adequate participatory mechanisms. It relies on the personal and leadership qualities of the rector and his team to mobilise the institution for academic change and region-wide socio-economic development. This model is expected to help streamline the process from the strategic decision/plan to implementation. Universities will not only adapt more easily and rapidly to the changes and but also be able to lead the necessary changes. However, finding the right degree of centralisation in terms of decision making and implementation is often not easy in universities. Given the characteristics of the university as an organisation, the adoption of strongly co-ordinated decision making processes may be the appropriate way to move forward.

To move this agenda forward, it would be useful to introduce a pilot project for the governance of public universities in Catalonia launched by the Association of Public Universities in Catalonia (ACUP). Through this pilot project, the Catalan universities could progressively achieve opportunities for flexibility in institutional development and human

resources management. The increased autonomy would need to be introduced differentially in a phased up fashion, and over time depending on the capacity of the institution and the extent of the challenges they face.

International experience includes Portugal where an evolutionary development process was introduced as a response to the OECD review of National Policies for Education-Tertiary Education. Some institutions took advantage of the possibility granted by the new law to change their juridical entity and applied to become "public foundations" This status granted them greater autonomy in financial management and human resources management. However, the main barrier to the change is not the law itself but the culture of the university community. While the statutes have to be approved by a body with a membership of 300 any change is challenging.

Autonomy in human resources

One of the important elements of staffing autonomy is the extent to which universities have control over the financial aspects related to their payroll. This includes control over the overall salary costs and individual salary levels, as well as the degree of flexibility universities have in the recruitment of their staff (even if procedures are regulated to a certain degree).

There are mainly two categories of staff in Spanish universities: academic staff and administrative and support staff. In the public universities both comprise civil servants and salaried employees. Academic staff has tenure from an early stage in the academic career. The pay schemes appear to be relatively complex: On top of a basic salary that comprises limited performance-based differentiation, there are a series of bonuses at national level, based on the number of *sexenios* (that are evaluated in six year periods). *Sexenios* apply only to the civil servant academic staff. There is also the possibility of establishing internal bonuses schemes under the control of the governing council as the University Rovira i Virgili (URV) has done.

In many countries, universities are gaining more flexibility in human resources, while staff is directly paid and/or employed by the university instead of the government and/or staff are no longer civil servants. The ability of universities to define individual salaries, however, often remains controlled by the government. Furthermore, significant differences remain in the recruitment procedures, ranging from a larger degree of freedom to formalised procedures including external approvals, sometimes by the country's highest authorities. Although this is in some countries only a formality, it has an impact on the length of the recruitment procedures and

the flexibility to act quickly in an increasingly international recruitment environment.

Conclusions and recommendations

Catalonia has a growing capacity for strategic collaboration at the regional level. Several plans have been developed to anticipate the future challenges and to provide means to address them. These plans promote stakeholder participation. However, due to a lack of shared learning and institutional engagement, this goal has been only partially reached. A lack of co-ordination among different policies and instruments remains a challenge. A stronger co-ordination among actors at central, regional, provincial and municipal levels is needed to overcome the fragmentation of policies and the complexity of the governance system.

Earmarked funding for technology transfer in the university sector is available and allocated to different governmental bodies. A complex support system for R&D and technology transfer is in place. An extensive number of science and technology initiatives are in place throughout the region, often linked to universities. A regional identification of clustering exists, but the way in which cluster development is put into practice reveals a lack of articulation among the structures and mechanisms. There is a plan to rationalise these structures but the extent to which universities are involved in the planning and implementation of the rationalisation is not clear.

The Catalan university system has a high number of institutions distributed across the region catering for 225 000 students (in 2008/09). The universities are increasingly involved in science and technology transfer activities and most have developed their own interface structures to manage these tasks. However, there is a narrow understanding of the third mission and regional engagement, focusing on "science and technology push" model which acts as a constraint for a broader approach to regional and local development. There is a need to move away from the current highly transactional or consultancy approach of knowledge exchange towards a partnership model and collaboration in which the user is seen as a partner to the university rather than a customer. The emphasis on relationship and partnership building would allow the universities to improve access to knowledge captured within the institution and improve the quality and scale of knowledge exchange activities.

