Higher Education in Regional and City Development

Berlin, Germany

OECD

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Foreword

Universities and other higher 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 vehicle to mobilise higher education for economic, social and cultural development of cities and regions. They analyse how the higher education system impacts local and regional development and assist in improving this impact. They examine the higher education institutions' contribution to human capital and skills development; technology transfer and business innovation; social, cultural and environmental development; and regional capacity building. The review process facilitates partnership building in regions by drawing together higher education institutions and public and private agencies to identify strategic goals and work together towards them. To know more about the OECD review process and requirements, visit Higher Education and Regions' website at *www.oecd.org/edu/imhe/regionaldevelopment.*

These reviews are part of a wider multi-year 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 recommendations 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, regional and local governments for more responsive and active higher education institutions. As a result, 14 regions in 8 OECD countries and 3 non-member economies 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.

This OECD review of Berlin is part of the second round of OECD reviews of Higher Education in Regional and City Development. It was also the first of its kind conducted in Germany.

Acknowledgements

Numerous local stakeholders and representatives of higher education institutions provided valuable insights during the review visit and in the form of comments. The OECD would like to thank in particular local counterparts for this review: Senator Jürgen E. Zöllner, Ms Bering and Hans-Gerhard Husung from the State Ministry for Education, Science and Research and Senator Harald Wolf and David Weissert from the State Ministry for Economics, Technology and Women, as well as local co-ordination within the Social Science Research Centre WZB (Das Wissenschaftszentrum Berlin für Sozialforschung), particularly Jutta Allmendinger, Ulrich Schreiterer and Lena Ulbricht.

This publication draws on interviews carried out during a week-long review visit from 13 to 18 September 2009, on the findings of the Berlin Self-evaluation Report and using additional information provided to the review team. The report is based on data published up to and including 2009. The Review Team was also able to rely on the recent work of the OECD Local Economic and Employment Programme (LEED) on university entrepreneurship in Eastern Germany. The review was conducted under special circumstances, as two of the major research intensive universities did not participate in the review process. This led to gaps in information and data for which the Peer Review Team has tried to compensate during and after the review visit. Despite these shortcomings the Peer Review Team hopes that the outcomes of the review will reflect the situation in Berlin.

This publication was co-ordinated by Jaana Puukka (OECD Progamme on Institutional Management in Higher Education, IMHE). Peer reviewers from the France, Germany, Sweden and the United Kingdom participated in the review process: Björn Asheim (CIRCLE, Lund University, Sweden), John Goddard (University of Newcastle upon Tyne, UK), Ulrich Teichler (University of Kassel, Germany) and Philip Wade, consultant on regional policy and former OECD staff (details about the Review Team can be found in Annex 1 of this report.) Technical support was provided by Ernesto Flores. Rachel Linden supervised the publication process and Fionnuala Canning and Austin Delaney provided invaluable assistance in the editing phase.

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List of acronyms

AMA	Autonomy despite the Multi-morbidity of Old Age	Autonomie trotz Multimorbidität im Alter
AMIDSt	Amsterdam Institute for Metropolitan and International Development Studies	
ASH		Alice Salomon Hochschule
BBI	Berlin-Brandenburg International Airport	
BBW	Educational Institute of the Economy in Berlin and Brandenburg	Bildungswerk der Wirtschaft in Berlin und Brandenburg
BHT	Beuth-Higher School of Technology Berlin	Beuth Hochschule für Technik in Berlin (formerly: TFH)
BIEM	The Brandenburg Institute for Entrepreneurship and SMEs	Brandenburgisches Institut für Existenzgründung und Mittelstandsförderung e.V.
BMBF	Federal Ministry for Education and Research	Bundesministerium für Bildung und Forschung
BMW		Bayerische Motoren Werke AG
BTU	Brandenburg University of Technology Cottbus	Brandenburgische Technische Universität Cottbus
CTC		Career and Transfer Centre
DIW	German Institute for Economic Research	Deutsches Institut für Wirtschaftsforschung
DZA	German Centre of Gerontology	Deutsches Zentrum für Altersfragen
ECTS	European Credits Transfer System	
EER	European Entrepreneurial Region	
EFB		Evangelische Fachhochschule Berlin
EFS	European Social Fund	Europäischer Sozialfonds
EU	European Union	Europäische Union
EUR	Euro	
EUROSTAT	Statistical office of the European Union	
EXIST	Start-ups based on scientific research	Existenzgründungen aus der Wissenschaft
FAV	Research and Application Alliance Transportation System Techniques Berlin	Forschung und Anwendungsverbund Verkehrsystemtechnik Berlin
FH	University of Applied Sciences	Fachhochschule
FHTW	University of Applied Sciences for Technology and Economy	Fachhochschule für Technik und Wirtschaft Berlin
FHVR	University of Applied Sciences for Administration and Law	Fachhochschule für Verwaltung und Rechtspflege Berlin

FHW	Berlin School of Economics	Fachhochschule für Wirtschaft in Berlin
FUB	Free University of Berlin	Freie Universität Berlin
GDP	Gross Domestic Product	
GDR	German Democratic Republic	DDR, Deutsche Demokratische Republik
GPA	Grade Point Average	
HEI	Higher Education Institution	
HfM	Hans Eisler Academy of Music Berlin	Hochschule für Musik 'Hans Eisler'
HfS	Ernst Busch School of Performing Arts	Hochschule für Schauspielkunst 'Ernst Busch'
HI	Humboldt-Innovation	
HIS	Higher Education Information System	Hochschul-Informations-System GmbH
HTW	University of Applied Sciences for Technology and Economy	Hochschule für Technik und Wirtschaft
HUB	Humboldt University Berlin	Humboldt Universität zu Berlin
HWK	Chamber of Crafts	Handwerkskammer
HWR	University for Economy and Law studies Berlin	Hochschule für Wirtschaft und Recht
IASP	Institut for Agricultural and Urban Ecological Projects Humboldt University Berlin	Institut für Agrar- und Stadtökologische Projekte an der HUB
IAV	Engineer Association Car and Traffic	Ingenieurgesellschaft Auto und Verkehr
IBB	Berlin Investment Bank	Investitionsbank Berlin
ICT	Information and Communication Technologies	
IGAFA	Joint Initiative of Non-University Research Institutions in Adlershof	Initiativgemeinschaft Außeruniversitärer Forschungseinrichtungen in Adlershof
IGF	Institute for Gerontological Research	Institut für Gerontologische Forschung
IHK	Chamber of Industry and Commerce	Industrie- und Handelskammer
ILS	Institute of Land and Sea Transport Systems	
IMES	University of Amsterdam's Institute for Migration and Ethnic Studies	
IMHE	OECD Programme on Institutional Management in Higher Education	
INCHER	International Centre for Higher Education Research Kassel	Internationales Zentrum für Hochschulforschung Kassel
InnoZ	Innovation Centre for Mobility and Societal Change,	Innovationszentrum für Mobilität und gesellschaftlichen Wandel
INTERREG	EU Interregional Co-operationProgramme; part of the European Regional Development Fund (ERDF)	
IPAL	Innovations, Patents and Licences	Innovationen, Patente, Lizenzen
ISCED	International Standard Classification of Education	
ITU	IT University of Copenhagen	
JIB	Jazz Institute Berlin	Jazz-Institut Berlin
KHB	Art Academy Berlin	Kunsthochschule Berlin
KHSB	Social Work Studies - Catholic University of	Katholische Hochschule für

	Applied Sciences	Sozialwesen Berlin
KMK	Conference of German Ministers of Education	Kultusminister Konferenz
KONTAKT	Science-practice Co-operation Centre	Kooperationszentrum Wissenschaft-Praxis
KTPs	Knowledge Transfer Partnerships	
LEED	Local Economic and Employment Development (OECD Programme)	
MDC	Max Delbrück Centre for Molecular Medicine	Max-Delbrück-Centrum für Molekulare Medizin
NGO	Non-governmental Organisation	
OECD	Organisation for Economic Co-operation and Development	
OPTEC	Optic Technologies Berlin-Brandenburg	Optische Technologien Berlin-Brandenburg
PBL	Problem-based Learning	
PIK	Potsdam Institute for Climate Impact Research	Potsdam Institut für Klimafolgenforschung
PR	Public Relations	
RIS	Regional innovation systems	
RKI	Robert Koch Institute	Robert-Koch-Institut
SER	Self-Evaluation Report	
SHB	Steinbeis University Berlin	Steinbeis-Hochschule Berlin
SME	Small and medium sized enterprises	
SRH	SRH University Berlin (SRH: Foundation for Rehabilitation Heidelberg)	SRH Hochschule Berlin (SRH: Stiftung Rehabilitation Heidelberg)
TCC		Technologie Coaching Centre
TFH		Technische Fachhochschule Berlin (now: BHT)
TSB	Berlin Technology Foundation	Technologiestiftung Berlin
TTB	Technology to Business	
TUB		Technische Universität Berlin
UdK	Berlin University of the Arts	Universität der Künste
UNESCO	United Nations Educational, Scientific and Cultural Organization	
UTEP	University of Texas at El Paso	
VET	Berufliche Aus- und Weiterbildung	Vocational Education and Training
WISTA	Park of Science and Technology Adlershof	Wissenschafts- und Technologiepark Adlershof
WZB	Social Science Research Center Berlin	Wissenschaftszentrum Berlin für Sozialforschung
ZVS	Central distribution of study places	Zentralstelle für die Vergabe von Studienplätzen

Assessment and recommendations

Towards a better functioning human capital development and regional innovation system in Berlin

Berlin is the largest city and the capital of Germany with more than 3.4 million inhabitants. Once a manufacturing city, its economy is now dominated by the service sector (close to 85% of all employment) with a strong emphasis on education, research, cultural and creative industries and health services. Although downsized since reunification, the public sector accounts for the bulk of jobs. The capital's most important economic sector is health services with approximately 180 000 employees. Small and medium-sized enterprises are the predominant form of organisation in the private sector accounting for 80% of employment in Berlin. In terms of social structure, Berlin is characterised by a large migrant population accounting for 14% of the total number of residents.

The size of the higher education and research sector in Berlin relative to the overall economy is significant. As a net importer of students and by winning national and international research grants and contracts, higher education and research make a powerful direct and indirect impact on the city. Universities and research institutes are a key sector of the Berlin economy. The sector accounts for 4.4% of the city's GDP. Higher education and research are strongly embedded in the economic, social and cultural life of Berlin. The institutions collectively form a magnet which attracts students, researchers and business in search of talent. There is a high level of recognition of the economic and social impact of higher education including its contribution to human capital development in general. Berlin's strong higher education and research sector, cultural industries and creative people provides a strong base on which to build an innovative and entrepreneurial city.

However, Berlin has not met the economic expectations following reunification, as the capital has not been able to re-establish its standing as an industrial city. The expansion of the service sector, notably the development of the health and culture industries, has only partially

compensated for the demise of the traditional industrial base and the sharp reduction in public employment in both East and West Berlin. Albeit lower than in East Germany, unemployment rates in Berlin constantly remain some 6-7% higher than the national average, with many of the unemployed being those from immigrant backgrounds or with low skills. In this context, the key challenges for the Berlin Senate and its higher education institutions are the following:

- How to promote new business formation and attract knowledge-based businesses (industry and services)?
- How to promote the development of the existing heterogeneous SME base?
- How to address the challenge of long term unemployment and the needs of the migrant population by providing access to areas of growth?

To face these challenges, Berlin needs concerted efforts and a system approach to human capital development as part of a broad-based regional innovation system. Stronger incentive structures are necessary to mobilise higher education institutions for local and regional development. In order to improve regional development outcomes, evidence-based decision making needs to be strengthened within the Senate and higher education institutions. In addition, creating jobs and providing access to employment opportunities should be seen as the primary goal of innovation and human capital development in Berlin.

The current extent of regionally relevant activities by Berlin higher education institutions, including industry collaboration, widening access initiatives and entrepreneurship activities, are more the result of bottom-up processes and not fully reflected in higher education policy or institutional set-up. There are gaps in important areas such as lifelong learning and the needs of migrant populations as well as support for small and medium-sized-enterprises. This situation manifests itself in:

- A lack of strategic anchoring within higher education institutions and within the higher education "system" in Berlin. Action is often dependent upon the commitment of individual staff or students, and not reflected in strategic development, curriculum development or budget allocation of the higher education institution. The current indicator-based funding system does not provide sufficient incentives structures for the mobilisation of higher education to regional and city development. The system of institutionally steered incentives and support activities linking higher education/research with the region remain inadequate.

- Weak legitimacy of the needs of the city within the higher education institutions, particularly research-intensive universities. Regionally and locally relevant activities are predominantly viewed by the higher education leadership as a "third mission" and often not seen as linked to research or academic subjects and this mindset limits the resources invested for into these activities. Incentives allow for isolated initiatives, the impact of which is diminished by their non-coordinated character.
- A co-ordination deficit within higher education institutions and within the higher education system. A range of services, departments, individuals and structures are delivering their own activities without co-ordination and monitoring of results. The co-ordination of information and action on the part of the various public agencies, higher education institutions and research institutes as well as various stakeholders is also in need of improvement.
- Weak evidence base. The system of gathering information on the regional environment as well as the successes and failures of respective activities of higher education institutions and research institutions is limited in scope and quality. There is a lack of information and robust data particularly in the field of skills gaps, ethnic and socio-economic backgrounds of students, student progress, graduate employment, graduate destinations (outmigration), breadth and scope of work-based learning activities and business formation which make it difficult to evaluate the outcomes of local policies and institutional practices.

Regional innovation in Berlin

Berlin is one of the prime locations for science in Germany and ranks among the top three innovative regions in the EU. The Berlin Senate has made strong progress in making innovation a pillar of its economic development…

With its diverse set of higher education institutions, more than 70 publicly funded R&D institutes, a number of national laboratories and 40 technology parks and incubators, Berlin is one of the prime locations for science in Germany and among the top three innovative regions in the European Union. About 40 000 people, 3% of Berlin's workforce, are engaged in R&D activities. Significant investments have been made in research and development; Berlin spends 4.2% of its GDP in R&D, which is more than any other German State.

The Berlin Senate has made strong progress in making innovation a pillar of its future prosperity. It has a science-led strategy for economic development and capacity for its delivery. This involves the identification of key areas of strength in research and the development of technologies with considerable commercial potential. The strategy focuses on "competence fields" - medical technology, biotechnology, health, traffic engineering, ICT/media, optics and power engineering especially renewable energies. These fields constitute building blocks for the three industrial clusters in health, communication and media and transport systems that are expected to help transform Berlin into a knowledge-intensive innovative region over the next decade.

Berlin's three research-intensive universities and two well-functioning science parks, Adlershof and Buch, are the cornerstones of the Senate's ambition to turn Berlin into an innovative region with a high degree of knowledge-intensive industries and jobs. Their combined knowledge base has a considerable potential for new business formation and attraction of external firms. Although the business base of the city is limited, links between researchers and key firms have been supported by intermediary bodies, numerous networking arrangements and providing spaces where business and research can work together and new business can be incubated. The Senate also supports a number of delivery organisations, such as the Berlin Investment Bank and the Berlin Technology Foundation that interface with higher education and research.

Berlin's science-led strategy has been successful: the investments linked to the research base have contributed to significant employment growth in the key competency fields. Between 2003 and 2007, the competence fields grew in terms of employment by 16%, compared to an overall decline of 2.2% for all manufacturing industries. Success is most evident in life sciences where there are well-established processes of science-led innovation linked to clinical practise.

…but science-led innovation is not enough to address the challenges of long-term unemployment and a low absorptive capacity in the SME-based economy. Research has to be diffused to be exploited by firms in the region to create employment and economic growth. This calls for strengthening the capacity of the universities of applied sciences...

The Berlin competence fields, clusters and science parks are strongly R&D based and seek to exploit research outcomes of the three universities

and public and private research institutes to produce radical innovations. Berlin's science-driven strategy is, however, less appropriate in other sectors where innovation is more incremental and user-driven. The strong presence of traditional small and medium-sized enterprises and long term structural unemployment pose a challenge for Berlin's economic development.

Almost all higher education institutions in Berlin have technology transfer offices, career centres and third-party funding counselling services that aim to facilitate industry collaboration and knowledge exchange. Many of these offices remain understaffed and poorly equipped to collaborate with smaller firms. For example, *Humboldt Innovation GmBH* is now a wholly owned subsidiary company of the university which aids and facilitates sustainable collaboration between science and business, realising contract research projects and supporting scientific services in a competent, flexible and unbureaucratic manner. However, its capacity to collaborate with small and medium-sized enterprises is limited. Collaboration with business and industry appears also limited in PhD training where stronger links could be made with key clusters and entrepreneurial skills could be provided.

Currently, the HEI-industry linkages remain weak in terms of small and medium-sized enterprises. The universities of applied sciences are often better equipped than research-intensive universities to engage with small and medium-sized enterprises as well as the health sector or welfare services. As a response to growing market needs, Berlin's universities of applied sciences have developed their business interface units, for example the science-business co-operationcentre KONTAKT at the Hochschule für Technik und Wirtschaft in Berlin (University of Applied Sciences for Technology and Economy).

Recognising the need for more integrated responses, the Berlin Senate has sponsored the establishment of the Institute for Applied Research to improve the collective capacity of the universities of applied sciences to address the needs of the small and medium-sized enterprises. This institute will bring together the technology transfer and lifelong learning offices in each university to offer a one-stop-shop for Berlin business. This is a challenging effort and careful consideration needs to be made in designing the business model underpinning the distribution of income and costs between the individual institutions.

Despite the progress made, the universities of applied sciences face a number of constraints in knowledge transfer. Their funding model is closely tied to student numbers and so restricts their capacity to invest in R&D-related activities. More significantly, the considerable teaching load of academics works against engagement with more speculative developmental projects that might benefit business and the community in the city. Unlike

professors in the research-intensive universities, senior academic staff in the universities of applied sciences receives minimal research support the university to underpin their externally-orientated work. Salaries are also linked to teaching rather than to research performance. Spreading an applied research culture through the universities of applied sciences remains a challenge.

…to overcome the fragmentation of the regional innovation system, a more system-oriented regional policy is needed with active outreach to SMEs, new types of innovation tools, further education provision and sector-based policies. Closer collaboration is also necessary between the research intensive-universities and universities of applied sciences...

Berlin, like many other metropolitan regions, faces a risk of fragmentation in its regional innovation system due to weak connectivity. To overcome the fragmentation of the regional innovation system, a more system-oriented and pro-active innovation-based regional policy should be devised and anchored on both science-led and user driven innovation.

New types of innovation tools are needed to provide small and medium-sized enterprises with access to resources that will be helpful in innovation projects. These tools would increase the innovation capacity in firms by providing them with necessary resource inputs, financial support for product development and contacts with relevant knowledge organisations or assistance in solving specific technological problems where the absorptive capacity of the firm is critical. In addition, there is a need to enhance the organisational learning in the small and medium-sized enterprises to change behaviour and to develop management skills and innovation strategies. Highly skilled people and the skill provision, including better lifelong learning and further education opportunities from higher education institutions, are critical resources in upgrading the skills and capacities in the small and medium-sized enterprises. International experience has shown that stronger sector-based policies are often useful when approaching the heterogeneous SME-base.

In order to achieve a more broad-based innovation policy embracing both science-led and user-driven innovation, closer co-operation is needed between the research-intensive universities and universities of applied sciences in Berlin. Better co-operation and coordination would also enhance student mobility and pathways between institutions, increase the

attractiveness of the higher education institutions among the industry and promote closer industry-university cooperation.

The following measures would promote the higher education institutions' contribution to regional innovation in Berlin:

- The local/regional dimension of the "third mission" of the research intensive universities should be strengthened through promoting their pro-active engagement in regional development. This should be done by recognising the need for "triple helix" collaboration embracing the government, industry and academia as a guiding policy framework for regional innovation. Research-intensive universities should aim to move from undertaking "generative" activities to becoming more engaged in "developmental" activities. Stronger links could be made with PhD training and cluster development and to provide PhDs with entrepreneurial skills.

- A systemic perspective should be applied to the regional development strategy by improving the connectivity in the regional innovation system through better collaboration and a more efficient division of labour between the research-intensive universities, universities of applied sciences and research institutes and their respective partnering industries in order to create closer research collaboration across the higher education and research sector and industry, particularly small and medium-sized enterprises.

- The research and development capacity of the universities of applied sciences should be improved in terms of time and funding in order to make them better positioned to assist and co-operate with small and medium-sized enterprises. To improve the absorptive capacity of small and medium-sized enterprises and to reduce the cognitive distance between small and medium-sized enterprises and higher education institutions, policies should be implemented to encourage mobility schemes and technology brokers. The provision of further education by higher education institutions should be upscaled and extended to re-skilling and up-skilling activities.

- Incentives should be strengthened for higher education institutions and research institutes to increase their capacity to act as technology transfer agencies as they bring non-local knowledge to Berlin by attracting talent and foreign direct investment. Incentives for higher education institutions and their staff to engage in local and regional development activities should also be created.

Human capital development in Berlin

In human capital development, Berlin has a wide supply of study places which are overwhelmingly expected to be funded by locally allocated tax revenues. This poses a serious challenge for Berlin…

Berlin has a large investment of human capital development in terms of the number of higher education institutions, student enrolment, teachers and researchers. The total number of higher education students in Berlin is about 135 000 (2008); roughly 70% of them are enrolled at research-intensive universities, 25% in universities of applied sciences and 5% in universities of fine art and music. Berlin accounts for about 6.74% of national higher education enrolments, while its share of the overall population is only 4.14%.

The high level of supply of study places is expected to be funded overwhelmingly by locally allocated tax revenues in Berlin. The city has experienced a process of cuts in the public sector, including higher education, for many years. The city state of Berlin has had to shoulder the cost of higher education for a student population more than one and a half times as large as the average found in German regions with a corresponding number of inhabitants. For this reason, Berlin continues to face greater challenges in higher education funding than other city states.

Financial stringencies in core funding, national level projects such as the "Initiative for Excellence" and the indicator-based higher education funding system have led the Berlin universities to seek diversification of funding streams. The greater focus on the pursuit of world class excellence in research may have unintended effects on socially and regionally relevant activities linked to teaching and learning and the regional engagement of higher education institutions.

…there are challenges in human capital development including low tertiary attainment rates, long study times, high dropout rates and limited mobility of students between educational institutions which call for better co-ordination in the education system and more transparent pathways…

The Berlin higher education institutions tend to have longer study times and higher dropout rates than Germany in general. Recent decades have, however, seen rapid progress in completion rates. Between 2002 and 2007 all higher education institutions in Berlin improved their completion rates. For the three research-intensive universities the average rose from 46% to 63%, while for the universities of applied sciences it grew from 63% to 88%. Despite the positive progress, continued focus is needed in this area. The regional labour market in Berlin is not able to absorb all graduates and some of them move to other cities or regions after graduation or accept jobs below the level of their qualifications. Systematic studies about graduate mobility and success and collection of comprehensive data on graduate's careers are required.

One of the main issues impeding human capital development in Berlin and neighbouring Brandenburg is the absence of region-wide mechanisms to articulate a long term vision and implement an integrated development strategy for all educational institutions. Transparent pathways for students through the education system are required. This would involve the development of stronger credit recognition schemes, course and programme articulation agreements, clear and enforceable policies related to credit transfer and increased support for joint and collaborative programmes.

…reforms are also needed to widen access to higher education among non-traditional learners from lower socio-economic backgrounds as well as mature students. Lifelong learning activities should be scaled up aggressively…

According to the ongoing OECD Review of vocational Education and Training, only limited success has been reached in channelling students with VET backgrounds to tertiary education. In Germany, the share of students taking the "non-traditional routes to higher education" is small, ranging

from 1% to 4%. Germany also ranks among the least active of the OECD countries in terms of the participation in lifelong learning. There is limited robust data available about equity in higher education in Germany and Berlin in terms of access of non-traditional learners or mature students to higher education which suggests a lack of policy focus. Given the long term unemployment in Berlin and the challenging demographic development with an ageing population, more attention is required in this area. Skills upgrading and general enhancement of qualifications would improve competencies of the work force. So far, the Berlin higher education institutions have shown only limited interest in this area. National reforms have been made in 2009 to widen access to tertiary education. It is however too early to evaluate the impact of these reforms.

…there is a particularly strong need to target efforts at Berlin's significant migrant population to improve labour market outcomes and to reduce social and cultural exclusion...

Berlin has a significant foreign born (14%) and immigrant background population (23.8%) with low higher education participation rates. The competitive environment limits access of Berliners with immigrant backgrounds to higher education as they usually lack the secondary schooling grade levels that would ensure entry into the system. Among the graduates of Berlin upper secondary schools in 2007, the proportion of foreign nationals was 5.6% and the proportion of pupils with migrant backgrounds (including all pupils whose first language is not German, irrespective of their nationality) was 9.7%. These rates are far from being reflected in higher education enrolment. There is limited robust data in this domain. For the vast majority of immigrants who are German nationals because at least one of their parents is German or has acquired German citizenship, no specific statistics are collected. The share of non-Germans who received their *Abitur* in Germany varies between 2% and 5% at the universities and between 2% and 7% at the universities of applied sciences.

Widening access to higher education is one of the broad policy goals pursued by the Berlin Senate. The migrant population provides an important un-tapped potential for additional higher education students right in the heart of the city. This means reaching out to a large population segment that is characterised by lower German language proficiency, lower secondary education attainment, high unemployment and often poor living conditions in one of Berlin's distressed urban areas. This is a tough but necessary task since failure will manifest itself in the cost of exclusion, such as 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.