Universities compete for students and staff and have limited tradition for collaboration. The university degree programme portfolio reflects a supply-driven approach. The Regional Government of Catalonia has passed a regulation to avoid programmes without a minimum number of enrolments.

In Catalonia universities student/staff ratios are favourable, around 10 to 1. Advantage should be taken of this favourable situation, before it turns into a threat that might imply decreasing public funding.

Within the university sector, regional engagement is perceived as a responsibility for the university social councils. To improve this engagement there is a movement to change the composition of the councils. This approach, however, fails to address the real challenge: the governance model of the universities. In this respect Catalonia and Spain have an additional burden of a cumbersome and old-fashioned model of institutional governance. A higher degree of co-ordination is also required for the university sector.

Catalonia has significant activities under way for the promotion of regional development and innovation. The OECD review team recommends that the chances of success can be increased if the following measures are taken to enhance partnership building and to reform university governance:

Recommendations for the Spanish government:

- Take *steps to modernise university governance by launching a pilot project.* To remove the barriers for universities engagement in regional and local development and other entrepreneurial activities, the university collegial bodies, with elected rectors and deans, should be replaced by a dual structure with appointed leaders and boards including external stakeholders. Universities should have increased institutional autonomy over financial, estate and human resources management. An agreement could be reached whereby some Catalan universities could apply to adopt more managerial forms of governance and be granted a higher degree of autonomy. Such a programme could run for five to seven years as a pilot project that would be evaluated and results disseminated afterwards throughout the university system.

Recommendations for the regional (Catalan) government:

- *Establish a regional co-ordination platform for tertiary education.* To enhance co-operation and long-term dialogue between tertiary education and the region a co-ordination platform involving university rectors, presidents of social councils, and local and regional governments should be established. The Regional Government of Catalonia should develop a framework and a strategic plan, elaborated as a shared task between the stakeholders

– university and the region – to promote this co-operation. Progress should be monitored and relevant changes included in a dynamic way. Steps should be taken to ensure that there is better collaboration between the university and vocational tertiary education sector.

- *Strengthen incentives for universities' regional engagement activities.* The Regional Government of Catalonia should design a funding allocation mechanism to drive the engagement of universities and different stakeholders in joint strategic initiatives. The regional government should take a full advantage of the decentralisation of the funding for universities in order to reward and incentivise contribution of universities to regional development.

Recommendations for Catalan universities:

- *Prioritise regional and local development.* The universities of Catalonia should attach a top priority to the region-wide socio-economic development and engagement by making the rector or pro-rector (who is reporting directly to the head of the institution) responsible for this task. A professional management should be put in place to support this task. Along with science and technology transfer, stronger focus should be given to a broad range of regional and local development such as human capital development as well as social, cultural and environmental development. Incentives should be created to encourage university faculty and staff engagement.
- *Collaborate to rationalise the degree programme offer.* The universities in Catalonia should develop ways to rationalise their offer of degree programmes and to develop joint degree programmes at master's and PhD level. Good progress has already been made in inter-university PhD and master programmes.

References

CRSC (Catalonia's Regional Steering Committee) (2010), "The Autonomous Region of Catalonia, Spain: Self-evaluation Report", *OECD Reviews of Higher Education in Regional and City Development*, IMHE, *www/oecd.org/imhe/regionaldevelopment.*

Estermann T. and T. Nokkala (2009), *University Autonomy in Europe I. Explanatory Study*, EUA, Brussels.

OECD (2007), *Higher Education and Regions: Globally Competitive, Locally Engaged*, OECD Publishing.