To date, no effective policy tools have been devised to increase the enrolment of pupils with a migrant background graduates from Berlin secondary schools. Some measures have been taken to improve the conditions in secondary schools with high proportions of youth from low-income families and youth with migrant backgrounds. For example, the student-teacher ratio has been decreased to 14 to 1 in secondary schools with a large proportion of migrant students as compared to 24 to 1 elsewhere. In addition, according to Berlin's higher education law, 1% of study places are reserved, on probation, for students having barely missed passing the *Abitur*. But since there are few candidates, the possibility is seldom used. Study places that could have been filled by non-German students residing in Germany are often occupied by students coming from foreign countries, not from Berlin.

Some higher education institutions have taken action to reach out towards people with immigrant backgrounds. Positive outcomes would however require consistent, long-term actions by higher education institutions to reach out to schools in vulnerable areas in order to improve the quality of teaching and to raise aspirations among the migrant youth. The educational disadvantage of migrant population in Berlin is, however, so pressing that individual and institutional responses should be supported by a long term multi-stakeholder collaboration led by the Berlin Senate.

…higher education in Berlin has traditionally placed emphasis on professionally relevant learning although no robust data is available on the scope and extent of this activity. The new shorter degrees may endanger this tradition if mechanisms are not put in place to guarantee stronger institutional anchorage, co-ordination, and evaluation…

Berlin higher education institutions have launched initiatives, projects and programmes with close labour market links. Students and staff engage in collaborative efforts with business and industry, community outreach and volunteering that are likely to improve students' labour market outcomes. For example the Dual (bachelors) Degree programmes offered by some universities of applied sciences in Berlin involve partnerships with employers to train engineers and give them practical technical and management skills.

Much of this work lacks strategic anchoring within the higher education institutions and depends on the initiative of individuals or single departments. They are often not reflected in the curriculum development or budget allocation. There is a coordination deficit when a range of departments, individuals and structures are delivering their own activities. No system-wide data is publicly available on the extent to which academics or students in Berlin higher education institutions are engaged with business and the public sector through their normal teaching and related research. Institutional level data is also at a low level although there are some exceptions, particularly among the universities of applied sciences.

…Berlin has a good track record in graduate entrepreneurship and a rich support framework, but more work is needed to equip a larger group of students with entrepreneurial skills …

Berlin's strong science base, cultural industries and creative people provide great potential for new entrepreneurship and entrepreneurialism. There is a high level recognition of the economic and social impacts of entrepreneurship. In 2008, Berlin ranked number two in Germany after Hamburg with 17 start ups per 100 000 inhabitants. Berlin has about 20 start-up centres that provide young technology-oriented enterprises with advice, services and spaces and the annual Business Plan Competition Berlin-Brandenburg, managed by the Berlin Investment Bank has enabled more than 4 000 business ideas to serve as basis for the creation of new companies.

Berlin higher education institutions have made significant progress to boost university spinoffs and graduate entrepreneurship in the region. All three research-intensive universities have established their own centres for entrepreneurship which bundle start-up support activities and promote entrepreneurship education activities. The universities of applied sciences have also established their entrepreneurship activities, for example Beuth-Higher School of Technology Berlin has a founders' shop Location4Innovation to facilitate graduate startups. Despite the efforts, entrepreneurship education in Berlin is in an early phase of development, reflected in the limited breadth and refinement of entrepreneurship education activities in the higher education institutions and a small proportion of students benefiting from them: only about 5-7% of the total student population in Berlin have access to entrepreneurship education. Significant measures are needed to enhance institutional anchoring of entrepreneurship education in higher education institutions, to build capacity

among and incentivise entrepreneurship educators and to integrate entrepreneurship education into the curricula. System-level incentives are required for enhancing collaboration between higher education institutions to build a resource centre in entrepreneurship.

The following measures would promote higher education institutions' contribution to human capital development in Berlin:

- A holistic Berlin regional development strategy should be developed with measures opening higher education to categories of the population which have been largely left aside up until now, including mature students, students with lower socio-economic and/or migrant backgrounds. The strategy should also better address the training and research needs of small and medium-sized enterprises. The challenge is to ensure the pursuit of quality teaching while increasing access of a socially and ethnically diverse population to higher education and seeking to conciliate the pursuit of world class research with increased initiatives to answer the needs of small firms.
- Wider portfolio of robust data, related to the regional context, and with the situation of individual higher education institutions taken into account should be developed in Berlin to support evidence-based decision making at higher education policy and institutional level. The most effective region-wide graduate labour market systems are based on the collection of comprehensive labour market intelligence. For example, the data should be published on-line, in a single site, to improve students' ability to make rational choices about their studies. This would also help graduates and employers to come together and increase students chances of moving onto employment. The resultant data could also be 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.
- Regional government, higher education institutions, other educational institutions and key stakeholders of the economy and society could usefully collaborate to agree on region-wide goals, policies and priorities concerning human capital development. Higher education institutions and regional government could establish for this purpose a higher education coordinating body to address pathways between higher education institutions and different levels of education. In particular, measures should be put in place to accommodate and encourage mobility within and between institutions by formal agreements, to help students to move from one institution to another, when justified.

- The Berlin Senate, higher education institutions, schools and the business sector should develop long-term efforts to increase the enrolment and success of students with migrant backgrounds. These efforts should build upon existing outreach to schools by higher education institutions and successful models of effective support services for students, including both academic and social supports and experiential learning. Professors and researchers with an immigrant background should be recruited to enhance higher education institutions' image while offering role models for many young people. Higher education institutions undertaking such recruitments should be rewarded.

- Incentive structures should be strengthened to encourage higher education institutions and their staff to engage in activities benefiting regional and local development and entrepreneurship activities. Discretionary funds should be established for supporting projects using various kinds of teaching-related activity which include interaction between the higher education system and the community.

- The labour market relevance of university education should be strengthened. In particular, systematic information could be delivered to secondary school graduates concerning sectors and careers with promising development in Berlin. Such an effort could be made in conjunction with job market analysts and the private sector.

- Higher education institutions' lifelong learning activities should be strengthened. The education system should pay greater attention to the upgrading of competencies in middle-level education, for example by establishing innovative approaches for bachelors not transferring to master programmes and for the upgrading of training in areas statistically counted in Germany as tertiary education. Short-term programmes for adults in employment or seeking employment could also be considered as an extension of vocational training or as specific courses offered by higher education institutions.

Social, cultural and environmental development in Berlin

Berlin is making progress in becoming a laboratory and a global test bed for innovation in environmental, social and cultural fields by transforming some of its challenges into assets that can provide opportunities for growth and development. As a "living laboratory" for public transportation and renewable energies Berlin and Brandenburg have acquired a competitive advantage, skills and know-how in sustainable urban development. Ongoing climate change is opening global market opportunities for Berlin's services and products throughout the world…

Berlin has the capacity to play a global role in "green growth". In the past five decades its transportation infrastructure has been redesigned and rebuilt three times resulting in the refurbishing of lines and equipment, modernisation of junctions and rebuilding of major stations. Environmental concerns have been integrated into public transport design and planning to limit the carbon foot-print of city transportation through innovative technical solutions and a vision of mobility requirements in a dispersed city. Additional critical mass has been acquired through collaboration with the Land of Brandenburg. The Berlin Senate supports active cluster development in transportation and renewable energies working jointly with Brandenburg drawing on the experience developed in this area by different organisations, higher education institutions and companies. For example, the Technische Universität Berlin (TUB), in Charlottenburg provides a valuable contribution to teaching, training and research in the different areas of transportation and logistics, while the science park in Adlershof supports the development of leading edge research in renewable energies.

...but the development of a "greener" economy in Berlin and Brandenburg will require greater facilitation of industry-university collaboration, avoiding duplication and fragmentation of efforts and also developing new skills for the "green jobs"…

The specific Berlin context since reunification has provided an opportunity seized by policy makers, higher education institutions and the private sector, giving the city a leading edge in strategic areas as compared to other global metropolises. However, it is necessary to enhance collaborative platforms for eco-innovation to ensure efficient exchange of information, to reduce duplication of efforts and to enhance adoption of "green" technologies by local industries.

The effectiveness in addressing climate change will depend on how the higher education institutions liaise with industry and civil society. To boost green growth, collaboration between higher education institutions and small and medium-sized enterprises should be facilitated. Some higher education institutions have already taken steps to address the needs of the small and medium-sized enterprises. For example the institute for the Promotion of Agricultural and Urban Ecological Projects (IASP), located in Humboldt University co-operates with small and medium-sized enterprises to transform innovation into marketable products. The Institute for Resource Conservation, Innovation and Sustainability (IRIS), at the Hochschule für Wirtschaft und Recht (University for Economy and Law studies Berlin), collaborates with regional firms to help them develop business processes and products in a sustainable manner. These initiatives should be scaled up and made more inclusive and open to other higher education institutions.

Finally, as the development of a "greener" economy in Berlin and Brandenburg will depend on the availability of skilled labour to fill the new jobs, extensive retraining and up-skilling as well as developing a diverse set of new skills will be necessary. Skill creation for "green" jobs could be more efficiently organised by pooling learning resources of educational institutions and industries in Berlin and enhancing pathways among institutions.

Berlin has a strong image as the European art capital and creative city which attracts talent and knowledge-intensive businesses. Its cultural and creative cluster enjoys strong political support in the city. The excellent network of educational and training institutions for creative professions guarantees Berlin's place as a centre of attraction for young creative individuals…

Berlin has a strong image as a creative city in terms of the scope and range of its cultural scene and the presence of artists and creative people. With nearly 170 000 employees, including freelancers and independent contractors, and more than 22 500 creative enterprises with a total turnover of EUR 18.6 billion, the cultural and creative industries are important to Berlin's economy making up about 20% of Berlin's GDP. The cluster contributes to the growth and development of Berlin through attraction and retention of talent and knowledge-intensive businesses. There are also promising signs of companies relocating in Berlin, for example Deutsche Telecom has moved its R&D department to Berlin. The opening of the Berlin-Brandenburg International Airport is likely to increase the attractiveness of the city.

The Berlin Senate has excelled in cluster development and networking in the cultural and creative industries. 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 to bring together public and private sector and the non-profit organisations, associations and foundations to enhance the exchange and value creation. In addition, one of Berlin's competence fields, *i.e.* IT and media, belongs to a large extent to the creative industries. The Berlin Investment Bank has increased its commitment to financing this cluster.

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. These include the Cooperative Jazz Centre in Berlin

(founded in 2005) and the Cooperative Dance Education Centre which was established in 2006 at the initiative of the Berlin Senate and has gained recognition for its innovative model of collaboration and institutional anchoring.

…but challenges remain in the cultural and creative industries to provide better further education opportunities as well as entrepreneurial and multidisciplinary skills for graduates. Greater collaboration is needed to bring together creative industries, art education and technology and to reduce administrative constraints that may limit collaboration...

Although the level of qualifications and training in art and culture is at a high level in Berlin, a number of challenges remain. Further education opportunities do not meet the need of the diverse sector, especially those freelancers involved in creative professions. Entrepreneurial education appears under-developed in view of the large number of graduates who become self-employed. Moreover, course provision is not yet sufficiently multidisciplinary and ICT-based. Finally, the collaboration between creative industries, art schools and technical universities is often constrained by differences in institutional cultures and administrative regulations. In practice, for example launching new educational programmes can be both time consuming and cumbersome. Learning from international examples to boost interdisciplinary collaboration in creative industries would be helpful.

…Berlin's Neighbourhood Management Programme has the capacity to become a new "export article" for the Berlin. Higher education institutions could support its activities, for example through targeted action research on its immigration experience and ethnic entrepreneurship programmes. Higher education and research should be used to strengthen social inclusion end encourage ethnic entrepreneurship…

Berlin's neighbourhood management programme *Quartiers-management*, provides a framework for community development within the city. The programme, which is co-financed by the Federal government and the *Länder*, with the EU contributing around 30%, coming from the Regional Development Fund, embraces 35 city areas in Berlin, mostly in the

centre of the city, with large migrant populations and high numbers of people on transfer payments. To date, the involvement of Berlin higher education institutions in the neighbourhood management activities has been relatively limited and linked to evaluation, student internships and academic events. More could be achieved through collaboration between higher education institutions and by scaling up interventions currently driven by individual academics and departments. This would enable higher education institutions to excel in research about Berlin's immigration experience and public policy in a number of relevant spheres, for example in education, housing and employment. In addition, such applied research could help to boost ethnic entrepreneurship. *Bildung im Quartier* (BIQ) ("Education and training in the neighbourhood") is one of Berlin's five local regeneration projects implemented through the Neighbourhood Management Programme. It would provide an opportunity for much stronger engagement by Berlin higher education institutions through applied research, work-based learning and labour insertion of graduates.

The following measures would enhance the contribution of higher education institutions to the social, cultural and environmental development in Berlin:

- A systematic exchange of information and experience should be put in place between higher education institutions in terms of environmental sustainability, urban regeneration and integration of migrants, and cultural industries facilitated by the Senate and clusters around the fields of contribution 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 higher education institutions. Such a forum could organise thematic events, with regular information retrieval and exchange facilitated by a dedicated website. As a first step, higher education institutions' current connections, initiatives and projects involving stakeholder collaboration, community development and/or outreach should be mapped and published in the collaboration platform.

- In view of climate change, Berlin should capitalise on its accumulated know-how and wealth of experience in public transportation and increasingly promote renewable energies openings into global market opportunities. Higher education institutions and industry collaboration should be enhanced, for example through targeted innovation vouchers for small and medium-sized enterprises. Collaborative platforms for eco-innovation, like Knowledge Transfer Partnerships in the United

Kingdom, could bring forward more efficient exchange of information, reduce duplication of efforts and enhance the adoption of new technologies by local industries. Skill creation for green jobs should be more efficiently organised by pooling learning resources of educational institutions and industries in Berlin and Brandenburg and providing flexible pathways between educational institutions.

- In cultural and creative industries Berlin should, in collaboration with educational institutions and the public and private sectors, increase its efforts to support entrepreneurial skills among students and graduates and better further education opportunities. Multidisciplinary collaboration across higher education sectors and different institutions should be encouraged through reducing red tape and encouraging the establishment of joint institutes, departments and institutions.

- Berlin should, in collaboration with higher 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. In addition to increasing efforts to widen access to higher education and improving retention rates, higher education institutions should also reach out and empower the migrant population to address their own challenges through community development programmes. One way of mobilising higher education institutions could be through Berlin's Neighbourhood Management Programme in areas with a high proportion of migrants and people on transfer payments. Higher education institutions could support the Quartiersmanagement activities, such as *Bildung im Quartier* ("Education and training in the neighbourhood"), and through targeted action research on Berlin's immigration experience and ethnic entrepreneurship programmes.

Capacity development in Berlin

The Berlin Senate has pioneered capacity building for regional development through cluster based networking and urban spatial development. But collaboration within and between higher education institutions remains a challenge. There is a need to bring together the Berlin's higher education and research institutes and the Senate to consider how best to respond to the big challenges facing the metropolis…

Traditions of partnerships within the city or region between higher education institutions, businesses, regional agencies and government bodies, is a critical factor in attracting foreign direct investment and partnering with other regions and higher education institutions globally. The Berlin Senate has contributed to capacity building in various ways, for example through supporting networking in the fields of expertise and through urban spatial development. This includes the establishment of Charité, the joint medical school between the Technical University of Berlin and Free University of Berlin and its campus adjacent to the Buch science park in the north east sector of the city; the relocation of Humboldt University's science faculty from the city centre to Adlershof in the south-east sector of the city; and the mergers leading to the creation of the Hochschule für Technik und Wirtschaft Berlin (University of Applied Sciences for Technology and Economy), with two campuses in the eastern part of the city.

Despite the networking facilitated by cluster development, the participation of higher education institutions in fora linked to local and regional development appears fragmented. There is scant information about involvement in activities related to regional development or social integration. Diverse programmes and projects involving higher education institutions appear to be built on separate and non-coordinated initiatives stemming from specific circumstances rather than from an overarching vision of needs. Tackling deep-seated spatial as well as social disparities in Berlin remains a challenge and the presence of higher education facilities in different locations across the city can contribute significantly to this task.

With continuing financial pressure there is a need for an *ad hoc* albeit informal structure where the city's higher education and research institutes

can meet with one another and with the Senate to consider how best to respond to the significant challenges facing the metropolis, including spatial development and human capital development and which require well-functioning educational pathways between the institutions and different levels of education.

…stronger incentives are needed to mobilise higher education institutions and their staff for local and regional development…

Higher education institution's culture, capacity for change, leadership and appropriate co-ordination mechanisms play an important role in their capacity for partnership building and collaborative action. In Berlin, the incentive structures for mobilising research-intensive universities for regional and city development are limited. There is no explicit "third task" or regional development task assigned to them and regional engagement is left to the initiative of the individual institutions. The principal driver of research-intensive universities is scientific excellence and/or its applicability to business competitiveness wherever firms may be located. While the universities of applied sciences usually have close links to the labour market and also local and regional development, they are constrained by their limited capacity in terms of time and money.

There are few direct funding mechanisms to stimulate regional engagement of higher education institution in Berlin. So far, the Berlin Ministry of Education, Science and Research has used its core funding resources to steer universities towards regional engagement in a limited way, for example the new contract funding arrangements introduced in 2008 have not embraced an engagement agenda for the Berlin higher education institutions.

In terms of institutional management, Germany's research-intensive universities give a major role in institutional decision-making to academic staff, but limited influence to external partners. The "Initiative for Excellence" is a national top-down programme involving the central government's thrust to improve the quality of research in higher education institutions and at the same time also change the way universities work. It supports new concepts for organising and enabling cutting edge research at universities. From the perspective of regional engagement of higher education institutions, it can divert the institutions from their regional tasks. In Berlin, the initiative is bringing research-intensive universities and research institutes closer together and improving collaboration. In the absence of a more profound higher education reform, there is a risk that

while a new more responsive and entrepreneurial "layer" is developed within the institutions, the academic heartland is left untouched.

The following measures would build capacity for regional development in Berlin:

- The mission of higher education institutions to engage locally and regionally, and specifically to contribute to economic, social and cultural development, should be made explicit in higher education legislation.
- Appropriate career and/or financial incentives should, where possible, be made available to encourage and reward academic staff engaged in local and regional development.
- The Berlin Senate should seek every opportunity to mobilise the higher education sector for local and regional development by creating incentives. This could be done in the form of long term core funding and additional strategic incentive-based funding schemes. Incentives for higher education institutions should be aligned to support regional development objectives in the form of time and money. The Senate now rewards universities both for winning academic research contracts and for work commissioned from specific users. This is a step in the right direction. In addition, for universities, stronger incentives are needed to ground international excellence and research in the city with regional benefit. For the universities of applied sciences, academic time should be available to undertake user-orientated research, otherwise, the financial incentives may have limited impact on the extent and scale of external engagement.
- The current costs of accountability of higher education institutions should be audited to identify and quantify the burden that it imposes on universities as well as the potential to ameliorate it by data sharing, raking assurance from the work of others and a risk-based approach to assurance.
- The Berlin Senate in collaboration with is key stakeholders including the higher education institutions should establish a clearly articulated long-term integrated strategy for economic, social, cultural and environmental development of the city. Such a vision and underpinning strategy is a fundamental prerequisite to a fully-fledged engagement between the city and higher education and research.

- The Berlin Senate, higher education institutions, other educational institutions and key stakeholders of the economy and society should work together to establish a Regional Higher Education and Research Strategy which connects top-down high-level strategies and bottom-up initiatives and to guide the development of the overall higher education system to optimise its impact on the city. A forum linked to this strategy should enhance the dialogue between higher education institutions and the city regarding their interaction, help understand the drivers of each group and organise capacity building through targeted leadership development programmes for those filling "boundary spanning" roles between higher education and the wider society. The programmes should focus on developing skills in a collaborative manner through addressing practically some of the major challenges facing the city.

- Lateral co-ordination between higher education institutions and the Senate's various areas of responsibility could be strengthened in different ways. The Berlin Board could be developed into a forum where the wide ranging contributions of higher education to the city could be articulated, highlighting inter-connections between these areas and links to the various ministries which could contribute to and gain from the work of higher education institutions. The Berlin Investment Bank (Investitionsbank Berlin), which provides a well-resourced business-oriented and specialised development vehicle, could also be developed into a single delivery agency in the field of economic development, empowered to mobilise the support of higher education institutions and strengthen links with the business community.

- Clear links should be established between city regeneration and spatial planning and mobilisation of higher education to support city development. Geographical proximity can be a catalyst for supporting links between higher education and business through both research and teaching. Adlershof is a success story and will become an even more significant innovation hub in south-west Berlin with the relocation of the airport. The linkages between the research institutes facilitated by the IGAFA (Joint Initiative of Non-University Research Institutions in Adlershof) and underpinned by the management and marketing of WISTA (Park of Science and Technology Adlershof) are models of good practice. A similar hub needs to be developed at Buch and at Charlottenburg (perhaps under the umbrella of a single organisation built around WISTA). These hubs need to handle transport, housing and community relations issues as well as being underpinned by strong higher education and business intermediary organisations. This could be a task for a strengthened Berlin Investment Bank (Investitionsbank Berlin).

- Evidence-based decision making should be strengthened in the region by focusing on a dashboard of key performance indicators to assist managers and funders to steer higher education institutions and the overall system. This can result in a shared local knowledge base which will galvanise the development of a strong local strategy for change. Care should be taken to avoid accountability burden and over-emphasis on what can be measured (e.g. patents, licenses and spin outs) rather than what matters (e.g. creativity or social innovation) and lagging indicators (what has happened) rather than leading indicators (e.g. building capacity to act in the future).

- Higher education institutions should review recruitment, hiring and reward systems to include regional development agenda. They should create systematic mechanisms to monitor and evaluate their activities in this area, to share good practice within the institution and benchmark this experience with other organisations and localities. In addition, they should invest in developing the skills of facilitators, i.e. those with boundary spanning roles who help create links between the higher education institution and other stakeholders.

Chapter 1: Berlin and its higher education institutions

This chapter presents the profile of Berlin, with its main economic activities and its socio-economic characteristics that distinguish it from other major German cities, in particular because of its long-standing division. It examines the growth of Berlin's tertiary education and its role in regional development within a tight budgetary context. It identifies the main strengths and weaknesses, in order to analyse the major challenges it faces by integrating the strategic role of higher education institutions in regional development policies.

Introduction

Berlin, situated only 70 km from the Polish border, is the largest German city, the Federal capital and one of the 16 *Länder* (states or regions at NUT2-level in terms of the EU and OECD regional classification). The *Länder* have their own substantial authority, including legislative power, but they do not have fiscal autonomy: they are not allowed to raise their own taxes but collect federal income tax and other taxes. Public revenues are assigned to the *Länder* through a continuously adjusted formula based in particular on their respective number of inhabitants and regional GDP.

Shortly after reunification in October 1990, Parliament voted move the capital of the Federal Republic of Germany from Bonn to Berlin. In 1999, the Parliament, Government, President[1] and most ministries were effectively transferred to Berlin.[2] Berlin enjoys the special status of being one of the three city-states (*Stadtstaaten)*, alongside Hamburg and Bremen, meaning that the city is also a *Land* that is now composed of 12 boroughs (*Bezirke*). The mayor of the city serves at the same time as prime minister of the *Land*, the Berlin Senate acting as city and regional government and the "Senators" as state ministers.[3]

Berlin's hinterland is constituted by another *Land*, Brandenburg (capital Potsdam, about 150 000 inhabitants), which is predominantly rural and sparsely populated. The other main cities are Cottbus (about 100 000 inhabitants), Brandenburg on the Havel (about 70 000 inhabitants) and Frankfurt on the Oder (about 60 000 inhabitants). Brandenburg, like most other *Länder* of the former German Democratic Republic (GDR), is economically lagging, although the region around Potsdam is dynamic. Potsdam and Berlin are close to each other: a distance of only 40 km separates their main train stations. For this reason, many people live, study and work in Berlin and Potsdam almost as if it were one city. Potsdam is host to an important university that maintains many links with Berlin and carries on research activities in which higher education institutions in the capital city are involved. In 1996, a political initiative to unite the two separate *Länder* was rejected by voters in the State of Brandenburg, while a thin majority in Berlin voted in favour of that proposal. Co-operation between the two *Länder* is developed in many areas. A joint economic commission has been set up and strategic approaches, such as in the field of health, are often jointly designed.

1.1 Socio-spatial and demographic patterns in reunified Berlin

Berlin has more than 3.4 million inhabitants who live over a surface of 892 km^2, the average population density amounting to 3 847 inhabitants per km^2, which is that of a metropolitan area. Population densities in the boroughs (*Bezirke)* are however quite different depending on their location and the historical heritage of each neighbourhood. The inner city consists of large green spaces (Tiergarten) and highly populated areas (Wedding) with over average population densities, particularly in migrant neighbourhoods like Kreuzberg. A district such as Neukölln is made of predominately built-up areas adjacent to yet to be redeveloped brown-fields. The outer fringes of the city are less densely populated as the Berlin boundaries were defined in 1920 by inclusion of numerous small towns and villages, agricultural land, lakes and forests. These land use patterns, in spite of a political division of more than 40 years and a physical division of more than 30 have more or less survived until this day.

Berlin is a city of contrasts. As a former industrial city it retains many undeveloped areas with abandoned plots and factories along the no man's land of the former Wall. There are a few subway stations from the rebuilt city centre around Potsdamer Platz, astride the former limit between the two parts of the divided city and within walking distance of the historical centre. These closed facilities and open spaces provide opportunities for future Berlin development and many have actually been taken over by associations active in the contemporary art scene, such as in the case of the Uferhalle in Wedding which was a former railroad depot. But Berlin is also a green city, being the European city with the highest planted density, many parks and a closely knitted network of cycle paths linking the different neighbourhoods, from the former renovated slab housing areas of East Berlin to the western commercial areas located around the Kurfürstendamm or the residential areas to the west of the city centre and Prenzlauer Berg in East Berlin which attracts artists and intellectuals.