OECD (2010), *OECD Reviews of Regional Innovation Catalonia, Spain*, OECD Publishing.

PACEC (Public & Corporate Economic Consultants) (2010), *The Higher Education Knowledge Exchange System in the United States*. A report to HEFCE by PACEC and the Centre for Business Research, University of Cambridge.

Reichert, S. (2009), *Institutional Diversity in European Higher Education: Tensions and Challenges for policy makers and institutional leaders*. EUA, Brussels.

Santiago, P. *et al.* (2009), *OECD Review of Tertiary Education: Spain*, OECD Publishing.

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 is reaching out to 14 regions and city-regions in 11 countries. 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.

Susan Christopherson is J. Thomas Clark Professor in the Department of City and Regional Planning at Cornell University. She is an economic geographer (PhD, U.C. Berkeley) whose research focuses on economic policy and economic development. Her work in the field of economic development has focused on strategies for revitalising the New York State economy. In the past five years, she has completed policy studies on economic development via targeted workforce development; a clusters strategy to build the photonics industry; the role of universities and colleges in revitalising regional economies; and production trends affecting media industries in New York City. Susan Christopherson is an expert on the film and television industries and particularly on work and the workforce in those industries. Her recent research has focused on the way in which trends in media work foreshadow changes in work organisation across the economy.

She has served as a consultant to the OECD Working Party on the Role of Women in the Economy. In the field of media services, she has examined the implications of media globalisation and trade policy in China and Jordan for the United Nations Conference on Trade and Development (UNCTAD). Her current projects include studies of phoenix industries in resilient regions and entrepreneurship in creative industries.

Ernesto Flores joined the OECD Programme on Institutional Management in Higher Education (IMHE) in Paris in 2009 for a 15-month secondment to support the OECD review programme Higher Education in Regional and City Development. He holds a Masters degree in Productivity and Quality Systems from Monterrey Institute of Technology and Advanced Studies, Mexico. He has also followed a training of Cluster Management in the Barcelona Graduate School of Economics. He 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. There, he served as planner and consultant in strategic planning for Federal Government offices to support them applying strategic thinking and planning, developing scorecards and using technologies to strategy follow-up in order to align actions consistent with the Mexico's National Development Plan. Since 2004, he has been working at the Sonora Institute of Technology (ITSON) as planning coordinator in the Directorate for Planning, at the Rector's Office, where he has participated in projects aimed at improving economic and social performance in Southern Sonora, Mexico, such as the creation of a Technology Park and the Digital City initiatives. He is the liaison for university's international projects in the field of innovation-based regional development.

Ellen Hazelkorn is Director of Research and Enterprise and Dean of the Graduate Research School, Dublin Institute of Technology; she also leads the Higher Education Policy Research Unit. She has worked with universities and university associations around the world and is associated with the International Association of Universities (IAU). She has been a Consultant to the OECD/IMHE. Hazelkorn is a member of the Irish National Digital Research Centre (NDRC) Management Board and the International Advisory Council of the Irish Research Council for the Humanities and Social Sciences. She was appointed to the Review Body for Dutch Higher Education, and was a member of the review team in the OECD Review of Higher Education and Regional and City Development of the State of Victoria. She has been nominated to the Board of the United Nations University. She was Rapporteur for the EU Expert Group on Assessment of University-based Research, and a member of the Arts, Humanities and Social Sciences Foresight Working Group (Ireland). Hazelkorn is also a

member of the International Rankings Expert Group (IREG), the Executive Committee of the Dean and European Academic Network (DEAN), and of the Editorial Boards of Higher Education Management and Policy, HEMP (OECD/IMHE) and Higher Education Policy (IAU). Hazelkorn has authored/co-authored 80 articles, policy briefs, books and book chapters and other papers on Irish politics and society; digital technologies, gender, work practices and the cultural industries; relations between the media and the state; and higher education policy. Most recently, she has published on the impact and influence of higher education rankings on decision-making and academic behaviour in association with IMHE and IAU, EUA, UNESCO and the Institute for Higher Education Policy (USA).