Berlin demographic trends since reunification are characterised by an initial rise in population numbers after the fall of the Wall and then decline from 1996 until the year 2001, because of a rising number of departures from the capital city and a relatively constant inflow of immigrants. Since 2001 the population has started to grow again, registering in 2007 a migration surplus of 12 000 people, because the number of departures has been reduced while the number of new inhabitants has increased (StLA Berlin, 2006). Recent developments could stem from the move of capital city functions but also from the attractiveness of Berlin, in terms of low cost of living and quality of life, although no data is available on the socio-economic characteristics of in-migration, nor on the factors that slowed out-

migration. According to the Berlin Innovation Report for 2006, 13% of all persons with regular employment and who pay for Social Security in Berlin in 2004 were university graduates, the highest percentage in Germany. Also, according to the latest forecast, unlike other parts of Germany, Berlin's population will continue to gradually grow and reach 3.48 million inhabitants by 2030 (Schreiterer and Ulbricht, 2009).

Berlin also has a relatively high proportion of inhabitants with a migration background and some 14% are foreigners, mostly Turks.[4] The settlement patterns of the different areas of the city are quite divergent. In former East-Berlin 10.7% of the population is considered to have a migrant background, mostly from Vietnam, but also the so called "*Russland Deutscher*", with a German born status and coming from different parts of the former Soviet Union. The share in West Berlin is approximately three times higher, at 31.7% (ISQ, 2008), where, besides the predominant Turkish group, there are many immigrants from former Yugoslavia and the Balkan states and also the Middle East. Some of these migrated during the 1960s and 1970s, some were born in Germany but have parents who migrated there. Altogether, with an average of 23.8% of migrants in the overall population, Berlin is the third state after Hamburg (25.6%) and Bremen (26.3%) in Germany in terms of inhabitants with a migrant background (StLA Berlin, 2006).[5] This gives the city a cosmopolitan flavour but also constitutes a challenge in terms of socio-economic integration as a high proportion of these inhabitants are on welfare and with a very low proportion entering higher education.

1.2 Berlin in the German and European context

Before reunification, the two sides of Berlin were cultural showcases with very diverse offerings catering to quite different life-styles: to the East the "Museum Island" with in particular the famed antique Pergamon Museum and close by the Berliner Ensemble where Bertolt Brecht staged his plays and to the West a whole spectrum of cultural attractions encompassing the prestigious Berliner Philharmoniker, as well as the off-beat Kreuzberg neighbourhood amongst others. This diversity remains a unique feature of reunified Berlin, with a substantial number of additions such as the New National Gallery for contemporary art.

The high concentration of subsidised cultural establishments and activities in Berlin (in spite of budget cuts) combined with a dynamic non subsidised arts scene contribute towards making Berlin a cultural magnet. Comprising also an important media industry, publishing and film making, Berlin is a lively city of culture, as well as being an attractive city of higher education and research, with campuses and facilities spread all over its

territory, as will be developed further. It attracts artists from all over the world and many art galleries have flourished in different parts of the capital. Berlin, as a cultural capital, now appears to play the role that Paris and New York played at certain periods.

Today's Berlin has not met the economic expectations following reunification, as the capital has not been able to recapture its former industrial base but it has become a burgeoning city of services (see below). Reconstruction continues, albeit at a slower pace because of tight budgets and slow growth, with many central areas yet to be redeveloped. Berlin is and will remain for a long time an "Unfinished City",[6] with its specific character and attractiveness residing precisely in this continuous flux of activity and multi-faceted initiatives that defines it as a city seeking to expand with a rising "creative class" as outlined by Richard Florida.[7] The unusual "mix" of Berlin contributes to its dynamic image, alongside its rich cultural heritage, thus putting it in the prime position of German tourism destinations.

1.3 Economic profile

The economic profile of Berlin is untypical for a capital city, as it reflects the geo-political evolution of a divided post war Germany as well as the major changes but also the unfulfilled hopes of the return to a capital city status. Berlin's pre-war manufacturing base was partially reconstituted after 1945, both in the East and the West but under conditions that led to a substantial reduction in industrial activity after reunification, in the face of competition from firms located in other German cities. Lack of productivity in the former industrial conglomerates of the German Democratic Republic (GDR) and the interruption of advantageous subsidies and tax schemes in favour of the West Berlin economy led to a downturn in industrial employment while the expected relocation of large firms into Berlin did not materialise. Within such a context, Berlin's economy today offers contrasting features: it is mostly a service economy based in particular on tourism, culture industries and health services with anaylse of the firm structure revealing the predominance of small and medium-sized enterprises, representing around 80% of employment in the capital city. Of the 113 414 companies registered in Berlin at the end of 2007, 78 786 were single self-employed (SenWTF, 2009). The public sector, including higher education institutions, although downsized since reunification, is also an important employer, while activities linked to R&D are more developed in Berlin than in other cities.

Traditionally, the city had a strong industrial core of sectors including electrical and mechanical engineering, motor-vehicle manufacturing,

chemicals, pharmaceuticals and food products, which survived to this day, albeit at lower levels: more than half of manufacturing jobs in Berlin were lost between 1991 and 2008. Today, electrical engineering employs around 35 000 people, mechanical engineering and vehicle construction 19 000, chemical and metal industries 12 000 each, printing and paper industries 15 000 and food production 13 000. Just 235 enterprises (0.3%) have more than 500 employees, and only 185 had a turnover of more than EUR 50 million (SenWTF, 2009). The largest companies in the region include Deutsche Bahn, Bombardier, BMW, Siemens and Bayer-Schering. Following the Federal trend, Berlin's tertiary sector has been constantly growing since reunification (net increase of 19.1%) (StLA B-W, 2009a). Today, of all *Länder*, Berlin accounts for the highest service sector share in the regional economy (close to 85%) (StLA B-W, 2009b). The capital's most important economic sector is health services with approximately 180 000 employees. About 12 000 people have jobs in one of the 160 biotechnology companies. Another 135 000 people work in the communications, media, and culture industries covered by more than 10 000 companies that include film and television industries (Aengevelt-Research, 2008).

The expansion of the service sector, with in particular the development of the health and culture industries, has only partially compensated the demise of the traditional industrial base and the sharp reduction in public employment in both former East and West Berlin. Unemployment in Berlin rose steadily until 1998 and stabilised at around 16% until 2001, only to pick up again until 2005 (19%) and dropping ever since (13.9% in 2008). Although the situation has improved since 2005, Berlin unemployment rates constantly remain some 6-7% higher than the national average, with many of the unemployed being with immigrant backgrounds or low skills.[8] Economic growth followed similar patterns, with negative growth from 1998 until 2004 (minus 2.2% in 2003 and minus 2% in 2004), picking up again since 2005 but at levels lower than national averages, with the notable exception of 2008 (Berlin +1.6%; Germany +1.3%) (StBA, 2009a).

Overall economic trends during the last 4-5 years show an economic turn-around in many areas, underpinning the change of Berlin's economy from manufacturing and public administration towards knowledge-intensive service industries such as health and life sciences, IT and media, traffic and mobility. These positive developments are reflected in the rate of firm creation (balance of business registration and deregistration) in Berlin. In 2008, with a rate of 26 per 10 000 inhabitants, the capital city ranked second just after Hamburg with 29 per 10 000 inhabitants (Amt für Statistik Berlin-Brandenburg, 2009). Moreover, with 14.1% of its economically active

population self-employed, Berlin registers the highest rate amongst the *Länder*, by far exceeding the national average of 11.2%.

Due to its particular background and as recent trends tend to demonstrate, Berlin's economic development perspectives are closely linked to its main assets as a learning region: a particularly dense network of higher education institutions and research centres that distinguishes Berlin from most other *Länder*. Their contribution to employment, to demand for goods and services, to innovation and R&D in Berlin as well as in Brandenburg and the rest of Germany is considerable. Recognising these strengths, Berlin's economic development strategies are largely centred on knowledge dissemination, innovation and research. The following sections will present higher education institutions and research activities in Berlin within the wider context of higher education in Germany and Berlin development strategies while the following chapters will seek to analyse the impact of higher education institutions on the Berlin economy but also their role in social integration.

1.4 Higher education in Germany

Main features

The German federal system entails large responsibilities for *Länder* in the field of education. *Länder* have the responsibility for schooling at all levels K-12[9]. However, the work-based learning within dual vocational training is regulated by federal statutes and organised by the chambers of commerce and industry. In addition, continuing education of adults is regulated by federal statutes. In the area of tertiary education, the *Länder* are directly and fully responsible for the overall organisation, funding and functioning of their public institutions, both for teaching and for research, drawing upon financial resources allocated to each *Land* from the Federal level. Alongside this core funding, diverse Federal funding mechanisms (competitive grants, specific structural funds) complete university resources. Only a few *Länder*, and Berlin is not one of them, have introduced tuition or allowed their higher education institutions to levy fees (around EUR 500 per semester). Academics as well as all the staff in higher education institutions are civil servants or work under the statutory rules of public employment.

There are three different types of higher education institutions in Germany:

- Universities (Universitäten), including various specialised institutions, offering the whole range of academic disciplines and focusing in

particular on basic research, so that advanced stages of study have mainly theoretical orientation and research-oriented components.

- Universities of applied sciences (Fachhochschulen, FH) with a special focus on engineering and technical disciplines, business-related studies, social work, and design. Their mission of applied research and development implies a distinct application-oriented focus and professional character of studies, including integrated and supervised work assignments in industry, enterprises or other relevant institutions.
- Schools of art/music (Kunst- und Musikhochschulen) offer programmes in fine arts, the performing arts and music in such fields as directing, production, writing in theatre, film, and other media; they also cover a variety of design areas, architecture, media and communication.

During the mid-2009, there were 394 higher education institutions, in Germany, the great majority of which is public, with a small but rapidly increasing number of private institutions[10] accredited by the *Länder*. 189 of these are universities of applied sciences, 104 are universities, 6 are teacher training colleges,[11] 51 are schools of fine arts or music, 30 are special civil service institutions and 14 are theological seminaries. Together, in the autumn of 2008, all tertiary education institutions enrolled 1 996 million students (336 000 first year students) including 236 934 non-German nationals (StBA, 2009b). More than two thirds of all students attend universities and about 30% universities of applied sciences or schools of art and music (Schreiterer and Ulbricht, 2009).

Until recently, higher education institutions were not allowed to admit students under their own responsibility but had to accept all applicants who successfully graduated from upper secondary education (*Abitur*) unless demand by far exceeded the number of places available, which was the case in medicine or psychology. Universities could not select applicants by themselves but had to accept the decisions of the so-called "central distribution of study places" (Zentralstelle für die Vergabe von Studienplätzen, ZVS). First year students were assigned according to their GPA and final examinations in secondary education, waiting time and region. Only ten years ago, a few higher education institutions were allowed to choose among their applicants for small numbers of programmes, especially in the arts. Today, close to half of all programmes in public higher education institutions have restricted access and these may, according to the field of study and number of applicants, decide on their own upon how to run the admission and whom to admit on what grounds in accordance with the regional access to higher education law.

While universities offer both basic and applied research and doctoral training and programmes of study of a more theoretical kind, universities of applied sciences may also engage in research but are not allowed to grant doctoral degrees. Universities of applied sciences account for many more institutions but for far fewer students than universities and cover broad fields of occupational studies. They were established in the 1970s mainly to widen participation and access to higher education, but also to boost regional development and broaden the economy's skill base. Universities of applied sciences were well received because of their practical approach and their co-operation with firms, mostly small and medium-sized enterprises. All universities of applied sciences today offer bachelor and master degree programmes. Because of their low research intensity they tended to be considered less prestigious than traditional universities. Today, however, the former imbalances between the two types of higher education institutions are changing: Universities of applied sciences are encouraged to get more involved in research while practical concerns and outlooks of study programmes and the employability of graduates have eventually become more important for all institutions of higher learning including universities.

After a slight decline between 2004 and 2006, the share of an age group entering post-secondary education in Germany increased again and for the first time reached 34% in 2007. Yet, entry rates in Germany are still below the OECD average of 56% (OECD, 2009). A large part of professional training and education belongs in Germany to the dual system of education combining training on the job and schooling. This at least partly accounts for why Germany has low attendance rates in comparison to many other highly industrialised countries. Academic tertiary attainment rates are low by international standards: in 2009, only 23% of a typical age cohort completed a tertiary education programme compared to an OECD average of 39% (OECD, 2009). Dropout rates of nearly 50% in the sciences and engineering have stirred serious concerns about the state of German higher education and economic prospects in these fields (EFI, 2009).

Another special feature of German higher education is that, unlike in most other European countries, most positions in health services and care, (including physiotherapy, midwifery, occupational therapy, elderly care, and nursing) do not require a higher education degree. Incumbents are taught and trained for three years in the dual system and at universities of applied sciences (*Fachhochschulen),* vocational schools specialising in these occupational fields. There is also a vocational track within upper secondary education that has become quite popular during the last two decades. From almost 400 000 students leaving school after 10th grade in 2004 and 2005, 41% (161 000) later got an upper secondary degree from a vocational

school. These numbers show that vocational schooling now plays an important role in the preparation for tertiary education.

Higher education governance and funding

Higher education governance and funding mechanisms in Germany have varied over years, with federal frameworks and funding mechanisms introducing a measure of coordination and homogenisation with the *Länder*. Under a constitutional amendment, a federal regulation signed into law in 1969 provided a new binding framework for state laws regulating higher education, and the federal government was permitted to co-fund expenditure for construction and large-scale equipment in higher education (*Hochschulbauförderungsgesetz*). The *Gemeinschaftsaufgabe Hochschulbau* (joint funding for buildings) has contributed nearly EUR 2 billion, half of which were paid for by the 16 *Länder* and half by the Federal government.

In 2007, another constitutional reform shifted all responsibilities for funding and governing higher education back to the *Länder*. Yet, provided all of them unanimously agreed, it authorised special collaborative venues together with the Federal government and fixed-term cooperative programmes of limited scope. Today there are thus 16 different *Länder* laws and systems for higher education that now tend to move more and more apart again. Resources, per capita funding, governance structures, priority areas and programmes differ to a large extent between *Länder* and individual higher education institutions.

In many other respects, Germany has kept pace with international developments. Most *Länder* have subscribed into deregulation, granted higher education institutions more autonomy and responsibilities, shifted from line-item budgeting to block grants, changed their regulatory frameworks, cut back both their control and the decision making powers of academic bodies in favour of strengthening academic leadership and introduced new governing boards (or boards of trustees) more open to civil society and the private sector. Moreover, the rise of new public management has fuelled models of contractual management that, mostly for a period of two to four years, aim to combine goals and objectives agreed upon with performance-based funding, better accountability and new reporting systems.

As for the newly established cooperative programmes between the *Länder* and the federal government, two deserve special attention: the *Hochschulpakt 2020* and the *Exzellenzinitiative*. Facing fiscal strains, continuing underinvestment and steeply rising number of applicants and new entrants in higher education, the *Länder* and the Federal government signed a co-funding agreement in June 2007 for the provision of an

additional 91 000 places for students in German higher education institutions until 2010 (*Hochschulpakt 2020*) and for paying higher education institutions a 20% flat-rate for overhead costs (cost recovery) on competitive grants from the German Research Foundation (Deutsche Forschungsgemeinschaft). The total costs of the first *Hochschulpakt* were a little more than EUR 1 billion for the four years 2007-2010 of which the Federal government covered EUR 565 million and the *Länder* the rest. In June 2009, the two parties committed to further extend that programme until the end of 2015.

The "Initiative for Excellence" (*Exzellenzinitiative*), provides ample funding for leading-edge research and for doctoral schools at German universities to help improve both their performance, their international competitiveness and visibility. Launched in the summer of 2005, the overall expenditure was set at EUR 1.9 billion for five years, with the first grants allocated in 2007. Three quarters of the total were funded by the Federal government. The "Initiative for Excellence" should also support new concepts for organising and enabling cutting edge research at a small number of universities to help them become internationally highly recognised "beacons of science". Altogether nine universities were awarded such grants: one of these is the Free University of Berlin. This programme has been extended: an additional EUR 800 million is bringing total funding up to EUR 2.7 billion for the second term of five years (2012-17).

1.5 Higher education in Berlin

Major features

Berlin's higher education system, the location of which is indicated in the map below, comprises 14 public and 22 private institutions. The public institutions include:

- Three research-intensive universities, *i.e.* Free University of Berlin, Humboldt University and Technical University of Berlin. In addition, the Charité Medical School is run by Humboldt and Free Universities.
- Four universities of applied sciences
- Two universities of applied sciences operated by the Protestant and Catholic churches but primarily publicly funded, with a special focus on social work and nursing
- One university of applied sciences run by the federal government for civil service training
- Four schools of art, drama and music.

Figure 1.1 Map of higher education institutions in Berlin

1 – Freie Universität Berlin (FUB)

2 – Technische Universität Berlin (TUB)

3 – Humboldt Universität zu Berlin (HUB)

4 – Charité

5 – Science park Berlin-Buch

6 – Science park Berlin-Adlershof

7 – Beuth Hochschule für Technik in Berlin (BHT)

8 – Hochschule für Wirtschaft und Recht (HWR)

9 – Alice Salomon Hochschule (ASH)

10 – Evangelische Fachhochschule Berlin (EFB)

11 – Katholische Hochschule für Sozialwesen Berlin (KHSB)

12 – Hochschule für Technik und Wirtschaft (HTW)

13 – Universität der Künste (UdK)

14 – Hochschule für Schauspielkunst "Ernst Busch" (HfS)

15 – Kunsthochschule Berlin (KHB)

16 – Hochschule für Musik 'Hans Eisler' (HfM)

17 – Steinbeis-Hochschule Berlin (SHB)

18 – SRH Hochschule Berlin (SRH)

19 – Bildungswerk der Wirtschaft in Berlin und Brandenburg (BBW)

Source: Schreiterer, U. and L. Ulbricht (eds.) (2009), "The City of Berlin, Germany Self-evaluation Report", OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/30/10/43942109.pdf*

Of the three research-intensive universities, the first two are located in former West Berlin. The Freie Universität Berlin (FUB) created in 1948**,** situated in the south-western District of Steglitz-Zehlendorf is the largest (29 008 students, 1 290 academics, among them 330 full professors and 1 798 full-time staff positions in 2008).[12] The Technische Universität Berlin (TUB) with its central Charlottenburg campus counted 24 600 students, 1 093 academic positions (with 294 full professors) and 1 508 staff the same year. The historical Humboldt University Berlin (HUB), located in former East Berlin (Unter den Linden and in Adlershof, site of the Technology and Science Park) had 23 826 students, 969 faculty members (247 full professors) and 1 315 members of staff.

The biggest art school is the "Universität der Künste" (UdK) or University of the Arts, where there are 3 781 students, 298 lecturers (among them 158 full professors), and 241 staff positions. The other three independent schools of art, drama and music are the Hochschule für Musik Hanns Eisler (Academy of Music Hanns Eisler Berlin), the Hochschule für Schauspielkunst Ernst Busch (University of Dramatic Arts Ernst Busch) and the Kunsthochschule Berlin Weißensee (School of Art and Design Berlin Weißensee). Together, these small schools have no more than 1 504 students, 169 faculty (of which 113 are full professors), and 108 staff members. The two universities of applied sciences run by the churches jointly have less than 2 000 students. The Evangelische Fachhochschule Berlin (Protestant University of Applied Sciences) has about 1 200 students and the Katholische Hochschule für Sozialwesen Berlin (Catholic University of Applied Sciences) a little less than 900.

The other four universities of applied sciences show a division of labour by focus on a particular area: two on engineering and physical sciences, one on business and law, and the fourth on social work, health, and education. The Beuth Hochschule für Technik Berlin (Beuth University of Applied Sciences for Technology Berlin), formerly the Technische Fachhochschule Berlin, counts 9 217 students, a faculty of 277 full professors and 210 staff. It offers 34 bachelor and 35 master programmes in engineering and computer sciences. The Hochschule für Technik und Wirtschaft (former FHTW) covers business, design, engineering and media technologies with 34 bachelor and 23 master programmes and an enrolment of 9 686 students. The Hochschule für Wirtschaft und Recht (School of Applied Sciences for Economy and Law) is the result of the recent merger of the former Fachhochschule für Wirtschaft and the former Fachhochschule für Verwaltung und Recht. It has 22 bachelor and 17 master programmes in the fields of business and accounting, legal services, public administration and engineering (dual study courses). Its two predecessors together counted 8 039 students, 155 professors, and 177 staff. The Alice Salomon

Hochschule is by far the smallest of the four public universities of applied sciences. It offers 4 bachelor and 8 master programmes in social care and work, health, early childhood education and physiotherapy and has 1 809 students, 56 professors and 51 staff positions. In a deliberate policy decision it was recently moved to the slab housing (*Plattenbau*) area within the District of Marzahn-Hellersdorf, in former East Berlin.

Most of the 23 private higher education institutions (940 places for first-year undergraduates) in Berlin are focused on specific occupational fields (nursing, health, and business services) and on postgraduate or continuing education (like the European School of Management and Technology, the Hertie School of Governance or the Berlin University for Professional Studies -Deutsche Universität für Weiterbildung - recently founded by Free University of Berlin and a publishing company). Amongst these, the institution with the largest enrolment is in the Steinbeis-Hochschule Berlin (Steinbeis University Berlin) with 3 840 students, the SRH-Berlin with 169 students and the Berliner und Brandenburger Wirtschaft Hochschule (BBW), operating under the aegis of corporate organisations and regional companies (140 students in the fall of 2008) (Amt für Statistik Berlin-Brandenburg, 2009). In collaboration with the Hochschule für Wirtschaft und Recht, it offers access to people already at work who do not meet regular admission prerequisites. Steinbeis carries a wide range of business-related courses leading to certificates, MBAs and doctoral degrees, while SRH-Berlin offers courses in strategic management and in communication meant to particularly address migrants and young women. Moreover, at least four private academies focus on media design and technology with limited enrolment but in close co-operation with regional (new) media production companies, in a field considered as a priority for Berlin development.

Altogether, in the autumn of 2008, a total number of 133 594 students were enrolled in Berlin, accounting for 6.74% of all students in Germany, while Berlin's share of population only amounts to 4.14%. Of the students in Berlin, 95 239 attended a university and 33 484 a university of applied sciences. Thus 25.1% of all students in Berlin went to a university of applied sciences, 5% lower than the national average (30.1%). The share of first-year students at universities of applied sciences has reached 29%, which is not far off the national average (33%).

Efforts have been made for more than a decade to shift the balance towards the universities of applied sciences. Within the funding framework for 2006-2009, a separate Structure Fund for Universities of Applied Sciences (*Fachhochschulen Strukturfonds*), co-financed with the Federal government, was established for this purpose. The universities of applied sciences in Berlin were thus able to increase their total number of full-time faculty (lecturers) from 638 in 2000 to 715 in 2007 (12%), while in the

general context of budgetary restrictions, university faculty positions were reduced from 4 082 to 3 478 (15%) (SenBWF, 2008). Under the aegis of the *Hochschulpakt 2020*, Berlin committed itself to increase the slots for first-year students by 10% and to admit an additional 19 500 youngsters until 2020, with 1 200 new places per year are located at universities and 1 700 at universities of applied sciences.

Recent trends show that the performance of Berlin higher education institutions has been regularly increasing on the basis of different indicators. With extra guidance efforts and new incentives, all higher education institutions in Berlin managed to continuously raise their respective completion rates between 2002 and 2007. For the three comprehensive universities, the average climbed from 46 to 63%, and for the universities of applied sciences, always higher than universities, it grew from 63% to 88% (Schreiterer and Ulbricht, 2009). Also, in 2005, with 33.3%, Berlin scored second highest of all *Länder* for the share of higher education graduates among the 25-year old population (DIPF, 2008). Finally, in 2007, the number of first-year students in Berlin increased by 10% compared to the year before, the biggest increase in Germany. This is due partly to the fact that Berlin is a highly attractive university city for students from other parts of Germany and abroad. In 2006, 54.3% of all higher education students in Berlin were not Berliners and over 10% were foreigners (StBA, 2006).

About 45.7% of students in Berlin are from the City-Region. Compared to other *Länder* where the share of local students tends to be much higher (Bavaria: 70.4%, North-Rhine Westphalia, 72.2%) the Berlin percentage is low, like in other city-regions (Bremen 35.5%; Hamburg 45.1%). The *Hochschulpakt 2020* addresses these imbalances by providing some financial compensation for *Länder* hosting many more students coming from other regions than the average. In 2004/05, 27.8% of Berlin's secondary education graduates left Berlin to study elsewhere (StBA, 2006).

As the regional labour market is not able to absorb all graduates, some of them move to other cities or regions after graduation. However, up to now there is no systematic study about graduate mobility and success, and neither the *Länder* nor the Federal administrations collect comprehensive data on graduate's careers. The situation is different for first-year students. Together with their application, they have to report in which *Land* they have completed their secondary education, so that there is a complete track record on their migration. In addition, some Berlin higher education institutions have nonetheless undertaken graduate surveys to track their alumni. For example, in the case of Humboldt University, the survey conducted for 2007 (HUB, 2009) indicates that nearly 60% of graduates stay in Berlin up to two years after graduating, 5 to 10% locate in Brandenburg, 25% in other *Länder*, while 6% choose to go abroad. This is not very different from the

average for Germany (35% employed outside of their region of study).[13] As more than 50% of students in Berlin come from outside the region, this would seem to indicate that Berlin keeps somewhat more graduates than there are departures. Such a factor could have contributed to recent demographic increases based on overall city attractiveness, in which the supply of certain high level jobs, such as in research, can play a role.