Karen Maguire is Head of Unit for Regional Innovation in the Regional Competitiveness and Governance Division of the OECD's Public Governance and Territorial Development Directorate. Her projects focus on policies regarding clusters and regional innovation systems. She is the main author of the OECD publication *Competitive Regional Clusters: National Policy Approaches* and a co-author of *Globalisation and Regional Economies: Can OECD Regions Compete in Global Industries?* She is currently managing several OECD Regional Innovation Reviews, including Catalonia (Spain). Those recently completed include the North of England and Mexico (15 states). Prior to joining the OECD, Ms. Maguire worked as an investment banker for UBS in New York, an international consultant in economic development and a research analyst for the Urban Institute in Washington, D.C. She holds a Bachelor's degree in economics and sociology from the University of Chicago and a Master in Public Policy from Harvard University's Kennedy School of Government.

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 two hundred and twenty 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 of 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. 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).

Maria Helena Nazaré began her academic career in Mozambique, in 1973, lecturing at the University Eduardo Mondlane. Before her special interest in Physics was to take her to the University of Aveiro, in Portugal, she spent three years working on her PhD at King's College London, graduating in 1978. In 1986, she took up leadership of the research group in Spectroscopy of Semiconductors in the Department of Physics at the University of Aveiro. She has been developing a long-standing activity in higher education management, be it at the University of Aveiro, as well as in national and international positions. Rector of the University of Aveiro since 2002, she has formerly been Head of Department, between 1978 and 1980 and again between 1988 and 1990, Vice-President of the Scientific Council in 1990-91 and Vice-Rector of the University of Aveiro, a position held until 1998. Member of the Research Working Group of the European University Association, and member of the EUA Institutional Evaluation Pool, since 2004, she has participated in the evaluation of universities in Spain, Turkey, Palestine and Slovenia. She has been appointed Vice-President of the EUA in 2009. She is also chair of the Portuguese Rector's Conference Committee for Research and Knowledge-transfer and a member of the administration board of Portugal Telecom.

Annex II: Programme of the review visit

Sunday 28 February 2010

18:00-19:30 OECD Review Team internal meeting

19:30-20:30 Meeting with regional coordinators

Monday 1 March

09:00-10:00 **Meeting with Regional Co-ordinators and authors**

- Josep M. VILALTA, Executive Secretary, ACUP
- Martí PARELLADA, General Director, Fundación CyD
- Jose García QUEVEDO, author and coordinator of the self-evaluation report
- Néstor DUCH, author of the self-evaluation report
- Xavier FINA, author of the self-evaluation report
- Alicia BETTS, author of the self-evaluation report

10:00-11:00 **Third mission role of the Open University of Catalonia (UOC)**

- Pere FABRA, Vice-rector of Academic Affairs and Staff, UOC

11:30-12:30 **Meeting with the Steering Committee**

- Josep M. VILALTA, Executive Secretary, ACUP
- Martí PARELLADA, General Director, Fundación CyD
- Francesc SANTACANA, Strategic Metropolitan Plan of Barcelona
- Joan CAMPRECIÓS, Strategic Metropolitan Plan of Barcelona
- Xavier TESTAR, Barcelona City Council
- Mateu HERNÁNDEZ, Barcelona City Council
- Eva GRANADOS, UGT Catalunya (Trade Union)
- Rosa NOMEN, Vice-rector for International Relations, Ramon Llull University

12:30-14:00 **Meeting with Rectors and Presidents of the Social Councils of the Catalan universities**