Higher education funding and governance in Berlin

Since 1997, Berlin's higher education institutions are funded via contracts negotiated with the Senate Ministry for Education, Science and Research. These four year contracts stipulate strategic priorities for general higher education policy and objectives for each institution. On the basis of these contracts, higher education institutions agree to pursue goals such as reaching a given number of students and graduates, opening new study courses, pursuing certain research activities and delivering annual progress reports with key figures and performance data. Introduced to improve co-ordination and planning, these contracts, although linked to considerable budget cuts, protected Berlin's higher education institutions from ongoing reductions during the following years when tax revenues and public spending went down even further. The contract in place since 2006 expired at the end of 2009. Contracts for the period 2010-13 were finalised mid-2009 in time for the Parliament vote on the Berlin budget for 2010. The new contracts allow for a 20% increase in study places in spite of continuously tight budget allocations in all sectors. The increase in the public subsidies in 2010-13 has been meant to compensate for the budget cuts that took placebetween 2006-09.

In 2008, as agreed in the contractual framework 2006-09, all higher education institutions in Berlin (not includingt Charité) received Senate appropriations of EUR 984.2 million: 761.75 for universities, 142.38 for universities of applied sciences, and 80.07 for the schools of art, drama and music. Since the year 2000, overall funding increased slightly each year from EUR 911.73 million to EUR 1033.81 million in 2005, only to decrease again in the following years, reaching in 2008 a level only a little higher than at the beginning of the decade. In this context of budget restrictions, university funding did not fare as well as universities of applied sciences and art schools. Whereas the universities' budget in 2008 was only marginally higher than in the year 2000, the latter increased significantly in the case of universities of applied sciences (from EUR 91.3 million to 142.3 million) and somewhat for art schools (from EUR 73 million to 80 million). This underlines the deliberate policy measure to increase the role of universities of applied sciences as indicated above and the requirement of reducing

university duplications in certain fields resulting from the integration of institutions from former East and West Berlin into one single system.

Third party (mostly Federal) research expenditures partially alleviated overall budget restrictions as they increased from EUR 133.9 million in the year 2000 to 248.92 million in 2008. This trend benefited mostly universities where the majority of research is conducted (EUR 235.1 million in 2008). Federal research grants are very attractive for the *Länder* as these have only to complete national funding with a small share of the overall cost: for the first years 2006-12 of the "Initiative for Excellence" Berlin universities were granted EUR 210.9 million of which the *Land* has to pay only 25% (EUR 52.7 million).

The higher education financing system includes elements of competitive funding based on performance indicators used to provide incentives in fields considered important in teaching, research and gender equality (SenBWF, 2005). This competitive funding scheme also supports efforts towards the "profile definition" of higher education institutions, to reflect the special strength of each institution. The contracts for higher education stipulate, that from 2008 on, 30% of flexible resources assigned to all Berlin higher education institutions apart from investment expenditure and salaries, are subject to performance-based assessment and redistribution within each of the three institutional segments (universities, universities of applied sciences, schools of arts and music). In 2007, when the percentage was slightly lower, funds subject to redistribution totalled EUR 186 million. The criteria according to which performance is measured include teaching (50% at the universities, and 80% at the universities of applied sciences and schools of art and music), research and graduate training (45% in universities and 15% for other institutions), and gender mainstreaming (a modest 5% for all).

This new contractual model has changed traditional modes of governance and steering in higher education.[14] There has been a move away from higher education institutions using a rule-obedience approach towards taking on the responsibility of doing business and surveying outcomes. Contract renewal processes and annual reports create transparency, facilitating discussion of goals and objectives, performance and achievements between all stakeholders, but also deliberation on opportunities and shortcomings of individual higher education institutions. In this context higher education institutions have had to co-operate more closely in establishing new study programmes, defining strategic priorities[15] and even when applying for large research contracts and grants or deciding upon key academic positions.

The contractual approach has led to new organisational structures that have turned out to be highly effective, yielding new forms of higher education governance that in other *Länder* were established by new legal frameworks. An example of this is the new composition and role of boards of trustees. Under the law still in place, the regents of Berlin's higher education institutions have to be representatives of clearly defined organisations or social groups, such as trade unions, employers' or welfare organisations. In spite of this, the new trustees in effect often stand for themselves once elected. Besides, all higher education institutions elect business executives and professionals in their boards to help raise the voice of potential employers of graduates or innovative companies interested in research collaboration with higher education institutions. In the boards of BHT (Beuth University of Applied Sciences for Technology Berlin) and HWR (School of Applied Sciences for Economy and Law) four out of nine members are high ranking officers in companies very active in the region.

Coordination between higher education institutions in Berlin, which to date has remained at a low level, is ensured by the following bodies:

- The "Conference of Presidents and Rectors of Berlin's higher education institutions" (Landeskonferenz der Rektoren und Präsidenten der Berliner Hochschulen) represents Berlin's higher education institutions at the federal level, discusses issues of common interest, such as higher education policy and governance and agrees when required on common positions to bring forward in public debates.
- In 2004, three universities in Berlin established a "Permanent Conference of Berlin Universities" (Ständige Konferenz der Berliner Universitäten), to ensure universities have a stronger voice in higher education policy, particularly now as they face heavy budget cuts, which would entail difficult restructuring, abandonment of courses and of fields of study. As the remodelling process continues, the permanent conference still meets, occasionally publicising its positions.

1.6 Research and innovation in Germany and Berlin

In Germany, publicly funded research is largely carried out by institutes independent from universities that are jointly funded by the Federal government and the *Länder*. There are four separate branches of research institutions, differentiated by their respective missions: The Helmholtz Association of German Research Centres (Helmholtz-Gemeinschaft Deutscher Forschungszentren), Germany's largest research organisation, runs 16 independent centres pursuing basic and directed research in the physical and biological sciences, with an annual budget of some

EUR 2.8 billion. The Max Planck Society (Max-Planck-Gesellschaft) with its 78 institutes is the leading institution for basic research and has institutional funds of nearly EUR 1.2 billion. The Fraunhofer Gesellschaft consists of 56 institutes that focus on contractual applied research and development in different areas; about 40% of its total budget of approximately EUR 1.3 billion per year is publicly funded while 60% is covered by companies. The Gottfried Leibniz Scientific Association (Wissenschaftsgemeinschaft Gottfried Leibniz) is an umbrella for 86 institutes that address a wide range of different objectives and areas both in research and services, with a budget of some EUR 850 million. Finally, there are research institutions targeting specific policy fields and linked to, or run by, a federal or state ministry (BMBF, 2008).

Berlin is the most important hub of non-university research in Germany.[16] It hosts 5 Max-Planck Institutes plus the institute's archives, 13 institutes sponsored by the Leibniz Association, 6 Fraunhofer institutes, 3 Helmholtz centres and a wide array of research institutes, mostly in physical sciences. Many of these institutes have close ties to universities, with joint appointments of leading academics, provision of graduate training, professors teaching both in higher education institutions and research institutes, employment of doctoral students and collaboration with university departments, centres and laboratories in big research projects. This is the case of the research clusters funded through the national "Initiative for Excellence" or collaborative research venues like the specific interdisciplinary research programmes (*Sonderforschungsbereiche*) funded with competitive grants for higher education institutions by the German Research Foundation (*Deutsche Forschungsgemeinschaft*, DFG). The important presence of non university research institutes brings significant funds to R&D in Berlin. These institutes received a total of EUR 505.2 million as institutional funding in 2007, the Berlin Senate contributing EUR 153.8 million, less than one third.

Altogether, the density and variety of non-university research institutes in Berlin, the importance of university research, their mutual co-operation and the active participation of a few big firms in R&D in certain sectors (pharmaceuticals, life sciences, transportation in particular) explain the strategic role that research and innovation play in the economy of the capital city. In Berlin, altogether some 40 000 people, 3% of the workforce, earn their living at least partially through R&D, which corresponds to 4% of the regional GDP (Schreiterer and Ulbricht, 2009). Berlin boasts the biggest science and technology park in Europe, located in Adlershof,[17] southeast of the city centre with 17 academic institutes, 6 000 students on the new Humboldt University campus and 832 companies, employing 14 000 people in 2008. The other science and technology park in Berlin, Buch, located in

the north-eastern part of the city, specialised in life sciences, molecular biology and pharmacology and run by the Helmholtz Association maintains close links with the Charité medical school. It is the heart of Berlin's medical cluster that employs 4 500 people, with another 3 000 jobs linked to its activities (Handrich, Pavel and Proske, 2008).

The research sector offers ample employment opportunities for higher education graduates and is an asset for major firms located in Berlin. However, spill-overs towards small and medium-sized enterprises, that represent the biggest share of local employment, still remain limited, so efforts are now made to reach out to smaller firms, particularly by schools of applied sciences. On the other hand, this research nucleus is instrumental in the creation of new firms, start-ups and spin-offs, providing a favourable innovation environment for entrepreneurship. These points will be developed in Chapter three. R&D is also the basis for an increasingly developing segment of business tourism in Berlin, where many high level international scientific symposiums and events are organised each year.

Due to the loss of its manufacturing base and the high concentration of knowledge in universities and research institutes, all major public and private Berlin stakeholders agree to the idea that the capital city's future is strongly linked to knowledge-intensive industries and innovation. The Berlin Senate has conceived a coherent innovation strategy based on fields of competence (*Kompetenzfeldstrategie*) aiming to identify and stimulate areas that meet five requirements:

- Outstanding research potential
- Excellent economic outlooks
- Projects of high standing and visibility
- Good chances for the acquisition of grants
- Regional networks with international building blocks for three clusters (health, communication and media, transport systems).

In this context, the five fields of competence identified by the Berlin Technology Foundation (see below) with other public and private stakeholders including higher education institutions are the following: biotechnology, medical technology,[18] traffic and mobility, IT and media, optics. Recently, energy technologies (with a focus on renewable energies) were added as a sixth field of competence (SenWTF, 2010b). To carry out its innovation and R&D agenda the Berlin Senate disposes of two effective policy tools: the Berlin Investment Bank (IBB) and the Berlin Technology Foundation (TSB).

The IBB, founded in 1924, is 100% owned by the *Land* of Berlin. It has assets of some EUR 20 billion, the high level of which originates in its initial mission of financing social housing, and 700 employees. IBB is today entirely geared towards financing innovation and supporting Berlin's urban and regional development with a particular focus towards small and medium-sized enterprises and start-up financing, within 22 different programmes ranging from grants for investments, research projects and training to loans (including micro-loans) and equity in the form of venture capital for not only technology based start-ups, but also start-ups in creative industries such as the media, design and fashion.[19] The OECD LEED programme has positively assessed the spectrum of IBB financial tools targeting entrepreneurship: "*The IBB offers phase–tailored and well balanced programmes with respect to the different phases of entrepreneurship. For the early phase and for most types of businesses there seems to be no obvious financing gap*" (OECD, 2009b). The IBB also manages the annual Business Plan Competition Berlin-Brandenburg in which many higher education students actively participate. Now in its fifteenth year, the competition has permitted 4 354 business ideas to serve as basis for the creation of new companies, 1 126 of these (5 154 jobs) still being on the market (OECD, 2009b). The IBB is also a shareholder and financier of several agencies involved in Berlin's development strategies. Berlin Partner Gmbh is a public-private partnership, majority owned by the private sector that maintains an Internet platform for investors. IPAL Gmbh is the patent exploitation agency jointly financed with the Berlin universities. Berlin Tourismus is the official tourism agency.

The TSB, a partnership between the *Land* of Berlin, banks and regional companies, has a two-fold mission: contributing to the definition of Berlin innovation strategies by identifying the areas on which these can focus on the basis of specific strengths and competences; furthering top level research in selected areas in which it is directly involved along with other research partners (research institutes, universities and firms). Now that the six competence fields have been identified, TSB regularly monitors and analyses technological and economic trends to identify possible new competence centres so that those with the most promising outlooks are quickly taken up and pursued. The areas in which TSB is directly involved are traffic control and mobility (through its off-shoot, FAV), IT, innovative construction techniques and water resources research. Lastly, TSB also helps in funding co-operative projects through which academic research and small and medium-sized enterprises are brought together to establish long-term networks. The financial resources to support those strategic networks and projects come from the Berlin *Zukunftsfonds* (Future Fund), established in 2001 with the revenues resulting from the privatisation of the Berlin water authority. The projects sponsored fall within the six competence fields but

since TSB has just some EUR 30 million as endowment, it dispenses loans under preferred conditions rather than non reimbursable grants. The Berlin Technology and Innovation Council (Technologie und Innovationsrat des Landes Berlin) with nine members, seven of whom are high ranking representatives from large companies, recommends the projects to be sponsored to the TSB board of trustees.

1.7 The contribution of higher education institutions to regional development in Berlin

Policy definition and co-ordination

As compared to other German cities, Berlin has a much greater number of higher education institutions, the heritage of its past and contemporary history. It also has a highly developed research base with very diverse university and non university institutions. As compared to other *Länder*, Berlin higher education institutions have undergone important restructuring and even closing of faculties or downsizing in certain cases, while facing continuous strong budget pressure and increasing student intake. Lastly, higher education institutions are more and more expected to be attuned to the needs of the local labour market and particularly the needs of small and medium-sized enterprises. For all these reasons, co-ordination and co-operation between higher education institutions and with the Senate as well as with the business world are required for a smooth functioning of a complex system facing simultaneously quite different and sometimes conflicting challenges. Many of the co-ordination and co-operation mechanisms that have appeared under these pressures are informal, while the overall picture leaves room for reducing dispersion of efforts and building more formal and binding co-operation mechanisms. A brief description of the most important initiatives follows hereafter.

"An morgen denken" ("thinking of tomorrow") tries to bridge the gap between higher education and the business world. It aims to bring together leaders from higher education institutions and important research institutes with representatives of Berlin industry and commerce to engage in discussions on common projects and the future path of tertiary education in Berlin. As an informal circle, the initiative does not have a fixed agenda nor does it regularly publish proposals. In 2002 and 2003 it staged discussions and roundtables, with outcomes received favourably by the media and the public. Then, in 2007, the Mayor of Berlin invited twelve high level representatives from government, the economy, science and research, urban development, culture and social affairs to continue deliberating on Berlin's

development perspectives. This so-called "Berlin Board" meets about three times a year, but more frequently at the working group level.

The Wissenschaftskommission Berlin (Berlin Science Commission) was founded in 2005 as a joint venture of three different organisations and interest groups in higher education to develop guidelines for the further development of research and university teaching in Berlin and Brandenburg, to critically examine weaknesses and shortcomings and to identify new opportunities and potentials to be exploited. It has 17 members, mostly high ranking academics, among them the presidents of the three universities and of one school of applied sciences as well as a number of directors of Max-Planck Institutes. In April 2007, the commission presented a policy paper suggesting the establishment of a joint "Forum for Transregional Studies", to set up a new industrial and research campus for life sciences in the inner city, and to create a new Berlin Centre for Optics and Microsystems bringing together a number of already existing institutes.

While the outcomes of these different proposals remain unclear, it is evident that formal linkages between Berlin and Brandenburg are needed to ensure that mechanisms are in place to channel useful ideas to the decision makers in Berlin (and Brandenburg) and to implement these ideas, if they constitute useful input into regional development strategies.

Regional dimension in higher education

Higher education policy in Germany has by definition a certain regional dimension, based on the simple fact that it is constitutionally a *Länder* responsibility. However this remains implicit rather than explicit. Most *Länder* allocate resources to higher education institutions by using indicators and formulas (student head counts and outcomes, level of research, publications and patents, quality etc.) but regional engagement and impact are not one of these. Apart from recurrent funding, *Länder* run special programmes to support or stimulate co-operation between higher education institutions and regional stakeholders, such as seed money for start-ups and technology transfer or special projects in R&D that by partnering higher education institutions and local business can be crucial for regional development. Accordingly, most Länder higher education laws (*Landeshochschulgesetze*) mention the so called "third mission" as a core objective next to teaching and research. Nonetheless, in the absence of incentives to this end institutions rather pursue their basic teaching and research missions, vying for excellence on the basis of national and international competition. This is even more the case for universities than for universities of applied sciences since the former are systematically encouraged to develop top-notch research. In this context, Berlin is not very

different from the broader picture. According to the Senate, the first strategic priority of the Berlin universities in 2007 was to secure the gains harvested in the "Initiatives for Excellence" and to make provisions successfully gain funding in its next round which starts in late 2010 (Schreiterer and Ulbricht, 2009).

On the other hand, the Berlin Senate is perfectly aware of the regional dimension of higher education and of how important it is for a city like Berlin with many disparities to have a balanced network of institutions in all districts. That is why after 1990 the Hochschule für Technik und Wirtschaft was established as a new university of applied sciences in former East Berlin and why in 1998 the Alice Salomon Hochschule moved from its old location in former West Berlin to another premises in a distressed urban area of the Eastern periphery. Besides, all Berlin higher education institutions contribute to regional development in various ways, first of all by their sheer weight: in 2008 overall higher education staff, both in teaching, research and administration represented close to 13 000 people (SenBWF, 2009). Higher education institutions clearly enhance the social, cultural and economic attractiveness of the city, they offer a wide range of courses adapted to labour market demands, some of which address special interest groups such as first-generation college goers from underprivileged social or ethnic backgrounds. They engage in co-operative research and development projects with local firms and have set up technology transfer offices, together with their support for entrepreneurial outlooks and training of students, graduates and faculty. Many Berlin higher education institutions have taken on vocational education and lifelong learning, opened their programmes to high school students and retired professionals, and provide for a great many cultural and athletic events. Besides these activities reflecting involvement in economic and social development, many faculty members take individual initiatives within their teaching and research that show concern for the community and often open the path for more direct institutional action.

Conclusions and recommendations

Summing up the findings of this introductory chapter in terms of higher education institutions' impact on regional development in Berlin, a certain number of strong points appear but also many under-exploited opportunities. Amongst the strong points, the overall attractiveness of the higher education system in Berlin definitely constitutes an asset upon which to build even further. Berlin is a magnet for many students, researchers and artists from other parts of Germany and abroad, with direct impact on the regional economy. All higher education institutions are involved, to varying degrees,

in activities that benefit regional development, with faculty often taking initiatives in that direction. Lastly, education and research are integrated into regional development strategies capitalising on innovation and building upon Berlin competences in selected fields.

On the other hand, a certain number of grey areas appear. Firm linkages benefit mostly bigger companies and co-operation between academia and small and medium-sized enterprises, although developing, particularly with schools of applied sciences, remains limited. The absence of regional development incentives in higher education financing mechanisms and in professional evaluations only permits often isolated initiatives, the impact of which is diminished by their non coordinated character. Although co-operation and exchange of information within the higher education system appears well developed in areas of strategic concern related to budgetary constraints, participation of higher education institutions in fora linked to regional development appears fragmented and little exchange of information occurs concerning involvement in activities focusing on regional development or social integration.

A holistic Berlin regional development strategy, with a more effective and coordinated higher education institutions' participation, would require measures opening higher education to categories of the population largely left aside up to now, while also better addressing the training and research needs of small and medium-sized enterprise. In other terms the challenges to be picked up are ensuring the pursuit of quality teaching while increasing access of a socially and ethnically diverse population to higher education and seeking to conciliate the pursuit of world class research with increased initiatives to answer the needs of small firms.

Notes

1. Parliament is composed of the Federal Assembly (Bundestag) and the Senate (Bundesrat). The President has a purely honorary role.
2. Berlin is very well connected to the rest of the country by air, road and rail but its international air traffic is not at the level of most capital cities as the role of a global airline hub is played by Frankfurt.
3. The elected Abgeordnetenhaus (House of Representatives) designates the Mayor and Senators.
4. Berlin is the most important Turkish city outside of Turkey.
5. Such statistics remain subject to caution as there is no systematic way of collecting such data on German citizens with an immigrant background, since gathering ethnic data is unconstitutional.
6. Also the title of a book on New York: Bender. T (2002), The Unfinished City, New York and the Metropolitan Idea, The New Press.
7. See Richard Florida's book "The Rise of the Creative Class and how it's transforming work, leisure, community and everyday life" published in 2005.
8. Regionaldirektion Berlin-Brandenburg der Bundesagentur für Arbeit (Federal Employment Agency) on www.berlin.de/imperia/md/content/senatsverwaltungen/senwaf/wirtschaft/statistik/aquo_b_bu_jd.pdf
9. Many *Länder* are in the process of reducing schooling from 13 to 12 years. In Berlin, in 2012, the first generation of students will leave upper secondary education after 12 years.
10. Proprietary higher education institutions are a recent phenomenon in Germany; most are special focus institutions, providing business education, qualification for health occupations or IT-jobs. They enrol many adult learners and part-time students.
11. Separate institutions only in Baden-Würtemberg.

12. All figures for Berlin Higher Educational Institutions for 2008 are drawn from: SenBWF (2009), *Leistungsberichte der Berliner Hochschulen zum Jahr 2008 einschließlich Mittelbemessung (ohne Medizin)*, Berlin Senate, 2009.

13. Survey of 2007 HEI graduates in Germany, INCHER, Kassel, 2009.

14. The following analysis is based on the Berlin Self Evaluation Report, as the OECD Review Team did not meet top higher education management to discuss these matters.

15. An example: Free University and Technical University Berlin partnered in mapping out a common strategic plan in 2004-2005.

16. In 2006, publicly funded research institutions independent from universities employed about 7 400 people of whom more than 3 600 had an advanced degree and were working as researchers.

17. Research in Adlershof is focused on optics and micro-systems technologies, material sciences, mathematics and computational sciences. The Park shelters the BESSY synchrotron accelerator, one of these few equipments in Germany and Europe.

18. A "Health Economy Cluster" approach including health care and health services encompasses medical technologies and bio-technologies with links to IT and optics.

19. Investment loans up to EUR 10 million and short term loans up to EUR 10 000, with a diversified portfolio in between.

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Chapter 2:The regional innovation system in Berlin

Innovation and the commercialisation of research are considered increasingly important drivers of long-term economic growth. This chapter will examine the supply of research and development by Berlin higher education institutions and industry's demand of R&D. Itr will also examine the interaction, relations and connectivity of the Berlin regional innovation system to identify challenges and opportunities that can be addressed by policy initiatives. It will also highlight the needs of different industrial sectors ranging from high-tech companies to traditional small and medium-sized enterprises and show how different parts of the higher education sector – research-intensive universities and the universities of applied sciences – can meet these challenges. The chapter will present good practice and learning models within Berlin and from other regions in the world. It will conclude with recommendations on how to improve the connectivity of the regional innovation system in Berlin particularly in terms of linkages between applied universities and local small and medium-sized enterprises.

Introduction

Berlin is one of the prime locations for science in Germany and ranks among the top three innovative regions in the European Union. There is a diverse set of higher education institutions including three research-intensive universities, universities of applied sciences and schools of art, drama and music with 180 000 students and 20 000 higher education graduates every year. In addition, Berlin is also a home to more than 70 publicly funded R&D institutes including the Max Planck Institute, Leibniz Association, Helmholtz Centre and Fraunhofer Society, a number of national laboratories and 40 technology parks and incubators. About 40 000 people, 3% of Berlin's workforce, are engaged in R&D activities. Berlin spends 4.2% of its GDP in R&D, more than any other German State.

The presence of universities and research institutes with world class research is a necessary but not a sufficient condition to boost regional innovation and competitiveness. Research has to be diffused to and exploited by firms in the region to create employment and economic growth. Different types of higher education institutions can play a complementary role in the provision of a complex mix of knowledge, skills and competencies in the region. Thus, research-intensive universities are the prime producers of scientific knowledge which is exploited in science driven regional innovation systems, while universities of applied sciences are important suppliers of engineering and art based knowledge, which is more relevant for user-driven models of innovation (see Box 2.1). The binary system of higher education is important to the Berlin regional innovation system also in view of Berlin's diverse industry base; research intensive universities and universities of applied sciences have different capacities to address the needs of the industry.

In this context, this chapter examines the following three dimensions to assess the effectiveness and coherence of innovation policies within Berlin:

- Is Berlin's regional innovation system well connected and responsive to the diverse industrial structure of the city?
- Do the existing higher education providers support a fully functioning regional innovation system? Are there gaps in delivery where performance could be improved?
- What lessons can be learnt from international experience?

Box 2.1 Higher education institutions and the regional innovation system

The most important contribution of higher education institutions to regional innovation is provision of human capital through educating a highly skilled labour force. Human capital has also three indirect ways to impact regional innovation through: i) researchers in higher education institutions, public and private R&D institutes and R&D departments; ii) employees in industry and organisations contributing to improved absorptive capacity that stimulates industry-university cooperation; and iii) the attraction of non-local R&D institutes and R&D departments of larger companies.

Regional Innovation Systems (RIS) are a strategic instrument for the implementation of regional innovation policies. Higher education institutions play a key role in the Regional Innovation Systems as nodes in the knowledge exploration subsystem. Regional innovation systems, which can be defined in narrow or broader terms, consist of two subsystems: i) the knowledge exploration and diffusing subsystem including universities, public and private research institutes, corporate R&D divisions and technology transfer organisations, and ii) the knowledge exploitation subsystem where regional clusters of industries interact with the knowledge exploration subsystem. This is the narrow definition of RIS.

Regional Innovation Systems can, however, also be defined in broader terms. In this case, the regional innovation system includes a wider set of organisations, such as all types of higher education institutions that impact and support learning and innovation in a region. Innovation activity in firms is based on interactive, localised learning processes stimulated by geographic, social and cultural/institutional proximity, benefiting from the knowledge exploring organisations mainly through skilled people (Asheim and Gertler, 2005).

The modes of innovation also manifest themselves in a different way in regional innovation systems. The narrowly defined regional innovation system is associated with the science-push mode of innovation, while the more broadly defined regional innovation system facilitates the demand-led mode.