- Joan VIÑAS, Rector, University of Lleida
- Xavier GRAU, Rector, Rovira i Virgili University
- Miquel OLIVER, Vice-rector for Quality and Institutional Strategy, Pompeu Fabra University
- Enric GARCÍA-BERRO, Vice-rector for Academic Staff, Polytechnic University of Catalonia
- Martí CASADESÚS, Vice-rector for Planning and Quality, University of Girona
- Conxita ÀVILA, Deputy Rector for special innovation actions, University of Barcelona
- Mercè UNZETA, Vice-rector for International Relations, Autonomous University of Barcelona
- Alícia GRANADOS, President, Autonomous University of Barcelona Social Council
- Joaquim BOIXAREU, President, Polytechnic University of Catalonia Social Council
- Àngel CUNILLERA, President, Rovira i Virgili University Social Council

15:30-17:00 **Meeting with representatives from Barcelona Activa / 22@ / Barcelona City Council**

- Yolanda PÉREZ, Business Growth Director, Barcelona Activa
- Lorenzo DI PRIETO, Human Capital Director, Barcelona Activa
- Xavier TESTAR, Director of the "Barcelona Research and Innovation" programme
- Isabel PONTI, Responsible of Communications, 22 @
- Ricard GARRIGA, Business Development, 22 @

17:30-19:00 **Thematic meeting on cultural outreach**

- Miquel OLIVER, Vice-rector for Quality and Institutional Strategy, Pompeu Fabra University (UPF)
- Núria ALMIRON, Communication department, UPF
- Josep BLAT, Director, ICT department, UPF
- Xavier SERRA, Professor, ICT department, UPF
- Enric VALLDUVÍ, Director, Translation and Language Science Department, UPF
- Vicente LÓPEZ, Vice-president, Barcelona Media
- Xavier CUBELES, Culture and Tourism Laboratory, Barcelona Media
- Joan BENASSAR, Responsible for R&D, Media Pro
- Joan ROSÉS, General Director, Activa Multimèdia Digital
- Ricardo BAEZA-YATES, Yahoo! Research
- Xavier VILALTA, Responsible for the Commercialisation of TECNIO, ACCIÓ10

19:00-20:30 **Thematic meeting on the Biotech and Life Sciences cluster**

- Miquel OLIVER, Vice-rector for Quality and Institutional Strategy, UPF
- Reimund FICKERT, Director for Business and Development, Barcelona Biomedical Research Park
- Xavier VILALTA, Responsible for the Commercialisation of TECNIO, ACCIÓ10
- Marta PRÍNCEP, Director of Innovation, Biocat (The Bio-region of Catalonia)

Tuesday 2 March

09:00-11:00 **Catalonia's strategy for talent attraction**

- Lluís ROVIRA, Deputy of the General Directorate for Research, Government of Catalonia
- Albert CASTELLANOS, Director, Catalan Foundation for Research and Innovation
- Jaume BERTRANPETIT, Director, ICREA
- Begoña GROS, Vice-rector for Research, Open University of Catalonia
- Conxita ÀVILA – Deputy of the rector for special innovation actions)
- Jordi ALBERCH, Vice-rector for Research, University of Barcelona
- Louise McNULLY, Vice-rector for Research, UPF

11:30-13:00 **Thematic meeting on Biotech: Hospitals and Health Sciences**

- Joan BIGORRA, Director for Innovation, Hospital Clínic de Barcelona
- Albert BARBERÁ, Scientific Coordinator, IDIBAPS

13:30-15:00 **Lunch meeting at the Polytechnic University of Catalonia**

- Gabriel BUGEDA, Commissioner for Evaluation and Quality
- Francesc SOLÉ PARELLADA, Deputy of the Rector for the Scientific and Technologic Park
- Josep CASANOVAS, Vice-rector for University Policy

15:30-17:30 **Thematic meeting: from research to innovation and market**

- Fernando ALBERICIO, Director, Barcelona Scientific Park
- Xavier VILALTA, Responsible for the Commercialisation of TECNIO

Wednesday 3 March

10:30-12:00 **Strategic Agreement to Promote Internationalisation of the Catalan Economy**

- Josep M. VILALTA, Executive Secretary, ACUP
- Joaquim TRIGO, Executive Director, Foment del Treball
- Moisès BONAL, Studies Director, PIMEC - SMEs
- Lourdes ESTEBAN, Director of Training and Employability (PIMEC - SMEs)
- Benet ARMENGOL, General Secretary (FEPIME)
- Eva GRANADOS, General Vice-secretary (UGT – Trade Unions)
- Marc BALAGUER, Consultant to councillor of the Work Department
- Francisco RAMOS, Consultant to the SOC Director of the Work Department
- Albert ROCA, Director, SME Programmes, Department of Innovation, Universities and Enterprise
- Rodrigo GARCÍA, Department of Innovation, Universities and Enterprise, Regional Government of Catalonia
- Andreu MORILLAS, Department of Economy and Finances, Regional Government of Catalonia
- Marcel PRUNERA, Director for Economic Promotion, Department of Economy and Finances, Regional Government of Catalonia
- Xavier PONT, Responsible for Economic Initiatives, Department of Economy and Finances
- Mercè MONTERO, Responsible for Coordination and Monitoring of Strategic Projects, Departament of Economy and Finances, Regional Government of Catalonia

12:30-14:30 **Thematic visit on student perspective and careers, Autonomous University of Barcelona (UAB)**

- Ma. José RECODER, Vice-rector for Institutional Relations
- Mercedes UNZETA, Vice-rector for International Relations
- Montserrat FARELL, Vice-rector for Academic Policy
- Jaume FARRÉS, Deputy of the Rector for the Postgraduate School
- Xavier ARIÑO, Head of the Students and Culture Unit
- Esther CRESPO, Head of the Communication and Promotion Area
- Vicenç SELLÉS, Head of the Treball Campus – Employment Office
- Jesús VIVAS, Head of the Programming and Quality Unit
- Teresa ARMENGOL, Life-long Learning Academic Manager
- Marta VILALTA, Head of the International Relations Office
- Mireia GALÍ, Responsible for the International Welcome Point
- Montserrat MASOLIVER, Head of the Academic Affairs Area

14:30-16:30 **Lunch meeting with representatives of UAB Research Park**

- Jordi MARQUET, General Director, UAB Research Park (PRUAB)
- Carlos VALERO, Manager, PRUAB
- Rickard BUCKSCH, Director for Innovation and Marketing, PRUAB
- Carlos JAIME, Vice-rector for Planning and Strategic Projects, UAB
- Francesc GÒDIA, Commissioner for the Rector for Biotechnology and Biomedicine, UAB
- Ivan MARTÍNEZ, Vice-manager for Research, PRUAB
- Juanjo VILLANUEVA, former Director of the Computer Vision Centre (CVC)
- Anna ROIG, Vice-Director of the Material Science Institute of Barcelona (ICMAB)
- Emilio LORA, Director, National Microelectronics Centre (CNM)
- Francesc GÒDIA, HexaScreen
- Xavier CODÓ, General Director, ICAR
- Lluis MARTÍNE, Director and founding partner, SEPMAG
- Ariadna SALAVERT, AB-BIOTICS

17:00-18:30 **Meeting with Ramon Llull University ESADE - Business School**

- Rosa NOMEN, Vice-rector for International Relations, Ramon Llull University
- Camila DE WIT, Head of InnoEnergy, ESADE
- Antonia María SERRA, Director, International Relations Service, ESADE
- Elisabet JUAN, Senior Innovation Lead, ESADE Creapolis