2.1 Berlin's science-driven innovation strategy

The Berlin Senate has taken policy initiatives to foster innovation and promote engagement of universities and universities of applied sciences in the economic development of the city. The Senate strategy has been to focus on specific "competency fields". These fields have high standing and visibility which have outstanding research potential and excellent economic prospects. In addition, they are regionally and internationally networked and

have the capacity to raise external funding. In 2005, five competence fields were selected by the Berlin Senate. They are medical technology, biotechnology, health, traffic engineering, ICT/media, optics and power engineering especially renewable energies as a recent addition. These competence fields constitute building blocks for the three industrial clusters, *i.e.* health, communication and media, and transport systems, that are expected to play key roles in transforming Berlin into a knowledge-intensive innovative region during the next decade. Each priority field is supported by a number of networking organisations and a series of cross-cutting activities. With the help of these initiatives, these sectors grew in terms of employment by 16% between 2003-07, compared with an overall decline of 2.2% for all manufacturing industries.

The Berlin Ministry of Economics, Technology and Women provides incentives to pull universities and research institutes into the city's economy and mobilise the demand side from within the business community. The Ministry has a clear strategy and set of priorities for the development of the city's economy in which the strength of the university and research institutes plays a key role. Most significantly the Ministry supports:

- A number of delivery organisations, - most notably the Berlin Investment Bank (IBB) and the Berlin Technology Foundation (TSB) – that interface with higher education and research
- Network organisations which bring together universities and research institutes with business
- Three major science parks
- A network of science-based business incubators in Berlin.

The TSB is one of the key organisations in Berlin that facilitates the move towards a more knowledge-intensive economy. It pays an important role in developing regional innovation strategies and cluster policies, promoting technology transfer and managing innovative networks. It identified the seven priority areas in advanced knowledge-based competency fields which relate in varying degrees to the research strengths of the universities and research institutes and of existing businesses.

The IBB functions as the economic development agency for the city and provides for example: loans (capital/infrastructure funds) for the science parks; technology centres (incubators) for national research grants; a technology commercialisation organisation able to work with the universities and research institutes (Innovationen, Patente, Lizenzen, IPAL); and support for networks involving researchers and business (*e.g.* BioTOP for the life sciences). The Berlin Investment Bank and private organisations

such as Chamber of Crafts (HWK) also support the technological upgrading of small and medium-sized enterprises as well as technology transfer from the universities of applied sciences. Moreover, the Berlin Investment Bank is running an annual highly successful business plan competition and also operates a mobility scheme financing personnel costs of graduates that are employed in small and medium-sized enterprises.

The science parks at Adlershof and Buch are central to the implementation of Berlin's science-based economic development strategy (see Box 2.2). Adlershof markets itself as a "city of science, technology and media" and houses twelve non-university research institutes. These focus on optics technology, materials research, micro systems technology, ICTs and sustainability and resources. Although independent, these institutions have come together to form The Joint Initiative of Non-University Research Institutions in Adlershof (Initiativgemeinschaft Außeruniversitärer Forschungseinrichtungen in Adlershof, IGAFA) whose aim is to "*create synergy and new knowledge in Adlershof by facilitating co-operation among research institutes as well as with universities and the business sector*". Joint appointments between research institutes and the universities facilitate collaboration. The scientific facilities offered by the institutes are major resources for companies and university researchers in Berlin and the rest of Germany. They enable research institutes to attract significant additional resources. Adlershof is also the home to six departments as well as a supporting library and information technology services of Humboldt University. These departments have a number of links with the non-university research institutes and provide opportunities for example for student projects.

The final element of the Adlershof complex is "media city", a cultural industries cluster which has few links with higher education and research in the park. Underpinning the whole development is a science park company WISTA (Wissenschafts- und Technologiepark Adlershof/Park of Science and Technology Adlershof) which markets the park to inward investors, manages various facilities, supports science and business networks and runs several incubator units.

The research institutes within Adlershof were built around selected scientific strengths of the Academy of Science in the former German Democratic Republic and not specifically matched to the economic base of the city. Moreover, Humboldt University's re-location after the German re-unification was made on purely academic grounds. In recent decades, however, capacity has been built for linking activity in the park to the wider economic development of the city. For example in the field of optics, which is one of the key research strengths in Adlershof, a dense urban network of firms and researchers is in place supported by the OPTEC (Optische

Technologien Berlin-Brandenburg/Optic Technologies Berlin-Brandenburg) organisation, which is based there.

Box 2.2 Berlin Science Parks: Adlershof and Buch

Adlershof City of Science, Technology and Media ranks among the 15 biggest science and technology parks worldwide and is one of the most successful high-tech locations in Germany. Adlershof has 17 academic institutes, including independent ones as well as science departments and centres of Humboldt University. There are more than 6 000 students and 14 000 employees in 832 companies and organisations (2008).

In addition to Humboldt University's science departments, IGAFA represents a joint initiative of 11 non-university research institutes. More than 400 innovative small and medium-sized high-tech companies are located at Adlershof with a staff of around 4 800 people and a turnover of more than EUR 500 million. In 2008, 38 new companies were started. Adlershof also hosts a media city with nearly 150 companies.

Adlershof is well served by pre-incubation facilities such as business angles, Humboldt Innovation and a business plan competition as well as a broad range of business services from coaching and financing to subsidized labs, technological infrastructure etc. The first incubator was launched in 1991 when the science park was established. Today, it contains 100 companies, while 250 have been spun out. Adlershof has a well developed infrastructure with guest houses, hotels, restaurants and sports facilities as well as growing connectivity. When the new Berlin-Brandenburg international airport is opened at Schönefeld in 2011, it will take 6 minutes by car or 10 minutes by S-Bahn to and from Adlershof. According to a study undertaken by DIW, the economic performance of Adlershof has surpassed most expectations (DIW Wochenbericht, 2008).

Buch is a medical cluster in former East-Berlin. It is operated by the Helmholz Institute, which receives 90% of its funding from the Federal Government. Buch was established in the early 1990s as an extension to the 'Max-Delbrück Centre for Molecular Medicine' (MDC), which is now one of the 16 large research organisations in Buch. MDC has more than 400 researchers and a similar number of guest researchers, while Buch has around 1 600 researchers carrying out basic research in molecular biology at the MDC and the Leibniz Institute for Molecular Pharmacology. Buch also has clinical research at the Medical School Charite which is the medical school of HUB and Free University as a result of a merger in 2003 decided by the Berlin Senate.

The close proximity of basic research in molecular biology, clinical research, and technological applications makes Buch rather unique from an innovation perspective and represents a strong competitive advantage for many types of medical and biotech research. Presently, 47 biotech companies with more than 750 employees are located in the Buch Park. The Buch medical cluster employs more than 4 500 people, while another 3 000 jobs outside the park are derived from its activities. Buch has several incubator buildings, a technology transfer organisation and a campus management to attract companies.

However, there is room for improvement. For example, an academic survey regarding Adlershof-based firms in general noted that "*the highest rate of growth was for businesses with intensive contacts to other businesses and with moderately pronounced relationships with the universities". Businesses that focussed heavily on the university rather than other businesses were somewhat less successful in personnel growth"* (Kulke, 2008).

At Berlin's other major science park, Buch, where there is a clear focus on the life sciences, the links between research and its exploitation are even stronger. Buch is the home of the national Max Delbruch Centre for Molecular Medicine (Max-Delbrück Zentrum für Molekulare Medizin, MDC), the nearby newly-created joint medical school (Charité) of the Technical University of Berlin and Free University of Berlin and a number of small biotech companies. Buch does not have the same scale, location and management infrastructure advantages as Adlershof. In addition, it suffers from short term funding decisions. Yet, it is clearly part of a city-wide network of 194 companies employing 3 700 people and supporting organisations like BioTOP and six smaller biotech parks. Most significantly, the city has the advantage of being the home for top pharmaceutical companies, most notably Bayer-Schering Pharma. It has also persuaded Pfizer Germany to relocate its headquarters to Berlin. As a consequence, there is a strong local industrial demand side to which the research base can respond. As well as independent research institutes like MDC, also the higher education sector is embedded into this strategy. This is indicated at one extreme by the establishment of the joint medical school Charité and at the other by a Master of Business Administration at the Berlin School of Economics in healthcare management with a focus on pharmaceutical management. There are also "learning laboratories" to get young people interested in the life sciences.

The two leading science and technology parks, Adlershof and Buch, demonstrate well functioning science driven regional innovation systems based on close collaboration between industry, universities and research institutes. They demonstrate how world class research in optics, material and computational sciences (in Adlershof) and molecular biology (in Buch) can be exploited by high tech industries creating highly innovative and competitive companies. Adlershof benefits from the presence of Humboldt University campus and two faculties with key disciplines such as chemistry, physics, biology, mathematics and computer science. This gives the science park a clear competitive advantage. It has a strong management with a well defined strategy and concrete and elaborated plans for remaining an attractive science park in the years to come. Adlershof will become more

significant with the new Berlin-Brandenburg International Airport in the nearby Schönefeld site.

Likewise, the second largest science and technology park, Buch, can also be described as a success story. In the field of medicine it demonstrates good collaboration between the three science intensive universities in Berlin, also incorporating research institutes and private sector partners. Buch's main challenge is its location in an area which does not provide an attractive living environment and has a poor connectivity to the central parts of Berlin. A well planned, safe environment with restaurants, hotels and rapid and easy connections contribute to a "people climate" orientation and capacity to attract international mobile talent. Currently, the number of international staff remains low. For example, at Charité, only about 10% of the staff are foreigners. Merger discussions associated to Buch create insecurity and damage the opportunity to attract and retain talent. The park would also benefit from a single voice to advertise and promote it more efficiently.

The three comprehensive research-intensive universities and the Science Parks are the cornerstones in the local government's ambition to turn Berlin into an innovative region with a high degree of knowledge-intensive industries and jobs. Their combined knowledge base has also a considerable potential for new business formation and attraction of external firms. Some examples of relocation of external firms to Berlin have already taken place. For example, Pfizer relocated their European headquarters to Berlin and Deutsche Telekom relocated their entire R&D division from Bonn including seven professorships. In addition, when Bio purchased Schering the R&D division remained in Berlin. Solon, a leading company in the field of solar energy with a turnover of more than EUR 800 million, has moved its headquarters to Adlershof science park in 2008 to take advantage of the co-location and proximity to many relevant high quality research institutes. Other companies to locate in Adlershof are Nokia and TomTom.

Health care is one of the clusters expected to transform Berlin into an innovative region based on knowledge intensive industries and jobs. Today, there are 194 biotech companies in Berlin. Pharmaceutical companies employ more than 10 000 people, while another 7 000 work in medical engineering and 3 500 in biotech industries. Thus, life sciences and health services are seen as one of the most promising sectors for economic growth and job generation in Berlin. At the same time, however, it is unrealistic to expect major relocation of R&D centres and production sites in the pharmaceutical field due to the structural changes in the pharmaceutical industry which is reorganising itself through enhanced networking. This new way of collaboration requires excellent interface management. It is unclear to what extent Berlin is prepared to face this challenge.

The Berlin areas of competences, clusters and science parks are strongly R&D based and seek to exploit research outcomes of the three universities and public and private research institutes to produce radical innovations.[1] Berlin's science-driven strategy is, however, less appropriate in other sectors where innovation is more incremental and user-driven. These are areas where the universities of applied sciences have potential to respond to immediate business needs, particularly those from the small and medium-sized enterprises that dominate the economic structure of Berlin. Universities of applied sciences could play an important role to build capacity in this type of firms to help them reach the research base in the research intensive universities and research institutes. For this to happen, a strategy is needed for higher education institutions across the city which exploits the complementarities of the research intensive universities and universities of applied sciences. A more user-driven model would need to focus on competence building and organisational innovations. This type of innovation model, **D**(oing), **U**(sing) and **I**(nteracting), is market-and demand-led and has the capacity to produce incremental innovations. Universities of applied sciences are particularly important suppliers of skills and competencies for carrying out innovation within the demand-led innovation as they harness experience-based, tacit and specialised knowledge.

In spite of the well-functioning examples of university-industry co-operation in the two science parks of Berlin, the general impression is that the Berlin regional innovation system demonstrates some of the characteristics of a fragmented, metropolitan regional innovation system (Tödtling and Trippl, 2005). The structural characteristics of fragmented metropolitan regions are summarised in Box 2.3.

Box 2.3 Fragmented metropolitan regional innovation systems

Metropolitan regions are often centres of innovation thanks to the presence of R&D organisations and universities, business services, as well as headquarters of international firms. As a consequence, R&D activities are usually above the national average. However, due to the problem of fragmentation, the metropolitan regions may lack dynamic clusters of innovative firms; there is a lack of innovative networks and interaction between universities and firms as well as among local companies. Metropolitan regions may also have an industrial structure which is characterised by 'unrelated variety'. This means that they have a diversity of industrial sectors which do not complement each other, and, thus, fail to produce knowledge spillovers. This may represent an important innovation barrier which can result in a situation where the development of new technologies and the formation of new firms are below expectations.

Box 2.3 Fragmented metropolitan regional innovation systems (continued)

Metropolitan regions usually also have above average educational attainment levels, especially with respect to higher education. They are home to the largest number of national universities and a well-developed network of other higher education institutions. In addition, they are often home to R&D institutes and departments of large national and international companies. As a consequence, there is a need to improve the impact of education and research rather than increase student enrolment or research volume. The main challenge is the weak connectivity in the regional innovation system which can partly be attributed to the fact that universities in metropolitan regions are traditionally more focused on their national and international roles, and have ignored the role they could play in promoting regional development.

Another challenge in the fragmented metropolitan regions is the lack of trust and social capital among the main actors in the regional innovation system. Universities' lack of interest in the regional task, presence of national multinational companies or foreign multinationals and a low regional commitment has not produced social capital and trust which is important to achieve a high degree of connectivity. Thus, the spatial proximity between the actors in the RIS in metropolitan regions has not been matched with a similar social and institutional proximity, which is characteristic of smaller regions such as the industrial districts of the Third Italy (Asheim, 2000; Boschma, 2005).

Due to the increased policy focus on the 'third task' and regional mission of higher education institutions, an increasing number of higher education institutions see conflict between their regional responsibility and national and international ambitions. This change of attitude is of strategic importance for achieving a well-functioning regional innovation system in metropolitan regions

2.2 The demand of R&D by industry and the response of higher education institutions

The industrial structure of Berlin is composed of large industries and small and medium-sized enterprises (SME) as well as knowledge based industries and traditional industries. The majority of the small and medium-sized enterprises belong to the traditional group, which also contains some larger firms. Innovation activities within the knowledge based industries (mainly high tech spin outs and some larger firms) are usually science driven and benefit from well developed connections with the research intensive universities and research institutes in Berlin and elsewhere. Innovation in the traditional industries is, however, often more demand-led and market driven. The large scale of the traditional SME sector is a

challenge for Berlin's economic development: traditional industries have limited support to develop the demand-led innovation and lack good contacts with R&D milieus in higher education institutions.

The recent innovation study undertaken by the Berlin Chamber of Commerce in 2009 identified weak HEI-industry linkages particularly in terms of small and medium-sized enterprises. According to the results of the study, 30% of high-tech companies gain new ideas and knowledge from higher education institutions, whereas in the case of medium-tech companies the percentage is much lower (20%) and in the case of low-tech companies is non-existent (0%).

Berlin has a tradition of university-industry collaboration. The three comprehensive research-intensive universities in Berlin have the capacity to supply world class research in fields such as medicine, biotechnology and biology, and technology. Measures have been taken at the institutional level to address local and regional innovation needs. For example, in 2009 Berlin higher education institutions gained 88 chairs sponsored by companies, foundations and private associations as compared to 24 in 2000. Nearly all higher education institutions have technology transfer offices and/or third party counselling services that serve as bridges and facilitate knowledge exchange and industry collaboration. For example, Humboldt University's dedicated unit for knowledge and technology transfer, Humboldt-Innovation GmBH, has gained excellent results (see Box 2. 4). However, many of the dedicated offices remain understaffed and poorly equipped to address the needs of Berlin's small and medium-sized enterprises. Moreover:

"*for most higher education institutions the regional contribution and impact of their R&D activities hardly can be called a top-priority. Instead of regional needs, their R&D is directed towards what is going on in the sciences and at the forefront of research worldwide. Their procedures and devices to support and intensify co-operation with regional industries and businesses thus rarely are thoroughly designed and sustainable, but more or less arbitrary*" *(*Schreiterer and Ulbricht, 2009).

Box 2.4 Humboldt-Innovation GmbH

Humboldt-Innovation GmbH was established in 2005 as the knowledge and technology transfer office of Humboldt University Berlin (HUB). It acts as a comprehensive science and industry interface that links knowledge/technology transfer, contract research and entrepreneurship. It is a one-stop-shop for technology transfer and entrepreneurship support for students and faculty, as well as other stakeholders interested in commercialising HUB research results. As a company, Humboldt-Innovation can operate in a more flexible, interdependent, and quicker way than an internal university structure. Its management reports directly to a supervisory board (with private sector representatives) and the HUB Vice President for Research. Humboldt-Innovation employs 13 staff:

Humboldt-Innovation is financially self-sustainable and receives no public funds. Its annual turnover in 2008 was about EUR 4.5 million. Sources of revenues are contract research, coaching fees, merchandising, licensing of audio files and custom-made software. Patents and licensing processes are all (except for those mentioned above) processed by the Land Patent Agency (IPAL) as established by the university and municipal education guidelines. Revenues are partly reinvested in spin-off creation.

Humboldt-Innovation's activities include research (scientific services, contract research, research co-operations), spinoff support (scouting, hatching, coaching) and merchandising (Humboldt-Store, Humboldt-Excursions, Berlin Natural Museum's store). For HUB entrepreneurs, founders, inventors and innovators it is both a help desk and a coaching centre. It facilitates access to the science park. Humboldt-Innovation has strong links within the university and beyond. Inside Humboldt University, several professors act as "entrepreneurship ambassadors" in their faculties and departments and help to create entrepreneurial mindsets. Humboldt-Innovation's external network includes business support and advisory service providers, firms, financiers and alumni.

Humboldt-Innovation's main partners are the Adlershof Science Park, the IHK Berlin, the Berlin Technology Foundation, the Forschungszentrum Jülich, the Berlin Investment Bank , the Technologie Coaching Centre, business angels, the B!GRÜNDET Start-up Network, the Gründernetzwerk Berlin, the London School of Economics, Imperial College (UK) and the TTB Siemens Berkeley.

Humboldt-Innovation has supported more than 20 successful spin-offs and accompanied over 200 research projects. Its success has been based on a flexible enterprise model and partnerships on a local, national and international level.

Source: OECD (2009), Universities, Innovation and Entrepreneurship: Criteria and Examples of Good Practice, OECD Publishing, Paris; and HUB (Humboldt University Berlin) (2009), Humboldt-Innovation website, *www.humboldt-innovation.de/HumboldtInnovation_hioverview_en.html*, accessed 25 January 2010.

National university policy in Germany has adopted a broad excellence strategy. The basic criteria in the evaluation process are academic merits, measured by international publication in refereed journals, the level of external research funding, the numbers of completed PhD dissertations and so on. As a consequence there is a strong focus on world class research and national and international comparison and limited incentives to encourage universities' regional engagement. In addition, in Berlin there appears to be a perceived contradiction between world class research and "third mission" tasks at the regional level.

International experience shows that world class research and regional engagement can be complementary tasks, reinforcing one another. For example Lund University in Sweden fairs well in global university rankings but is also active in innovation and knowledge transfer: it is the highest ranking university in Sweden at No. 67 according to the Times Higher Educational Supplement (Free University of Berlin is at No. 94) and has achieved 14 out of the 40 Centres of Excellence nominations by the Swedish Research Council in 2006 and 2008. At the same time, it has a strong focus in high-tech cluster development in ICT, biotech and functional foods in the region of Scania and knowledge based entrepreneurship through in-house incubators, etc. (see Box 2.8). Another case in point is Zhejian University in China which is deeply embedded in the regional economy of Hangzhou, China particularly in the support of low-tech industry (see Box 2.5).

Box 2.5 Zhejian University in the regional innovation system of Hangzhou, China

Zhejiang University (est. 1897) is a top national university in China. It is based in Hangzhou, China's most economically advanced region which has the highest concentration of private enterprises. During the development process of more than one century Zhejiang University has played a key role in national and regional development. In recent years, the university has focused on supporting the national strategy while, at the same time responding to regional demands. Zhejiang University has helped the regional industrial structure adjust to a series of economic transformations. It provides training and educational programmes to support the economic change and transformation in the region as well as research and outreach activities.

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Box 2.5 Zhejian University in the regional innovation system of Hangzhou, China (continued)

Zhejiang University implements key national projects and outputs to the local region, such as "water pollution control and treatment", and "R&D of new drugs". In co-operation with Hangzhou city, Zhejiang University has built demonstration areas to speed up the process of scientific and technological research and to promote the transfer of technological achievements. The university has also set up the Industrial Technology Research Institute for China's industrial economy to provide important scientific and technological support for the high-tech industry.

In addition to its high-tech focus, the Zhejiang University also addresses low-tech industry. It has, for example, developed digital textile technologies which have been successfully implemented in more than 5 000 enterprises. This has contributed to technological progress of China's textile industry. Furthermore, industrial automation technology developed by Zhejiang University has been implemented in more than 5 000 large and medium sized enterprises. With the support from local government, Zhejiang University has also built strategic alliances for industrial innovation and public innovation service platforms. The university has participated in 15 regional innovation service platforms

Traditional small and medium-sized enterprises in Berlin face difficulties in accessing the knowledge base of higher education institutions, especially in research-intensive universities. The universities of applied sciences are often more open and better equipped to engage with regional partners from industry, the health sector or welfare services. This can be attributed to the fact that their fields of study and research (engineering as well as social work, business administration and health services) are dominantly application oriented and more relevant and adaptable to the needs of industry and public institutions.

Despite their usually weaker research-base, universities of applied sciences in Berlin have developed their own business interface units, for example "science-business co-operation centre" KONTAKT of the University of Applied Sciences for Technology and Economy (HTW). The Beuth-Higher School of Technology Berlin has established a founders' shop, Location4Innovation to help graduates to start their own business. In addition, the Berlin Senate has taken steps to enhance the capacity among the universities of applied sciences to address the needs of the small and medium-sized enterprises in Berlin through sponsoring the establishment of the "Institute for Applied Research". These are valuable initiatives (see Box 2.6).

However, the funding model for the universities of applied sciences is closely tied to student numbers and so restricts their capacity to invest in supporting this work. More significantly, the teaching load of academics (18 hours per week) works against engagement with more speculative developmental projects that might benefit business and the community in the city. Unlike professors in the research-intensive universities, senior academic staff in the universities of applied sciences receive minimal research support to underpin their externally orientated work. Academic salaries are also linked to teaching rather than to research performance. In these circumstances, it is not surprising that in an institution like the University of Applied Sciences for Technology and Economy (HTW) only ten academic staff out of 250 account for between 70 and 80% of research activity. Under these conditions, it will be a challenge to spread an applied research culture through the universities of applied sciences.

Box 2.6 Examples of initiatives to link Berlin universities of applied sciences and business

Beuth-Higher School of Technology Berlin, BHT, has its own "Founders Shop" named Location4Innovation to help graduates of this university of applied sciences, but also from other higher education institutions in Berlin, start their own technology-driven spin-offs, It provides them with stipends of EUR 2 000 for up to 18 months, an office space, free lab facilities and individual mentors who advise them beyond the initial 18 months. In addition, the Founders' Shop offers seminars, workshops, and lectures on numerous business management, legal and social topics. All start-up teams are supported by experienced BHT professors and benefit from an extensive network of companies, which advise the teams on their requirements. The start-up academy is supported by the Berlin Ministry of Economics, Technology and Women and the European Social Fund.

The University of Applied Sciences for Technology and Economy (HTW) runs a transfer office called "Kooperationszentrum Wissenschaft-Praxis" (KONTAKT, science-practice co-operationcentre) offering a wide range of services. With its staff of seven people, it offers information on research funding sources; initiates and supports collaborative R&D projects with commercial partners; passes on research and development findings to the business world; provides comprehensive services to medium-sized and other external collaborative partners; and publishes numerous academic papers from scholars via the journal series called "HTW transfer". In addition, it hosts technology-orientated conferences, symposia and fairs that include SMEs as partners. With the HTW Centre for Entrepreneurs, it supports start-ups. KONTAKT also serves as a one-stop shop for potential clients who want to know more about HTW's specific areas of expertise and to contact possible partners.

The Berlin Institute of Applied Research was established in September 2009 based on a collaboration between two universities of applied sciences, Berlin School of Economics (FHW), and Alice Salomon Hochschule with a Senate funding of EUR 2 million with requirements of matching funding. The Institute is located at Beuth-Higher School of Technology Berlin but with laboratories also at other institutions. The institute aims to support small and medium-sized enterprises and create a "one-stop-shop" for them. In addition to supporting already existing firms the goal is also to attract new firms. The Institute has the ambition to foster collaboration between higher education institutions and industry as well as to channel research into areas important for the regional economy

To overcome the fragmentation of the regional innovation system in Berlin and to improve co-operation between small and medium-sized

enterprises and universities/universities of applied sciences there is a need for a more system-oriented and pro-active innovation-based regional policy. New types of innovation tools need to be introduced. Table 2.1 describes different types of SME innovation policy tools. The first type of instruments aim at providing firms with access to resources that will be helpful in innovation projects. They will increase the innovation capacity in firms by providing access to the necessary resource inputs, including financial support for product development, contacts with relevant knowledge organisations or assistance in solving specific technological problems where the absorptive capacity of the firm is critical. The second type of instruments focus on learning, changing behavioural aspects, innovation strategy, management, mentality or the level of awareness in firms, where highly skilled people and adequate skill provision from higher education institutions in the region are critical resources.

Table 2.1 A typology of regional innovation policy

	Financial and technical support	Behavioural change: Learning to innovate
Firm-focused	Financial support Brokers	Mobility schemes Learning work organisations
System-focused	Technology centres	Regional Innovation Systems

Source: Asheim, B.T., *et al.* (eds.) (2003), Regional Innovation Policy for Small-Medium Enterprises, Edward Elgar Publishing, Cheltenham.