Thursday 4 March

	Group 1 – Tarragona		Group 2 – Girona
08:00-09:00	**Travel to Tarragona**	08:30-10:00	**Travel to Girona**
09:00-10:00	**Rovira I Virgili University's (URV) third mission strategy** • Xavier GRAU, Rector • Josep Manel RICART, Vice-rector for Academic Affairs • Mercè GISBERT, Vice-rector for Teaching Policy • Santiago CASTELLÀ, Vice-rector for External Relations • Marina CASALS, Coordinator, Internationalisation Unit • David BASORA, Head, Rector's Office	10:00-11:00	**University of Girona's (UDG) third mission strategy** • Carles ABELLÀ, General Secretary • Josep CALBÓ, Vice-rector for Research • Magui PÉREZ, Vice-rector for International Policy • Martí CASADESÚS, Vice-rector for Quality and Planning • Alberto BOU, President, UDG Social Council • Ignasi THIÓ, Gerona City Council • Rosa PICAMAL, Gerona City Council • Helena MONTIEL, Head, Technology Transfer Office • Jordi FEU, Responsible, Rossinyol Project • Silvia SIMON, Director, Chair for Scientific Communication
10:00-11:30	**Thematic meeting on the Tarragona's chemistry cluster** • Xavier GRAU, Rector, URV • Josep Manel RICART, Vice-rector for Academic Affairs, URV • Joan IGUAL, Dean, Faculty of Chemistry, URV • Miquel À. PERICÀS, Director, Institute of Chemical Research • Miquel À. BORRAJO, General Manager, Chemistry Technology Centre of Catalonia • Anton VALERO, Tarragona Chemical Companies Association • Marina CASALS, Coordinator, Internationalisation Unit, URV • David BASORA, Head, Rector's Office, URV	11:10-12:00	**Thematic meeting: from research to innovation and market** • Pere CONDOM, Director, Scientific and Technologic Park • Laia CALVÓ, Entrepreneur • Firstname LASTNAME, Researcher, Abbiòtics • Jordi RAMOT, Founder, Wikilog
12:00-13:00	**Thematic meeting on URV's cultural and social outreach** • Xavier GRAU, Rector, URV • Josep Manel RICART, Vice-rector for Academic Affairs, URV • Mercè GISBERT, Vice-rector for Teaching Policy	14:00-15:00	**Lunch with students** • Adam BERTRAN, Coordinator, Student Council • Alexandra SIMON, PhD student • Luc HONORÉ, Master student • Lidia SERENO, Master student

	Group 1 – Tarragona		Group 2 – Girona
	• Santiago CASTELLÀ, Vice-rector for External Relations • Agustí SEGARRA, Director, Strategic Plan of Tarragona • Sergi DE LAMO, Tarragona Office Knowledge Region • Rosa RUEDA, Vice-president, PIMEC Tarragona (SME Union) • Oliver KLEIN-BOSQUET, City Promotion Manager, City Council of Cambrils • Carme JIMÉNEZ, Director, Ramon Muntaner Institute • Josepa GARRETA, Coordinator, Extended Campus • Marina CASALS, Coordinator, Internationalisation Unit, URV • David BASORA, Head, Rector's Office, URV	15:30-17:30	**Thematic meeting with UDG's Faculty of Tourism** • Miquel GOTANEGRA, Chamber of Commerce of Gerona • Josep COMAPOSADA, President, Touristic Association of Apartments of Gerona (ATA) • Josep M. PLA I CALSINA, President, Association of Camping of Gerona • Jaume GUIA, Director, European Master in Tourism Management • José Antonio DONAIRE, Professor, Faculty of Tourism • Josep M. BECH, Professor, Faculty of Tourism • Núria GALÍ, Professor, Faculty of Tourism • Dani BLASCO, Centre for Research and Innovation on Tourism Industries
13:00-14:00	**Travel to Lleida**		
14:00-15:30	**Meeting with the university top management** **Thematic meeting on the agro-industry cluster**		

Friday 5 March

08:30-11:30	**OECD Review Team internal meeting**
11:30-13:00	**Feedback session**

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Please cite this publication as:
OECD (2010), *Higher Education in Regional and City Development: The Autonomous Region of Catalonia, Spain*, Higher Education in Regional and City Development, OECD Publishing.
http://dx.doi.org/10.1787/9789264089006-en

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