Training highly skilled workers and providing intermediate technical skills and competencies within applied areas of education and research are important in promoting interactive user-producer learning and incremental innovations in work (Asheim, 2010). These skills and competencies improve the performance of demand-led innovation. In addition, they develop a platform for more traditional industry to link up with the science-driven innovation where research-intensive universities play a leading role. This happens for example when a small and medium-sized enterprise changes its technological trajectory to a new one which is based on systematic research and development in order to avoid being locked-in a price squeezing and a low road competition from the low cost countries. To do this the enterprise will need to employ higher education graduates to improve their absorptive capacity. This is often supported by different types of mobility schemes. In the long run, however, most firms will face challenges in relying exclusively on informal localised learning. They will need to gain access to wider pools

of scientific and engineering based knowledge on a regional, national and global scale (Asheim, *et al.*, 2003).

Demand-led innovation will remain an important part of the competitive advantage of most traditional small and medium-sized enterprises. Strong tacit, context-specific knowledge components, which is found for example in engineering knowledge that dominates the demand-led innovation, are difficult to copy by other firms in different locations, and will continue to be a basis for sustaining these firms' and regions' competitive advantage also in the long run (Porter, 1998). Important in this context is the recognition that learning is not only reproductive but also developmental and that a 'learning work organisation' has innovative potential because of the employees' autonomy in their work situation. Even the most analytical, science based company will benefit from better organisation of work.

Research literature on the relationship between forms of work organisation and economic performance in the EU confirms that learning is both developmental and creative (Lorenz and Valeyre, 2006; Michie and Sheehan, 2003). Studies have showed that, in addition to providing better and more qualified jobs, the 'learning work organisation' promotes better conditions for learning and innovation and a larger propensity for patenting. These studies stress the importance of the educational attainment level of the workforce and, consequently, the wide range of education portfolio offered by universities and other higher education institutions. This implies that the demand-led innovation based on a 'learning work organisation' does not only produce incremental innovations but can also create radical innovations. This will require the presence of a highly-skilled workforce who will have access to continuous learning provided by universities and universities of applied sciences. In this respect, Berlin clearly has a strong potential to develop and exploit.

2.3 Towards a broad-based innovation strategy

The distinction between science driven and demand led innovation is helpful in order to avoid a biased focus of promoting science-based innovation of high-tech firms at the expense of learning- and experience-based, user-driven innovation. However, it also highlights the limitations of such innovation strategies in the long term and, thus, emphasises the need for firms in traditional manufacturing sectors and services more generally to link up with the sources of codified knowledge in distributed knowledge networks (Berg Jensen *et al.*, 2007).

Experience from elsewhere shows that combining the two modes of innovation is an effective way to improve economic performance and

competitiveness. In other words, firms that have used the science-driven mode intensively may benefit from a stronger focus on the demand-led innovation and vice versa (Berg Jensen *et al.*, 2007). The ability of firms to search and combine knowledge from different sources seems to have a stronger associated with innovativeness than either interfacing predominantly with customers or suppliers applying a demand-led innovation, or with research institutes and universities providing input to science and technology oriented processes alone (Laursen and Salter, 2006).

In combining the two modes of innovation, *i.e.* the science-driven and the demand-led, the issues of cognitive distance, organisational forms and absorptive capacity become crucial (Nooteboom, 2000; Bosch, *et al.*, 1999; Kogut and Zander, 1996). If the cognitive distances and the differences in processes of knowledge acquisition, assimilation and transformation between the two modes of innovation are perceived by key actors to be too wide, it will not be possible to combine them and to view them as complementary instead of incompatible alternatives. There will be a lack of absorptive capacity within firms and regional clusters to acknowledge and appreciate the potential gains of the other mode of innovation as well as to access and acquire the necessary competence to combine the two modes of innovation. A broad based innovation policy that combines both science-driven and demand-led innovation will have a strong influence on the role higher education institutions' research can play in promoting innovation and competitiveness. The industrial structure of Berlin with a relatively high dependence on traditional small and medium-sized enterprises makes a broad based innovation policy a necessity.

In order to achieve a broad-based innovation policy, a closer and improved co-operation is needed between the research-intensive universities and universities of applied sciences in Berlin. Better co-operation and coordination would enhance student mobility and pathways between institutions and increase the attractiveness of the higher education institutions among the industry, which would promote closer industry-university cooperation. There are some *ad hoc* initiatives involving research collaboration between universities, universities of applied sciences and research institutes, for example the highly commendable joint research project on "Autonomy Despite Multi -morbidity in Old Age" (see Box 2.7) but there are no major initiatives to support collaboration across higher education sectors. In the international context, collaboration between different types of higher education institutions, is however not unusual. For example Lund University in Sweden promotes co-operation between the five universities and university colleges in Southern Sweden in order to coordinate education in particular but also third mission work in the region. The first area of focus is engineering education, a field common to all

universities. In addition, the region of Scania (Sweden) has a well developed "triple helix" collaboration between government, industry and higher education (see Box 2.8).

Box 2.7 Autonomy despite the multi-morbidity of old age

An example of research collaboration between universities, universities of applied sciences and research institutes in Berlin

"Autonomy despite the Multi-morbidity of Old Age" (Autonomie trotz Mulitmorbidität im Alter, AMA) is a joint research project sponsored for an initial 3-year period starting in 2008 by the German Federal Ministry of Education and Research "to investigate resources that may help seniors with multiple illnesses to maintain their independent living and everyday competencies." Members of the consortium include the Charité, the German Centre of Gerontology (Deutsches Zentrum für Altersfragen) the Robert Kock Institute the Free University of Berlin , the Social Science Research Centre Berlin (WZB), the Institute for Gerontological Research (Institut für Gerontologische Forschung, IGF) and Alice Salomon Hochschule. The co-operation between universities and universities of applied sciences ensures that the young researchers from Alice Salomon Hochschule may pursue a doctorate degree.

Source: Schreiterer, U. and L. Ulbricht (eds.) (2009), "The City of Berlin, Germany Self-evaluation Report", OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/30/10/43942109.pdf*

Box 2.8 University of Lund and "triple helix" co-operation in Scania, southern Sweden

A successful "triple helix" co-operation requires the presence of strong and able partners, including a strong higher education sector, competitive industry and proactive regional government. Scania has all these actors present in its regional innovation system. Lund University is the largest university in the Nordic countries and among the strongest in Europe. The region of Scania has a number of internationally competitive industrial sectors, for example information technology (Sony Ericsson), biotechnology (Medicon Valley) and the food sector. Scania also has a proactive regional government. In addition there is a national policy instrument VINNVÄXT launched by the Swedish Governmental Agency for Innovation Systems (VINNOVA). .

Box 2.8 University of Lund and "triple helix" co-operation in Scania, southern Sweden (continued)

It builds regional innovation systems with a ten year support to promote global competitive industries. The VINNVÄXT initiative in Scania focuses on food, including functional food, convenient food and international marketing of food.

The "triple helix" co-operation in Scania is one of the best examples internationally demonstrating how the "triple helix" approach can be highly operative in promoting regional development through a close relationship between the university, industry and regional government. The main obstacles are linked to governance challenges, especially in the VINNVÄXT programme when it became operational.

Lund and Copenhagen universities launched a joint project with INTERREG funding to build a Medicon Valley Academy/Alliance. The initiative, that was strongly supported by Region Scania, has resulted in the development of a global bioregion 'Medicon Valley' which is today among the third or fourth largest biotech regions in Europe in terms of products in the pipeline.

"Mobile Heights" is an initiative to promote wireless communications and internet based services in Scania and the neighbouring county of Blekinge. Two of VINNOVA's Industry Excellence Centres constitute the base for this effort, which is located at Lund University's technological institute. The initiative enjoys strong support from key industrial partners, such as Sony Ericsson and Region Scania.

VINNOVA is involved in funding the two Industry Excellence Centres over a ten years period

Conclusions and recommendations

Berlin has made great progress in making innovation a pillar of its economic development and future prosperity. It has thus a strong science-led strategy for economic development and capacity for its delivery. This involves the identification of key areas of strength in research and the development of technologies with considerable commercial potential. Although the business base of the city is limited, links between researchers and key firms have been supported by building capacity through intermediary bodies, numerous networking arrangements and providing spaces where actors from business and research can work together and new business can be incubated. Berlin's two well-functioning science parks have become national and international models. The investment linked to the research base has contributed to significant employment growth in the key competency areas. Success is most evident in the life sciences domain

where, internationally, there are well-established processes of science-led innovation linked to clinical practise.

However, Berlin's science-driven strategy is, less appropriate in sectors where innovation is more incremental and user-driven. The strong presence of traditional small and medium-sized enterprises is a challenge for Berlin's economic development: traditional industries have limited support to develop demand-led innovation and lack good contacts with R&D milieus in higher education institutions. The HEI-industry linkages remain weak in terms of small and medium-sized enterprises and the regional innovation model is in risk of fragmentation. A more user-driven model of innovation would need to focus on competence building and organisational innovations exploiting the complementarities of the research intensive universities and universities of applied sciences.

Berlin has significant activities underway to promote innovation with high hopes for success. However, Berlin's innovation system is fragmented, revealing underutilised potential. The OECD Team recommends that the chances for success can be increased if the following measures are taken:

- The local/regional dimension of the "third mission" of the research intensive universities should be strengthened through promoting their pro-active engagement in regional development. This should be done by recognising the need for "triple helix" collaboration embracing government, industry and academia as a guiding policy framework for regional innovation. The goal should be to move research-intensive universities from taking on "generative" roles to becoming more engaged in "developmental" roles. Stronger links could be made with PhD training and cluster development and to provide PhDs with entrepreneurial skills.

- A system perspective should be applied to the regional development strategy by improving the connectivity in the regional innovation system through better collaboration and a more efficient division of labour between the research intensive universities, universities of applied sciences and research institutes and their respective partnering industries in order to create closer research collaboration across higher education and research sector and industry, particularly small and medium-sized enterprises.

- The research and development capacity of the universities of applied sciences should be improved in terms of time and funding in order to make them better positioned to assist and co-operate with small and medium-sized enterprises (SMEs). To improve the absorptive capacity of SMEs and to reduce the cognitive distance between SMEs and higher

education institutions, policies should be implemented to encourage mobility schemes and technology brokers. The provision of further education by higher education institutions should be upscaled and extended to re-skilling and up-skilling activities.

- Incentives for higher education institutions and research institutes should be strengthened to increase their capacity to act as technology transfer agencies bringing non-local knowledge to Berlin through attraction of talent and foreign direct investment. Incentives for higher education institutions and their staff to engage in local and regional development activities should be created.

Notes

1. The approach is based on **S**(cience)**T**(technology)**I**(nnovation) mode of innovation. It represents a science push and supply driven high-tech strategy (Berg Jensen *et al.*, 2007).

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Chapter 3: Human capital development

This chapter examines how effectively higher education institutions in Berlin contribute to meeting the social and economic needs of the population in terms of opportunities to study and relevance of the qualifications offered. It discusses the size of the education system, the enrolment and graduation rates within higher education. It highlights the agenda for access for all and considers the situation of disadvantaged groups, particularly migrants while also concerning issues of life-long learning. The chapter then discusses the societal and professional relevance of the higher education institutions and graduate employment with particular emphasis being placed on entrepreneurship outcomes.

The chapter closes with a series of recommendations including the need to design a long-term regional development strategy, supporting evidence-based decision making within Berlin education system, opening higher education to diverse populations while also addressing the needs of small and medium-sized enterprises.

3.1 The size of the system, enrolment, graduation, mobility and funding

Overall enrolment[1]

The total number of higher education students in Berlin was about 135 000 in 2008. Roughly 70% of the students are enrolled at research-intensive universities, 25% in universities of applied sciences and 5% in universities of fine art and music. There are three major comprehensive research-intensive universities, *i.e.* Freie Universität Berlin, Humboldt Universität zu Berlin, and Technische Universität Berlin, four public universities of music and fine arts, five public universities of applied sciences as well as altogether 22 – mostly very small - private higher education institutions.

6.74% of all higher education students in Germany are enrolled in Berlin, while Berlin's share of the overall population only amounts to 4.14% (Schreiterer and Ulbricht, 2009). The relatively high share of students in Berlin reflects historical developments. West Berlin was a major centre of education, science and cultural policy in West Germany (with a special status within the Federal Republic of Germany), while East Berlin was the capital of the centralised German Democratic Republic. A closer study, however, reveals that the degree of concentration of students in Berlin surpasses only moderately that of the average of other large cities in Germany.[2]

The concentration of higher education students in Berlin has decreased over time. In 1995, 7.8% of all students in Germany were enrolled in Berlin, and in 2000, this rate was slightly below 7%. Financial cuts contributing to the reduction of student numbers were most dramatic in the case of the Free University of Berlin where student numbers declined from more than 60 000 in 1991 to 45 000 in 2000 and 30 000 in 2008. Between 1995 and 2008, the total student numbers in Berlin declined from about 145 000 to 135 000.

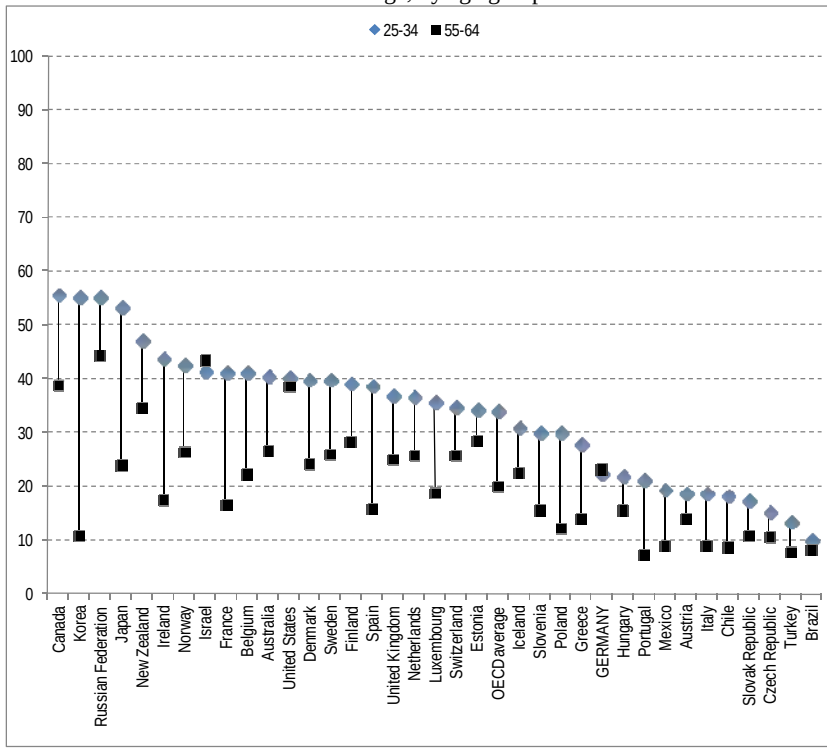
In international comparisons, global cities, *e.g.* Amsterdam, London, Paris, Tokyo or Vienna, have similar or even a higher degree of concentration of students. In Berlin, however, the high supply of study places is expected to be funded overwhelmingly by tax revenues allocated to the *Land*. This is unusual in international comparison but in line with the city state funding system in Germany.

Enrolment and graduation rates

While Germany has a strong vocational education system, tertiary attainment rates are low by international standards: in 2009, only 23% of a typical age cohort completed a tertiary education programme compared to an OECD average of 34% (OECD, 2009a; see Figure 3.1). Higher education expansion has not featured high on the policy agenda. In recent years, however, the calls for a more aggressive expansion in higher education have strengthened. Any growth in higher education enrolment can be seen as a "catching up" on the OECD average.

Figure 3.1 Population that has attained at least tertiary education (2009)

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

Enrolment and graduation rates in Germany have remained relatively low for decades.[3] The entry rate to higher education (ISCED 5A or tertiary type-A) in Germany increased from 26% in 1995 to 34% in 2007 (see Table 3.1). However, it remained among the lowest in OECD countries; the OECD average entry rate to tertiary education type A rose from 37% in 1995 to 56% in 2007. The graduation rate from higher education in Germany was 14% in 1995 and 23% in 2007 compared to the OECD average of 20% in 1995 and 39% in 2007 (see Table 3.2).

Educational statistics in the Federal Republic of Germany show consistently higher rates of secondary education completion, entry in higher education and graduation for the city-states *Stadt-Staaten* than for the other *Länder*. These phenomena are in part typical for large cities and in part due to varying school policies in the various *Länder*.

The performance of Berlin higher education institutions has been increasing in terms of completion rates. All higher education institutions in Berlin managed to continuously raise their respective completion rates between 2002 and 2007. For the three research-intensive universities, the average climbed from 46 to 63%, and for the universities of applied sciences, always higher than universities, it grew from 63% to 88% (Schreiterer and Ulbricht, 2009). Also, in 2005, with 33.3%, Berlin scored second highest of all *Länder* for the share of higher education graduates among the 25-year old population (DIPF, 2008).

At the same time, various surveys show that the study times are longer and drop-out rates higher in Berlin than in Germany on average. The Berlin Self-Evaluation Report does not provide any data on drop-out rates in Berlin. According to OECD statistics, the drop-out rate in tertiary education type A in Germany was 23% in 2005; this is clearly below the OECD average of 30% (OECD, 2009a).

Table 3.1 Entry and graduation rates (%)

Tertiary education type A

	1995	2000	2007
a. **Entry rates**			
Germany	26	30	34
OECD average	37	47	56
b. **Graduation rates**			
Germany	14	18	23
OECD average	20	28	39

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

Table3.2. Entry and graduation rates in German cities (%)

Tertiary education type A in Germany 2005

	Bremen	Hamburg	Berlin	Germany	OECD average
Entry rate	68.3	52.7	46	36.2	54.4
Graduation rate	30.7	24.7	31.2	19.9	36.4
Population 25-64	15	21	25	15	19

Source: Internationale Bildungsindikatoren im Ländervergleich 2007

Enrolment by institutional type

Berlin's higher education scene is dominated by the three traditional universities in terms of student numbers. In 2000, only around a quarter of first-year students enrolled at universities of applied sciences in Berlin in comparison to the national average of around one-third (see Table 3.3). However, from 2000 to 2008, the number of first-year students at universities of applied sciences has increased substantially while the numbers at universities have slightly decreased. As a result, the proportion of those enrolling at universities of applied sciences among all new students in Berlin has increased to about one-third in 2008 which is about the same as the national average.

The increase of the proportion of new students at universities of applied sciences reflects their growing popularity among applicants. This can be attributed to the introduction of bachelor and master study programmes in both types of higher education institutions. Moreover, the Berlin Senate established separate "structure funds for universities of applied sciences" for the years 2006 to 2009 to boost increasing participation in professional higher education. The Senate has also provided them with additional funding in the framework of the so-called Hochschulpakt 2020 (Higher education contract) between the Federal government and the state governments, aimed at funding part of the projected growth of student numbers in German higher education.

Since the study programmes at the universities of applied sciences have a strong emphasis on application and close links to local labour market needs, increasing their student number can been seen as bringing positive impacts on the regional economy. Berlin, however, has not had a shortage of entrant students at universities of applied science in comparison to the size of its population and its economy has been served by regional graduates from the universities of applied sciences more or less according to the German average.[4] It is, however, uncertain whether the Berlin economy

could absorb more graduates. In addition, it is premature to draw conclusions from the employment outcomes of the first relatively small cohorts of new bachelor and master graduates from the universities and universities of applied sciences and to evaluate how employers receive the new degrees.

Table 3.3. Enrolment rate (%) compared to population by institutions

Tertiary Education Type A 2008

Institution	*Fachhochschulen*	Universities	Total
Berlin	0.16	0.35	0.55
Germany	0.14	0.26	0.41

Source: Statistisches Bundesamt

Berlin higher education institutions cover a wide scope of study programmes. Given the close proximity of higher education institutions in Brandenburg, there would be a good opportunity to create a comprehensive, accessible higher education system with flexible pathways. However, there is currently a lack of co-ordination and formal agreements to enable students to move from one institution to another. Apart from some institutional co-operation agreements the decision on whether to accredit courses from other higher education institutions is taken by individual departments. In practice, combining courses from different institutions may be difficult. As a consequence, only a limited number of students participate in courses which are not offered in their own institutions. The barriers between the higher education institutions are even higher when students want to change from one higher education institution to another (Schreiterer and Ulbricht, 2009).

The traditional division of tasks between school education, vocational training and higher education in Germany has not encouraged higher education institutions to develop learning pathways, recognise prior learning and provide a wide further education portfolio. This is a disadvantage at a time when there is a greater need to widen access to higher education, combine work and study and provide lifelong learning opportunities. Higher education institutions are expected to serve non-traditional learners in a more flexible way.

International student mobility

Germany was among the first countries in the world to make a distinction between foreign mobile students and foreign non-mobile students in the official statistics. The term *Bildungsausländer* refers to foreign mobile

students, *i.e.* students in Germany who have acquired their entry qualifications to higher education outside of Germany. *Bildungsinländer*, in contrast, are foreign non-mobile students, *i.e.* those with a foreign nationality who had acquired their entry qualification to higher education in Germany.

The proportion of foreign mobile students in Germany has been on the increase for various decades and remains among the highest in Europe. By excluding small countries with incomplete higher education systems (*e.g.* Cyprus, Luxembourg), statistics show that Germany has the fourth highest rate in Europe with 11.2% in 2006 after Switzerland, Austria and the United Kingdom (Wissenschaft weltoffen, 2009). The proportion of foreign mobile students at German higher education institutions in Germany was 9.5%, whereas 3% of the foreign students had acquired their entry qualifications in Germany.

In 2008, 16% of students at the Berlin higher education institutions were foreigners: 12.5% foreign mobile students and 3.5% foreign non-mobile students. In 2005, the respective data were 14.9% (11.5% and 3.4%). The rates of foreign mobile students at universities in Berlin are more than twice as high as at universities of applied sciences.

The Berlin rate of foreign students and the rate of foreign mobile students are both the fourth highest among the 16 German *Länder*; surpassing the German average by almost one third (Wissenschaft weltoffen, 2009). Moreover, it has been estimated that the proportion of foreign mobile students will increase to 20% in the near future. In comparison to other metropolitan regions, however, Berlin does not present itself sufficiently well as an attractive site for study. The rate of foreign mobile students would probably increase, if efforts were made to advertise the attractiveness of Berlin as a place of study. Currently there is no joint marketing of the higher education offer in the city for example in the form of "one stop education website". This may suggest a lack of recognition of the potential that the international student population could play as "ambassadors" of Berlin.

Germany belongs to those economically advanced countries in which students are strongly encouraged to study abroad.[5] According to the EUROSTUDENT III study undertaken in 2007, 17% of German students enrolled at German institutions of higher education have had some "foreign study-related experience", among 8% had been enrolled in study programmes abroad – as compared to 10% and 5% respectively on average of 20 European countries. Graduate surveys provide more detailed information about study abroad experience. According to a graduate survey of the German higher education graduates of 2007, 18% had been enrolled at higher education institutions outside of Germany and a further 16% had

been abroad for other study-related experience (see Table 3.4). Corresponding data is not available about the Berlin higher education institutions.

Table 3.4. International mobility of German students

2007 Graduates from German HEIs with study-related experiences abroad during the course of study

Type of activity	*Fachhochschulen*	Universities	Total
Enrolled for study	12	19	18
Study project	2	3	3
Internship	11	16	15
Employment	2	2	2
Language course	3	7	7
Extended travel	2	6	5
Other activities	3	5	5
Study-related stay abroad altogether	22	36	34

Source: Generation Vielfalt (2009), "Studienbedigungen und Berufserfolg", International Centre for Higher Education Research, Kassel.

There are no major tensions between the international and regional emphasis of teaching and learning related activities in higher education in Berlin with respect to foreign mobile students. The situation of migrant students, however, is more challenging and will be discussed later in this chapter.

Higher education in Berlin: brain drain or brain gain

As the regional labour market in Berlin is not able to absorb all graduates, some of them move to other cities or regions after graduation. However, up to now there is no systematic study about graduate mobility and success, and neither the *Länder* nor the Federal administrations collect comprehensive data on graduate's careers. Some Berlin higher education institutions have nonetheless undertaken graduate surveys to track their alumni. For example in the case of Humboldt University, the survey conducted for 2007[6] indicates that nearly 60% of graduates stay in Berlin up to two years after graduating, 5 to 10% locate to Brandenburg, 25% in other *Länder*, while 6% choose to go abroad. This is not very different from the average for Germany (35% employed outside of their region of study).[7] As more than 50% of students in Berlin come from outside the region, this would seem to indicate that Berlin keeps somewhat more graduates than there are departures. Such a factor could have contributed to recent

demographic increases based on overall city attractiveness, in which the supply of certain high level jobs, such as in research, can play a role.

The mobility from secondary to higher education and from graduation to employment was addressed in a recent survey of the graduates of the year 2007 from 47 German higher education institutions. The study was undertaken about 18 months after graduation. Some indication is also provided about the situation in Berlin since two universities and one university of applied sciences in Berlin participated in this study. In the up-to-date unpublished survey co-ordinated by the International Centre for Higher Education Research Kassel (INCHER-Kassel), the Berlin Region comprises the Land Berlin as well some neighbouring districts (*Kreise*) of the Land Brandenburg with about an additional one million inhabitants, presented some interesting results (see Table 3.5).

According to this survey, early 2009, out of the employed graduates of the year 2007 from Berlin higher education institutions:

- 35% were not mobile at entry and exit: they were in the Berlin Region prior to study and remained there after graduation (24% correspondingly of all employed graduates in Germany),
- 30% were mobile only at entry: they came from another region to Berlin to study and found employment there after graduation (18% correspondingly of all employed graduates in Germany),
- 14% were mobile only at exit: they came from the Berlin Region to study but found employment elsewhere (16% correspondingly of all employed graduates in Germany),
- 20% were mobile at entry and exit: they came from elsewhere to study in Berlin and after graduation found employment outside of the Berlin Region (42%, i.e. about twice as many correspondingly of all graduates in Germany).

Table 3.5 Regional mobility (%) at entry to HE and from graduation to employment

2007 Graduates from two universities and one Fachhochschule in Berlin

	Universities	***Fachhochschulen***
Not regionally mobile	35	37
Mobile only at entry to higher education	30	28
Mobile only from graduation to employment	14	21
Mobile both at entry to HE and from graduation to employment	21	14
Total	100	100

Source: Unpublished data from the International Centre for Higher Education Research, University of Kassel

In terms of the intake to higher education, 50% of those Berlin higher education graduates who were employed about 18 months *after* graduation were Berliners *before* beginning their studies. Accordingly, the intake directly from the region was higher than the national average (40%), but lower than in metropolitan areas (57%). These figures indicate on the one hand that higher education institutions in Berlin are more successful than other higher education institutions in Germany to attract students from their region. This can be attributed to the broad range of study opportunities, the large size and the attractiveness of the city of Berlin. On the other hand, given that the percentage of students in Berlin is much higher than the respective national proportion of the population, the figures suggest that Berlin higher education institutions are on average more successful than other metropolitan higher education institutions to attract both students from its region as well from other regions.

In terms of the early employment situation after graduation, 60% of Berlin higher education graduates who were employed since graduation, had found employment in the Berlin region. This indicates that Berlin retains 10% more graduates than originally have come from the region. This finding is similar to that of metropolitan regions in Germany in general (57% of the students originate from the metropolitan region but 68% of graduates find employment there), and thus a sign of success for the economically weak Berlin region. In Germany as a whole (*i.e.* both metropolitan and other areas), 42% found employment in the region, while 40% originated from the region; this suggests than retention in non-metropolitan areas in Germany is below the proportion of student originating from the respective area.

This study does not, however, provide a complete picture of mobility. It does not address mobility during the course of study, dropout rates or the mobility or immobility of those graduates who fail to find employment. Yet, in view of the data and contrary to a widespread belief, it is evident that higher education graduates in Berlin do not have to leave the region in higher proportions than students on average in Germany. In addition, the data shows that Berlin is as "successful" as other metropolitan areas are in Germany in "retaining" the graduates in the regional labour market.

However, while retaining talent may be attributed to a supply of high-level jobs in the region and a contribution of graduates to the upgrading of jobs, some graduates also remain in the region for the first years after graduation because they have not found attractive employment. The available data suggest that regionally mobile graduates on average are slightly more successful on the labour market than those staying in their university region. There is no indication, however, that this difference is higher in Berlin than on average in Germany. In any event, the relatively

high supply of graduates in Berlin has not resulted in serious labour market problems.

Higher education funding

In Germany, the individual *Länder* are in charge of the basic funding of the universities, while financial aid for students, construction in higher education, as well as research promotion by higher education institutions and most of the funding of public research institutes outside universities are co-funded by the Federal government and the governments of the *Länder*. Therefore, German city-states (Berlin, Hamburg and Bremen) have to bear a disproportionate share of the public costs of higher education.

When the privileged funding of Berlin ended both in the east and the west, Berlin experienced a process of painful cuts in the public sector for many years. The Universities in Berlin have thus experienced financial cuts in the last two decades, as far as basic funding is concerned. These cuts were caused by the difficulties of the city state of Berlin to shoulder the cost of higher education for a student population more than one and a half as large as on average found in German regions with a corresponding number of inhabitants. Today, Berlin continues to face greater challenges in higher education funding than other city-states due to its relatively weak economy.

Financial stringency has led the Berlin universities to compete for national and international research funding. Similar incentives have been provided by the German "Initiative for Excellence" in which the Free University of Berlin was among the nine German universities selected. In addition, the increasingly indicator-based higher education funding system in Berlin provides incentives for high-quality research performance, high student numbers and high graduation grates. The new system of achievement-based remuneration of professors in Germany is also expected to reward primarily research performance. This development to greater focus on world class excellence in research may have detrimental effects on socially and regionally relevant activities linked to teaching and learning and regional engagement of higher education institutions.

3.2 Equity and widening access to higher education

Students without typical entry qualifications and mature students

There is limited robust information about equity in access to higher education in Germany. Similarly, the Berlin Self-evaluation Report does not address differences in access to higher education by parental educational

background or by socio-economic background. No reference is made of the proportion of students without typical entry qualifications (*e.g.* entry routes through prior vocational training and experience). In terms of gender equity in higher education, general statistics In Germany show that about half of the students are women. Also, 50% of the higher education students in Berlin are women.

Inequity in access to higher education in Germany is higher than the average of OECD countries participating in the Eurostudent study, which compares university student profiles in European countries.[8] According to the most recent Eurostudent study, German higher education students with blue collar-parents are only half as likely to enrol in higher education as blue-collar workers among the working population aged 40-60 (*cf.* HIS 2008). In addition, the share of students with "non-traditional routes to higher education" in Germany is only between 1% and 4% (depending on definition) while in Sweden the share is 35% and 33% in Spain, 25% in Scotland and 10% in Ireland and the Netherlands.

In Germany, many pathways linking upper secondary vocational education to tertiary education are in place including for people who leave secondary school without university entrance qualification (KMK, 2009). There are also a number of ways to acquire university entrance qualifications outside the *Gymnasia*. However, according to the ongoing OECD Vocational Education and Training Review limited success has so far been made in channelling students with VET background into tertiary education (Hoeckel and Schwartz, forthcoming). In fact, the overall share of students who move from the VET system to university education has decreased from 25% in 1990 to 28% in 2003 (Cortina *et al.*, 2008).

Recently, access to tertiary education has been extended in Germany: since 2009 individuals who acquired the Master craftsman, technician of *Fachwirt* title have been granted full access to university. In addition, graduates from upper secondary VET programmes (*Gesellen*) with three years of work experience have subject-specific access to tertiary education. It is, however, too early to evaluate the impact of these reforms. (Hoeckel, K. and B. Schwartz, fortcoming)

According to the recent government report (BMBF, 2009), "The central challenges with respect to the future growth and employment in Germany include ensuring the medium-term and long-term availability of a skilled workforce." Germany ranks among the lowest of the OECD countries when measuring participation in lifelong learning (see Table 3.6). Currently, 3.1% of all undergraduate, 10% of graduate and 8% of all Master study programmes are offered as part time of distance courses (Freitag, 2009). No robust data is available about the Berlin situation in terms of access of

mature students to higher education and adult education programmes (Schreiterer and Ulbricht, 2009). It is, however, widely acknowledged that Berlin faces a challenging demographic development with an ageing population. A general enhancement of the qualifications of the existing workforce would improve competencies in an effective way. Higher education institutions should be encouraged to recognise prior learning and experience, and provide opportunities to combine work and study.

Table 3.6. 30+ population participating in lifelong education

Full-time and part-time in public and private learning institutions

Rank	Country	Percentage
1	Finland	14.4
2	Australia	13.5
3	Sweden	12.9
4	Belgium	8.5
5	Denmark	8.1
6	Hungary	5.9
7	United Kingdom	5.7
8	Ireland	5.6
9	USA	5.5
10	Spain	4.0
11	Switzerland	3.8
12	Portugal	3.7
13	Austria	3.5
14	Italy	3.5
15	Netherlands	2.7
16	France	2.6
17	Germany	2.5

Source: Based on OECD (2009a), *Education at a Glance*, OECD Publishing, Paris.

The limitations in the data call for an improvement of systematic information in order to help the Berlin higher education institutions to address challenges in a strategic way. It is noteworthy that Free University of Berlin takes part in "National Educational Panel Study" co-ordinated by Bamberg University and supported by the Federal Ministry of Education and Research in Germany. This study aims to assess education processes across the entire life span, evaluating competencies from preschools to higher education and beyond. The study will also examine which competencies are decisive for attaining educational qualifications and participating in lifelong learning.

Access to higher education should be further opened and adequate guidance, induction and financial support measures should be designed for

non-traditional students. Mechanisms to recognise prior learning and experience should be strengthened. Dual programmes and flexible part-time programmes should be provided to reach mature students and those who combine work and study.

Students with migrant backgrounds

In Berlin, 23.8% of the population have a "migration background"- this usually refers to those who were born abroad or whose parent was born abroad. According to the Berlin Self-Evaluation Report (Schreiterer and Ulbricht, 2009), this figure is the third-highest among the German *Länder* (26.3% in Bremen and 25.6% in Hamburg).[9]

The selection for higher education begins at early stages. According to *Bildung in Deutschland* 2008,[10] 46% of Germans completing general schools or vocational training acquired the entry qualification to universities or universities of applied sciences, while the respective ratio was 18% among foreigners. It is estimated that 80% of the Germans and 70% of foreigners qualified to study eventually enrol in higher education.

Berlin is an attractive city for higher education, both for Germans from other parts of the country and for foreigners coming from abroad to study in Berlin. The proportion of students in the capital city as compared to its overall population share in the country is 2.5% higher and over 10% of Berlin students come from abroad. Applications exceed places available, so selection of students, usually based on final marks upon completion of the *Abitur*, is increasingly standard practice. As a result, access to higher education in Berlin is becoming more and more restrictive.

The competitive environment limits access of Berliners with immigrant backgrounds[11] to higher education as they usually do not present the secondary schooling grade levels that would ensure entry into the system. Among the graduates of Berlin upper secondary schools in 2007, the proportion of foreign nationals was 5.6% and the proportion of pupils with migration backgrounds (including all pupils whose first language is not German, irrespective of their nationality) was 9.7%.[12] These rates are far from being reflected in higher education enrolment, as the available data presented below indicates (see Table 3.7). In addition, dropout rates for people with immigrant backgrounds are also higher as they are often less prepared for higher education, because of insufficient mastering of the German language and difficulties stemming from their socio-economic condition.

In general, participation rates of people with immigrant background in higher education are low, both in Germany and in Berlin, although no precise figures are available because of the statistical difficulty stemming

from the fact that collecting ethnic data would be unconstitutional. The central indicator for non-German participation rates in higher education is the number of *Bildungsausländer*, foreign students who have finished upper secondary education in their country. This number is quite high in Berlin higher education institutions, as compared to other German cities. In 2008 these represented 13% at the Free University of Berlin, 12% at Humboldt University and 14% at the Technical University which was the highest proportion of *Bildungsausländer* in all German universities. Schools of music and fine arts also have a high proportion of *Bildungsausländer*, with 11% and 13% of *Bildungsausländer* at Hochschule für Schauspielkunst Ernst Busch (Ernst Busch School of Performing Arts) and Kunsthochschule Berlin, respectively and even higher at Hochschule für Musik Hans Eisler, HfM. Universities of applied sciences, however, attract fewer *Bildungsausländer*: 7% at Fachhochschule für Wirtschaft Berlin (Berlin School of Economics), 5% at Beuth Hochschule für Technik Berlin,[13] 5% at Hochschule für Technik und Wirtschaft Berlin, 2% at Alice Salomon Hochschule and 2% at the former Fachhochschule für Verwaltung und Rechtspflege Berlin, (now part of HWR).[14]

The other indicator about foreign students that is systematically collected concerns the students labelled as *Bildungsinländer* (non-Germans who received their *Abitur* in Germany) and which is indicated in the table below. Their share varies between 2% and 5% at the universities, between 2% and 7% at the universities of applied sciences while amounting to an atypical 51% at the Hochschule für Musik Hans Eisler, HfM. Again, the *Bildungsinländer* seem underrepresented in tertiary education. However, no specific statistics are collected for the majority of immigrants, who are German nationals because at least one of their parents is German or has acquired German citizenship.

Table 3.7. Number of "Bildungsinländer" students at Berlin HEIs in 2008

	Absolute numbers	% of students
Universities		
Technical University of Berlin (TUB)	1190	5
Free University of Berlin (FUB)	1001	3
Humboldt University Berlin (HUB)	574	2
Universities of applied sciences		
Beuth Hochschule für Technik Berlin (BHT)	657	7
Fachhochschule für Technik und Wirtschaft Berlin (FHTW)	420	4
Fachhochschule für Wirtschaft Berlin (FHW)	220	4
Alice Salomon University of Applied Sciences(ASH)	49	3
University of Applied Sciences for Administration and Law (FHVR)	37	2
Schools of art, drama and music		
Berlin University of the Arts (UdK)	-	-
Hans Eisler Academy of Music Berlin (HfM)	326	51
Ernst Busch School of Performing Arts (HfS)	38	17
Berlin Weissensee School of Art (KHB)	38	6

Source: HEI Performance Reports 2008 (Leistungsberichte der Berliner Hochschulen)

Widening access to higher education is one of the broad policy goals pursued by the Berlin Senate (Schreiterer and Ulbricht, 2009). Because of the high percentage of foreigners living in Berlin (14%) and of the even higher proportion of people with an immigrant background but holding German citizenship, widening access amounts to reaching out to this important population segment that is characterised by lower German language proficiency, generally lower secondary education attainment, high unemployment and rather poor living conditions in one of the Berlin distressed urban areas.

Some measures have been taken to improve the conditions in secondary schools with high proportions of youth from low-income families and youth with migration background. For example, the student-teacher ratio has been decreased to 14 to 1 in secondary schools with a large proportion of migrant students as compared to 24 to 1 elsewhere. A range of activities have directly addressed the conditions for learning as well as the guidance and counselling services of disadvantaged youth in schools and in vocational training.

According to Berlin's higher education law (Article 11), 1% of study places is reserved, on probation, for students having barely missed passing the *Abitur*. In practice, there are few candidates, so this possibility is of little used. Also, a percentage of study places varying between 5% and 10% is normally reserved in each institution to people with specific characteristics,

such as non-Germans and people "*to whom a rejection would cause severe difficulties*". In reality, however, the places for non-German students are often filled with students coming from foreign countries, not from deprived neighbourhoods in Berlin.

Whereas the number of foreign students belongs to the performance indicators for Berlin's higher education institutions and leads to additional funding, no policy tools have been devised to increase the enrolment of pupils with a migrant background having graduated from Berlin secondary schools. Information on the proportion of students from families with migration background is thus not usually collected by higher education institution. Higher education institutions have limited knowledge about how they actually stand when it comes to the enrolment and academic success of their students with migration background. Some institutions may gather information about the national, cultural and social background and status of their students in surveys, but not in a systematic and homogenous way that would permit useful analysis.

Although affirmative action in admission to higher education is restricted by law, higher education institutions have found a way around this when there is a pressing need. For example, a study programme in social work at Alice Salomon Hochschule that has a focus on managing cultural diversity has introduced experience of cultural diversity in the selection criteria which has benefited youth with migrant background.

In addition, Berlin higher education institutions have launched a wide range of initiatives that raise aspirations of disadvantaged youth, address the lack of integration of migrants, stimulate activities of creating new arenas of multi-cultural experience and cross-cultural understanding, and establish study programmes, support measures and even research units addressing the migrants and issues of cultural diversity. Fields such as social work, public administration and teacher training have a strong interest in recruiting students of minority background because there is a need to increase the share of migrants in the respective occupations (teachers, social workers, police, public administration, etc.). Similar initiatives had also been introduced in media studies, business administration and other fields. Efforts have been made to raise aspirations of young migrants, by offering them means of support within higher education and establishing specific study programmes paying explicit attention to intercultural diversity. However, most of the initiatives associated to widening access and improving retention rates among migrant students are driven by individuals, teams or departments. Measures should be taken to strengthen the institution-wide response to stimulate and support initiatives in this area, for example in the form of special funds distributed by the leadership of the higher education

institutions for related projects, and the inclusion of these items in financial allocation and rewards systems, etc.

The educational disadvantage of the migrant population in Berlin is, however, so pressing that institutional responses also need to be supported by a long term multi-stakeholder collaboration. There are successful international examples Berlin could use, involving wide stakeholder collaboration bringing together city and business and civic leadership, all school districts and higher education institutions. For example, El Paso n Texas has a high concentration of low-income people, many with migrant backgrounds and with low educational attainment. When children from these households enter school they face significant challenges in: *i*) remaining in school; *ii*) obtaining the skills necessary to increase their employability and productivity; and *iii*) obtaining a college degree. The higher education institutions in El Paso have addressed these issues in a comprehensive way and achieved notable measurable success in widening access to higher education and in educational attainment. Underlying individual institutional efforts, the College Readiness Consortium connects efforts in all El Paso primary and secondary education institutions to college level programmes to increase access and attainment (see Box 3.1).

Box 3.1 El Paso: widening access to HE through broad-based long term collaboration

The El Paso Collaborative for Academic Excellence is a long-term multi-stakeholder public-private effort initiated and hosted by the University of Texas at El Paso (UTEP) to improve educational attainment and retention from the first year in school through the college or university degree programme. The Collaborative includes membership from the business community, all levels of educational institutions (from primary through university), the public sector and a non-profit organisation concerned with improving educational achievement. The goal of the collaboration, which started in 1991, is to make systematic changes in educational policy and curriculum in all of the twelve El Paso County School Districts that would produce measurable results in performance in key areas of the curriculum. A specific goal is to decrease the achievement gap across ethnic and socioeconomic groups.

The approach of the collaborative has been measurably successful, particularly in improving the performance of Hispanic students, a group with the largest proportion of low-income students and for whom English is usually a second language. Test results for Hispanic students in the critical 11th grade, (a year before college entry) show improvement in performance from the 33rd percentile in 1993 to the 72nd percentile in 2008.

Box 3.1 El Paso: widening access to HE through broad-based long term collaboration (continued)

Hispanic students show increases in enrolment in fields such as science, technology, engineering and mathematics related curriculum over the period of Collaborative activities and a graduation rate of 76.7%, which is the highest among school districts in the State of Texas. Given that Hispanic students make up 89% of the student population in the El Paso school district, improvement in their educational achievement has had a significant effect on the overall performance of the school districts.

Higher education institutions benefit from the efforts to improve college readiness in primary and secondary education. El Paso Community College, with five campuses in the region, is critical to the effort of widening access to higher education. The community college system is the primary entry point to tertiary education for low-income students who are unable to pay for a four-year degree programme. As a result of direct efforts to widen access and increase educational attainment, for example by obtaining grant funding to improve remedial education, enrolment rates increased 35% in 2002-08 and graduation rates increased 92% during the same period. Programmes to increase college readiness and thus potential success in a four year degree program have resulted in significant improvements in mathematics, reading and writing, with, for example, the percentage of students assessed as college ready with respect to writing skills, improving from 35% in 2003 to 74% in 2008. One of the most innovative programmes undertaken at El Paso Community College to improve educational attainment and to increase the knowledge base of the region is the Early College High School Programme. This program enables high school students to obtain credit for College level courses and thus to shorten the time and money needed to complete a college degree.

The University of Texas El Paso (UTEP) has undertaken its own programmes to widen access and improve student performance and completion rates. The relationship between the broadened community programmes to improve college readiness and the ability of the University of Texas at El Paso to respond are integrally related because over 70% of its students come from within the region. The university has increased its enrolment by approximately 40% since the late 1990s and the vast majority of the increase has been in Hispanic students, who have increased from below 40% of the student body to over 75%. Degree award have risen from approximately 2 000 in the late 1990s to 3 500 in 2008. Attesting to a commitment to serve the bi-national and bi-cultural region, approximately 10% of UTEP's students are Mexican citizens who cross the border every day to attend classes at the University. The University of Texas El Paso has also taken steps to make university affordable and accessible to students who combine work and study

3.3 The societal and professional relevance of study for the region

Links between higher education and the world of work in Germany

German higher education has a strong Humboldtian tradition which is reflected in an appreciation of academic freedom and the right to pursue knowledge for its own sake. At the same time, higher education legislation in Germany – the Framework Act for Higher Education first enacted in 1976 and the higher education laws of the individual *Länder* – highlights the professional responsibility of higher education more strongly than respective legislation in many other countries.

In practice, professional and societal relevance has traditionally played an important role in German higher education institutions. Comparative studies undertaken in 1992 and 2007 have shown that Germany is among the countries where a large proportion of university professors have professional experience outside higher education (according to unpublished data of the project "The Changing Academic Profession" provided by the International Centre for Higher Education Research, University of Kassel). At universities of applied sciences, as a condition of entry for a professorship, professors have to be professionally active outside academia in their professional area of expertise for at least three years.

According up-to-date unpublished REFLEX study on employment and work of graduates of the year 2000 in selected European countries (data provided by the International Centre for Higher Education Research Kassel), students' work experience in higher education is wide spread in Germany. 45% of German and 19% of British graduates had work experience already prior to study; 61% of the German and 20% of British students had undertaken study-related work for income during the course of study; and 79% of German and 32% of British students had participated in internships.

The Federal Constitutional Court ruled in the 1970s that the freedom to choose to study and choose a field of study is an integral part of the constitutional right of free occupational choice. Therefore, the Court has argued that governments can only steer the intake of students to different fields of study at universities, if the existing resources clearly contradict the graduate demand or if the costs for additional study places are likely to endanger government's ability to meet other obligations. In practice, however, only in the medical fields the notions of possible shortages and oversupply of graduates have influenced quantitative planning in German higher education. Since the 1960s, notions of oversupply of graduates have featured more frequently in the concerns of employers, politicians and experts than the notions of shortages of graduates.

According to the Berlin Ministry of Education, Science and Research, labour market concerns do not impact higher education policy "*because there are no major shortages and because future labour market demands are difficult to predict*". Similarly, the Berlin 2004-2014 report by employers' and industrial associations, governments, unions and other associations of the Berlin and Brandenburg region does not identify any imbalance between supply and demand, but stresses that more than half of the students are enrolled in fields of study closely linked to the economy. However, the reduction of the study places at the Free University of Berlin in the 1990s and the increase at the universities of applied sciences in recent years were, to some extent, guided by the intention to increase the proportion of students in field of study linked to the private sector.

Higher education and graduate employment – situation in Berlin

In Berlin, the linkages between higher education and the world of work are influenced by local economic realities. The Berlin labour market is not able to absorb the higher education graduates as industry and production do not offer many employment opportunities. Higher education and research as well as the cultural sector and civic life are, nonetheless, extremely important for graduate employment.

However, the academic and R&D sector in Berlin employs about 20 000, possibly 30 000 highly qualified people. According to the "Berlin 2004-2014" report: "*In the research region more than 200 000 people teach, conduct research and work in various research institutions and respective sub-units of enterprises*" (p. 5), translation by OECD review team). This is a large sector for a city that produces about 15 000 higher education graduates each year. It is noteworthy that many employees stay in Berlin only for a few years after graduation. There are no specific concerns about shortages of highly qualified people in this sector due to the close links between higher education institutions and both public research institutes and private R&D departments and because a large proportion of higher education graduates aim to continue their studies and prepare themselves for employment in academia and research.

Cultural and civic activities are a large sector in Berlin where there are often no clear distinctions between unpaid student projects, gainful part-time work and internships; occasional and precarious employment of graduates; precarious self-employment and more or less regular employment and self-employment. Despite chronic underfunding and often precarious conditions, the sector enjoys a high degree of attractiveness (see also Chapter 5).

As elsewhere in Germany, higher education in Berlin has an emphasis on professionally relevant learning, which can manifest itself in learning in

projects, theses written in conjunction with practical tasks, internships, students' work for income which is related to their field of study and likely future professional area. Despite the wide range of activities, there is no systematic data available on the level of their integration in the curricular in terms of credits as well as the scope of student participation (number of students involved in various work-based activities on an annual basis, length of involvement and number of credits). In addition, firm linkages benefit mostly bigger companies, whereas co-operation between academia and small and medium-sized enterprises, although developing, particularly with schools of applied sciences, remains limited.

The main criticism of German higher education curricula, teaching and learning has centred around the need for better quality and to foster the personal development of students and strengthen their problem-solving abilities. Recently, international competencies, "key skills" such as team-work and leadership abilities, and concerns that the university bachelor programmes are not professionally relevant have dominated the debate. There are similar concerns in Berlin.

There are international examples that Berlin higher education institutions could use in embedding employability and transferable skills in their core curriculum, for example through experiential and problem-based learning approaches. Among a wide variety of problem-based learning initiatives (PBL) in different higher education institutions, Aalborg University in Denmark stands out because of its long term commitment and institution-wide approach to PBL. In fact, 50% of study programmes in Aalborg are organised around interdisciplinary project work in groups (see Box 3.2).

Box 3.2 Problem-based learning at Aalborg University

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

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

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

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

In Berlin, universities of applied sciences usually have close links with the world of work. For example the Dual (bachelors) Degree programmes, which are offered by several universities of applied sciences, involve partnerships with employers (See Box 3.3). Employers play a key role in designing programmes. Thus Hochschule für Wirtschaft und Recht Berlin (University for Economy and Law studies Berlin, HWR), has a "Dual Commission" which includes representatives from partner firms, the Berlin Chamber of Commerce, the employers association and a trade union. Its tasks are not only to develop new programmes but also to initiate major adaptations to established courses to meet the changing needs of companies and the labour market.

Box 3.3 Dual bachelors programmes in Berlin universities of applied sciences

Dual programmes are company-linked courses of study combining full-time classroom studies with on-the-job training on a rotational basis. Participants are selected, employed and paid by the companies while pursuing their studies in universities of applied sciences. The programmes combine university-based education and practical training in the corporate world so that students can gain academic skills and competencies needed by companies.

In Berlin, only two universities of applied sciences, the University for Economy and Law studies Berlin (HWR) and the Educational Institute of the Economy in Berlin and Brandenburg (BBW), provide dual Bachelors Degree Programmes. In the HWR, these 3-year programmes award students a Bachelor of Arts, a Bachelor of Engineering or a Bachelor of Science Degree as well as certificates for their vocational training. With 210 ECTS points, the programmes are not only comparable but equivalent to any "regular" bachelor programmes. Focus is mostly on business services, but there are also a few programmes in engineering. In summer 2009, the HWR enrolled 1 824 students, with 1 570 in the field of business and accounting and 254 in engineering.

Students are hired under regular employment conditions by a large variety of firms mostly based in Berlin and Brandenburg. They range from businesses such as chartered accountants to mid-sized companies in tourism, banking and trade up to global players like Bayer Schering, Bombardier Transportation or Daimler. In addition, large public sector employers such as the Berlin City Cleaning Company ("Berliner Stadtreinigung") participate in the dual programmes. Bachelor's theses are commissioned by and written within the context of the respective company, ensuring that the work is in the interest of the labour market and that students can get access to all information and data needed. The higher education institution is in charge of directing and assessing their work.

According to a survey at the HWR, in 2005, around 60% of graduates of the dual bachelors programmes found their first employment after graduation in the firm where they had undergone their training. The dual programmes are highly attractive for both students and the corporate world. However, since they train graduates for very specific tasks and occupations, they provide only a supplement to "normal" programmes and coursework within higher education.

Source: Schreiterer, U. and L. Ulbricht (eds.) (2009), "The City of Berlin, Germany Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/30/10/43942109.pdf*

Berlin higher education institutions have launched interesting initiatives, projects and programmes with close labour market links. Students and staff engage in wide ranging collaborative efforts with business and industry, community outreach and volunteering that are likely to improve students' labour market outcomes. While there is an abundance of initiatives and projects, the work is often project-based and/or driven by the action on the initiative of individuals or single departments. To a large extent, the action remains organic and undermanaged, and sometimes also funded by enthusiastic volunteers or their professors. There is also a limited evidence base and a lack of monitoring results of work-based learning initiatives which makes it difficult to evaluate the outcomes.

3.4 Building entrepreneurship skills

Berlin has a good track record in graduate entrepreneurship and a rich support framework. For example in 2008, Berlin ranked number 2 in Germany after Hamburg with 17 start ups per 100 000 inhabitants. Currently, Berlin has about 20 start-up centres that provide young technology-oriented enterprises with advice, services and spaces, the annual Business Plan Competition Berlin-Brandenburg, managed by the Berlin Investment Bank (IBB), has permitted more than 4 000 business ideas to serve as basis for the creation of new companies (OECD, 2009b). Berlin's strong science base, cultural industries and creative people provides great potential for new entrepreneurship and entrepreneurialism. There is a high level recognition of the economic and social impacts of entrepreneurship.

Berlin higher education institutions have made steps to boost university spinoffs and graduate entrepreneurship in the region. For example, all three universities have established their own centres for entrepreneurship, with directors reporting to the university boards (rector or vice-rector). The aim of the centres is to bundle start-up support activities and to promote entrepreneurship education activities. One of these centres is the Technical University of Berlin's first-stop-shop "Gründungsservice" which pools university's resources to gain critical mass. It has built on broad involvement of students and faculty and close collaboration with alumni founders (see Box 3.4).

Box 3.4 Gründungsservice, the Entrepreneurship Centre of the TUB

Gründungsservice, the Entrepreneurship Centre of the Technical University of Berlin (TUB) started in 2004 as a first-stop-shop on the campus targeting students, research assistants, postgraduates and professors from all faculties. The objective is to group and increase existing entrepreneurship support activities as well as to enhance opportunity, recognition and the rate of entrepreneurship within the Berlin-Brandenburg economy. Alumni founders are employed as role models, mentors and partners the female entrepreneurs. Professors act as "entrepreneurship ambassadors" and mentors. The centre organises regular meetings with professors from all faculties to assess demands and interests for entrepreneurship support activities. The centre has 14 employees and has funding to continue until 2011. The annual budget of approximately EUR 1 185 000 (2008) is financed by the European Social Fund, the Berlin Senate Administration for Education, Science and Research and the Federal Ministry of Economics and Technology.

The Centre provides a wide range of services and activities, for example: *i*) workshops and lectures on "soft skills", entrepreneurial motivation and opportunity recognition; *ii*) "technology scouting" for researchers, *iii*) individual assistance with writing a business plan and accessing public financing schemes (EXIST), *e.g.* assistance for TUB participants in the Berlin Brandenburg Business Plan competition; *iv*) facilitation of team building and team coaching with Zentrum für Technik und Gesellschaft.

The centre also organises events and conferences, such as "Alumni Angel Abend" a pitch and networking event as well as a PR campaigns to improve female entrepreneurship. It also runs a 1-week Entrepreneurship Academy with TUB-Alumni founders and offers scholarships for professors of technical and natural sciences. Business incubation (pre-seed) facilities including 6 offices and 13 workstations with complete infrastructure are available free-of-charge for 12 months and PR campaigns to enhance women's entrepreneurship.

The centre has wide collaboration with a number of partners, including the TUB Alumni, Business Angels, TUB faculties and university institutes activity involved in business start-ups, external business support organisations, Berlin networks, the Technology Coaching Centre, colleagues in the rest of Germany and abroad, and organisations fostering women's entrepreneurship.

By mid-2009, 650 students had attended workshops and lectures offered by the centre, more than 360 persons had received counselling and 18 start-up teams had been financed . In addition, the entrepreneurship centre had introduced three entrepreneurship education modules.

Source: OECD (2009b), Universities, Innovation and Entrepreneurship: Criteria and Examples of Good Practice, OECD Publishing, Paris; and TUB (2010), Gründungsservice webiste, *www.gruendung.tu-berlin.de/192.html*, accessed 10 February 2010.

The universities of applied sciences have also established their entrepreneurship activities (see Box 3.5). Despite much activity, "*entrepreneurship education at Berlin city level is in an early phase of development, reflected in a small breadth and refinement of entrepreneurship education activities in the higher education institutions and a small proportion of students benefiting from them*". Currently, about 5-7% of the total student population have access to entrepreneurship education. Entrepreneurship education in Berlin include a number of challenges: *i*) lack of integration in the curricula; *ii*) low student engagement relative to the total student population; *iii*) limited selection of entrepreneurship courses with a focus on business plan development and the "how to" approach, and less on different forms of entrepreneurship; *iv*) limited teaching resources; *v*) a lack of incentives for faculty members; *vi*) weak connection between research and teaching; and *vii*) a lack of systematic assessment and evaluation of entrepreneurship education activities (OECD, 2009b).

Box 3.5 Location4Innovation at Beuth Higher School of Technology

Beuth-Higher School of Technology Berlin (BHT) has its own "Founders Shop" (Gründerwerkstatt) entitled Location4Innovation to help graduates of this university of applied sciences, but also from other higher education institutions in Berlin, start their own technology-driven spin-offs, It provides them with stipends of EUR 2 000 for up to 18 months, a office space, free lab facilities and assigns individual mentors who advise them beyond the initial 18 months.

The Founders' Shop offers seminars, workshops, and lectures on numerous business management, legal and social topics. All start-up teams are supported by experienced BHT professors and also by an extensive network of companies. The start-up academy is supported by the Berlin Ministry of Economics, Technology and Women and the European Social Fund.

Source: OECD (2009b), Universities, Innovation and Entrepreneurship: Criteria and Examples of Good Practice, OECD Publishing, Paris; and TUB (Technische Universität Berlin) (2010), Gründungsservice webiste, *www.gruendung.tu-berlin.de/192.html*, accessed 10 February 2010.

In order to improve entrepreneurship education, this report recommends that:

- Entrepreneurship education should be strategically anchored within universities, e.g. through assigning the president or vice-president to take over responsibility for the development of entrepreneurship education.
- Entrepreneurship educators should be incentivised and rewarded, e.g. by reducing the teaching load and providing soft incentives such as annual awards.
- Investments should be made in human resources for entrepreneurship teaching, e.g. through creating entrepreneurship professorship positions; developing linkages between research and teaching.
- Entrepreneurship courses should be progressively integrated into curricula and undertake outreach activities across faculty to increase take-up rates.
- Good practices between universities should be shared.
- Communication with local business hubs should be built up.
- A resource centre for entrepreneurship education should be set-up.[15]

The OECD Review Team encourages higher education institutions to step up their entrepreneurship activities in line with the recommendations of the OECD/LEED Review. It also recommends that the higher education institutions share good practices among themselves. Examples of higher education institutions collaborating with each other to boost graduate employment can be found, *e.g.* in Brandenburg where all higher education institutions have established a joint centre with the regional development agency in order to pool resources and gain critical mass (see Box 3.6).

Box 3.6 BIEM - The Brandenburg Institute for Entrepreneurship and SMEs

The Brandenburg Institute for Entrepreneurship and SMEs (BIEM) is the entrepreneurship institute of the regional development agency and nine public higher education institutions including universities and universities of applied sciences. BIEM was founded in 2006 as a registered non-profit organisation. It reinforces, complements and co-ordinates the entrepreneurship support activities offered by Brandenburg's higher education institutions by pooling resources and enhancing collaboration and exchange. BIEM helps to achieve the "critical mass" needed to realise projects with wide ranging impact. The annual budget of EUR 100 000 is financed by the European Structural Funds, the Ministry of Economics of Brandenburg and other project-related revenues. BIEM has eight employees. Each partner organisation runs additional projects and they employ additional personnel according to project needs or the overall management of an entrepreneurship institute/centre.

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

Higher education institutions have established "entrepreneurship location managers/animators" (*Standortmanager*), who act as "one-stop-interlocutors" for would-be entrepreneurs. This structure contributes to building stronger linkages between the university's internal and external support services and to integrating entrepreneurship education and start-up support services. Other projects include "Entrepreneurship ACs", that evaluate entrepreneurial potentials and learning needs before start-up and match them with adequate mentoring during start-up, "Team Competency Lab" that focuses on team building and coaching at the BTU Cottbus or "GO:Incubator" at the University of Potsdam.

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

Source: OECD (2009b), *Universities, Innovation and Entrepreneurship: Criteria and Examples of Good Practice*, OECD Publishing, Paris; and BIEM-Brandenburg (2010), Brandenburg Institute for Entrepreneurship and Small and Medium Sized Enterprises website, *www.biem-brandenburg.de*, accessed 10 February 2010.

Conclusions and recommendations

Berlin is a magnet for students from other parts of Germany and abroad. It has a rich tradition of higher education institutions' collaboration with industry and good track record in graduate entrepreneurship. The economic and social impacts of higher education and human capital development are well recognised. Berlin's strong science base, cultural industries and creative people provide considerable potential for new entrepreneurship.

However, the Federal-State setting in Germany creates undesirable conditions for higher education and research systems in metropolitan cities. The creative opportunities of metropolitan cities widely acknowledged in many economically advanced countries as well as in the metropolitan regions inside larger *Länder* in Germany, for example Munich and Cologne, call for new funding arrangements in German city states, notably Berlin and Hamburg.

The current extent of industry collaboration, widening access initiatives and entrepreneurship activities in Berlin are more the result of a bottom-up process, and not fully reflected in higher education policy and institutional set-up. In addition there are gaps in important areas including lifelong learning activities and addressing the needs of migrant populations and small and medium-sized enterprises. Berlin and its higher education institutions already have activities underway for the promotion of human capital and entrepreneurship. The OECD Review Team recommends that the chances for success can be increased if the following measures are taken:

- A holistic Berlin regional development strategy should be developed with measures opening up higher education to categories of the population largely left aside up until now, including mature students, students with lower socio-economic and/or migrant backgrounds, while also better addressing the training and research needs of small and medium-sized enterprises. The challenge is to ensure the pursuit of quality teaching while increasing access of a socially and ethnically diverse population to higher education and seeking to conciliate the pursuit of world class research with increased initiatives to answer the needs of small firms.

- A wider portfolio of robust data related to the regional context and with the situation of individual higher education institutions should be developed in Berlin to support evidence-based decision making at higher education policy and institutional levels. The most effective region-wide graduate labour market systems are based on the collection of comprehensive labour market intelligence, on-line publication of the data in a single place to improve students' ability to make rational

choices about their studies and to help graduates and employers to come together and increase students chances to moving into employment; and using the 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.

- Regional government, higher education institutions, other educational institutions and key stakeholders of the economy and society could agree on region-wide goals, policies and priorities concerning human capital development. For this purpose, higher education institutions and regional government could establish a higher education coordinating body to address pathways between higher education institutions and different levels of education. In particular, measures should be put in place to accommodate and encourage mobility within and between institutions by formal agreements, to help students move from one institutions to another, when justified.

- The Berlin Senate, higher education institutions, schools and the business sector should develop long-term efforts to increase the enrolment and success of students with migrant backgrounds. These efforts should build upon active outreach to schools by higher education institutions and existing successful models of effective support services for students, including both academic and social supports and experiential learning. Professors and researchers with an immigrant background should be recruited to enhance higher education institutions' image while offering role models for many young people. Higher education institutions proceeding to such recruitments should be rewarded.

- Incentive structures should be strengthened to encourage higher education institutions and their staff to engage in activities benefiting regional and local development and entrepreneurship activities. Discretionary funds should be established for supporting projects of various kinds of teaching-related activities which include interaction between the higher education system and the community.

- The labour market relevance of university education should be strengthened. In particular, systematic information could be delivered to secondary school graduates concerning sectors and careers with promising development in Berlin. Such an effort could be made in conjunction with job market analysis and the private sector.

- Higher education institutions lifelong learning activities should be strengthened. The education system should pay greater attention to the upgrading of competencies in middle-level education, for example by

realising innovative approaches for bachelors not transferring to master programmes and for the upgrading of training in areas statistically counted in Germany as tertiary education. Short-term programmes for adults in employment or searching employment could also be considered as an extension of vocational training or as specific courses offered by the applied universities.

- Measures should be put in place to accommodate and encourage mobility within and between educational institutions at different levels by co-ordinating and formulating formal agreements to enable students to move from one institution to another and recognition of prior learning and experience.

Notes

1. In analysing available statistical information, we have to bear in mind, first, that there does not exist any notion of "tertiary education" in Germany. Rather, official reports in Germany note three types of "higher education" (Hochschulen) – universities, universities of fine arts and music as well as Fachhochschulen (translated into English as "universities of applied sciences"). Only for the purpose of international data delivery, some sectors of advanced-level vocational training are counted as "ISCED 5B" (UNESCO) or "Tertiary Type B" (OECD).

2. The debate on the relatively high concentration of students in large cities in Germany is being misled by educational statistics that are sorted according to the *Länder*, but not according to smaller regions. Thus, reference to the high concentration of students is made in relation to city states (Stadt-Staaten, *i.e. Länder* that consist only of one or two major cities), *i.e.* Berlin, Hamburg and Bremen, while limited attention is paid to the high concentration of students in metropolitan cities within larger *Länder*, *e.g.* Munich in Bavaria, Cologne in North Rhine-Westphalia or Frankfurt in Hessen.

3. In the Federal Republic of Germany, expansion of higher education enjoyed political support only around 1970, while during the following two decades policy focus was on the alleged excessive numbers of graduates. In the Eastern part of Germany, the enrolment rates stagnated

from around 1970 to 1990, and were significantly lower than in the West at the time of German unification. Since the mid-1990s the policy debate has focused on two contradictory themes: "low" entry rates – predominantly with the view on developments in other economically advanced countries - and "high" numbers of graduates – predominantly to the views of a sizeable proportion of German employers, politicians and experts.

4. The low percentage among all new entrant students has been caused by the fact that the enrolment rate at universities in Berlin compared to the size of the population was substantially higher than the German average.

5. The corresponding comparative statistics collected by UNESCO, OECD and EUROSTAT, which have reported a study abroad rate for Germany of 4% in recent years, are not suitable to indicate the frequency of outward mobility because few countries make any distinctions between study abroad and outward mobility, and many countries do not register temporarily mobile students or do this incompletely.

6. Absolventenstudie 2008, Sonderanalyse. Befragung des Absolventenjahrgangs 2007 im Rahmen des Kooperationsprojekts Absolventenstudien unter Leitung des INCHER Kassel, HUB, Juli 2009.

7. Survey of 2007 HEI graduates in Germany, INCHER, Kassel, 2009.

8. Many students in *Fachhochschulen* have been awarded the *Fachhochschulreife* (entry qualification to universities of applied sciences) on the basis of completion of vocational training, but this is not registered as a-typical, special or "non-traditional" route to higher education.

9. Various large cities in Germany with high percentages of migrants do not show up here because they are not *Stadt-Staaten*: *e.g.* Munich, Stuttgart, Frankfurt, Cologne and various cities in the Ruhr area.

10. This is a first report on educational indicators by experts written on behalf of the Federal Government and those of the *Länder* (BMBF and KMK).

11. Up to 50% of pupils in many Berlin secondary schools have an immigrant background. In a few schools the rate attains 90%.

12. *Berlin-Brandenburger Bildungsbericht* 2007, Tab. D6-5: 291.

13. Formerly '*Technische Fachhochschule Berlin*', TFH.

14. *Leistungsberichte* 2008: 45.

15. The resource centre for entrepreneurship education could facilitate the exchange and discussion of pedagogical practices, innovative methods

and ideas amongst Berlin universities. Such a resource centre could: *i*) Gather pedagogical practices and material currently in use in Berlin and establish contacts to good practice initiatives overseas; *ii*) Create an information system of pedagogical practices and make it freely accessible for teachers, researchers, students and other organisations involved in entrepreneurship education; *iii*) Produce innovative and pertinent teaching material, including case studies, videos, games, course contents, syllabi, etc. and make it electronically available; *iv*) Provide training for teachers based on regional, national and international expertise; and, *v*) Organise regular events, also using on-line services, targeted at different and mixed audiences to enhance communication on, and exchange of, new and innovative approaches in entrepreneurship education (OECD/LEED, 2009).

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Chapter 4: Social, cultural and environmental development

Social, cultural and environmental developments underpin and stabilise economic growth and improve community health and welfare, social cohesion as well as clean, healthy and sustainable environment. They also provide an opportunity to transform challenges into assets for the benefit of the regional and local economy. This chapter will review the contribution of the higher education institutions to the City of Berlin's social, cultural and environmental development. It will illustrate how Berlin is making progress in becoming a laboratory and a global test-bed for innovation with respect to "green growth" and environmental sustainability, cultural industries as well as urban regeneration and integration of the migrant population. The chapter concludes with recommendations to capitalise on Berlin's accumulated knowledge and expertise in public transport and renewable energies, to boost interdisciplinary learning and research as well as entrepreneurship in cultural and creative industries, and to upscale the outreach activities of higher education institutions to Berlin's migrant population.

Introduction

Berlin and other global cities are well placed in transforming their social, cultural and environmental challenges into assets for the local economy. In the case of Berlin, innovations for example in green growth and environmental sustainability, cultural industries and urban renewal as well as integration of immigrant populations, will resonate beyond the city limits and will enable their diffusion on a global scale. The global city status provides Berlin with a gateway role and a platform through which it can highlight its successes and develop linkages with stakeholders in other cities around the world. Higher education institutions can potentially play an important role in all of these areas as sources of expertise, as generators of innovation and as providers of learning and skills (To learn more about global cities see Godfrey and Zhou, 1999; Beaverstock, *et al.*, 2000; Sassen, 1998; Smith, 2003.)

The Berlin Senate, the key stakeholders in Berlin and also higher education institutions are aware of the considerable assets and unexploited opportunities in social, cultural and environmental domains. The Berlin competence field strategy aims to stimulate cluster development for example in health, communication and media (which to a large extent encompasses cultural industries), transport systems and energy technologies. While networking in these fields is facilitated by the Berlin Senate, no considerable funding incentives have been introduced. The limited capacity of the Berlin Senate to match fund federal research initiatives reduces its attractiveness as a partner for research-intensive universities.

In the context of Berlin's competitive advantage in sustainable development, its diverse population, thriving cultural sector and eventually its uneven development within the city, this chapter examines:

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

4.1 Climate change, green growth and transportation

World greenhouse gas emissions have roughly doubled since the early 1970s. In the absence of change, global greenhouse gas emissions are projected to increase by more than 50% by 2050, causing a significant increase in world temperatures (OECD, 2009). Berlin is expected to warm by an average of 2.5°C. Climate change will have a material impact on the city and its surroundings. Berlin's water supply and sewage system as well as the agriculture, forestry, landscape planning and environmental protection will be affected. Following the advice from the Potsdam Institute for Climate Change Research (PIK), the Berlin Senate has developed strategies to adapt the city's infrastructure to the changes and to counter challenges of rising temperatures.[1]

Climate change is not only a challenge, but also an opportunity to develop a more resilient and sustainable economy and to boost green growth. It can bring forward positive developments for cities like Berlin, including increased efficiency in energy management, industrial production, spatial development, public and private transport, construction and operation of buildings and water management. Up-scaling the research and innovation effort may yield significant returns in local and regional development. Worldwide jobs related to renewable energy and energy efficiency are estimated to increase to several millions by 2030. Most of these new jobs will be concentrated in a small number of innovative regions. Despite the crisis, venture capitalists anticipate a continuous increase in their investments to boost sustainable development (Deloitte, 2009).[2]

The positive outcomes will, however, require concrete action to identify opportunities for change, to create innovations to make low-carbon technologies more attractive and develop skills to make wider use of green technologies. Berlin is in a good position to play a global role in green growth. The Berlin context, since reunification, has provided an opportunity seized by policy makers, higher education institutions, independent research institutes and the private sector, giving the city a leading edge in the strategic areas as compared not only to other German cities but to other global metropolises.

One of the challenges facing a reunified Berlin was the merging of two public transport systems that were separated for close to 30 years. In the past five decades Berlin's transportation infrastructure had to be redesigned and rebuilt three times amounting to complete refurbishing of lines and equipment, modernisation of junctions and rebuilding of major stations.[3] Environmental concerns have been integrated into transport design and planning to limit traffic congestion by providing a practical and efficient transport system and increasingly seeking ways to limit the carbon foot-print

of city transportation through innovative technical solutions and a different vision of mobility requirements in a dispersed city. This has put Berlin in the unique position among capital cities of having had to completely rethink its transportation needs and infrastructure, offering the opportunity of acquiring and developing new skills and know-how in a field that is crucial for sustainable urban development. As a result, the city region has acquired a leading advantage in transport systems and technologies, a sector whose services and products are now demanded by foreign markets.

Building on its competitive advantages and on its location, Berlin know-how is reaching out to other areas beyond public transportation including the automotive and aerospace industries and fast-developing logistics, and is Berlin also becoming a major transport hub (road, rail, and sea) between Germany and Eastern Europe.[4] The transport sector has a significant impact on the Berlin economy is important: around 50 000 people work in this area[5] where there are both big companies (Deutsche Bahn, Siemens, Bombardier) and approximately 1 000 innovative small and medium-sized enterprises (TSB FAV, 2008). The public sector scientific staff, in higher education institutions and research institutes in this sector is approximately 1 800 people, in addition to those in private companies.

Additional critical mass has been acquired through collaboration in a wider regional context. Co-operation with the Land of Brandenburg is well developed: the transportation system is inter-regional and the skills and production base is a joint one. Whereas many metropolises still face major transportation challenges, the Berlin-Brandenburg region can be considered as one of the urban areas in Europe with the most up-to-date transport infrastructure that will soon be completed with the opening of the Berlin-Brandenburg International Airport (BBI).[6]

The Berlin Senate has chosen transportation as one of the three priority strategic areas for its future development, working jointly with Brandenburg to promote the sector. The two *Länder* have agreed for this purpose on a cluster approach based on five Centres of Excellence: railway technology, road transport and automotive industry, intelligent transport systems, logistics and aerospace (for details see Annex 3). These five fields are brought together within a Master Plan for Transport and Mobility in Berlin and Brandenburg. The Technology Foundation Berlin (TSB), through its FAV[7] branch, is in charge of the strategic leadership of the Master Plan, in close co-operation with the Brandenburg Economic Development Board.

Among the universities, the Technische Universität Berlin (TUB), in Charlottenburg provides a foremost contribution to teaching, training and research in the different areas of transportation and logistics. Its Faculty V, "Transport and Machine Systems" comprises a wide array of specialised

technical departments, a "Technology and Society Centre" investigating transport behaviour,[8] the "European Telematics Factory" working with service providers and transport operators on management systems and solutions and an Institute of Land and Sea Transport Systems" (ILS).

The Technical University of Berlin (TUB) is also developing models of process chains starting with fossil and renewable energy carriers and their conversion to handling the resulting pollutants. Research is carried out with respect to transport in global metropolises, transportation concepts in New Towns and climate change, bicycle, pedestrian and barrier-free mobility. TUB is also active in teaching and researching transport planning as well as the development and operation of road systems in urban and rural areas. Humboldt University is partner to a project called DELIOS or "Decentralised systems for traffic lights based on optical traffic data acquisition and traffic volume dependant control" which aims to develop flexible traffic management.[9]

Transportation and environmental issues are also increasingly linked to energy efficiency and research on renewable energy sources. As a result the Berlin Senate decided in November 2008 to add the energy sector to the existing fields of competence, with a common strategy for Berlin and Brandenburg having been devised. This strategy is structured around five themes: photovoltaic research and production; electricity transportation and network co-ordination; turbo machines; energy efficient technologies and renewable energies (TSB FAV, 2008). This new field of competence is able to draw on the experience developed in this area by different organisations, higher education institutions and companies. The Berlin Science Park Adlershof plays a key role through its leading edge research and the presence of high-tech spinoffs which have attracted businesses to the park for example in the field of solar technology.

Policy advice on climate change and sustainable development is provided by the Potsdam Institute for Climate Impact Research (Potsdam Institut für Klimafolgenforschung), known as PIK, which brings together researchers in the natural and social sciences. PIK is well linked locally, regionally and internationally and collaborates with the Berlin and Brandenburg universities, via joint research programmes and appointments. As a member of the European Climate Forum, the institute has a direct and regular exchange with top level decision-makers in the fields of business, politics and civil society. It has recently published, at the request of the Berlin Senate, a study about the probable impact of climate change on Berlin over the next 45 years, suggesting policy responses (PIK, 2009).[10]

In the last few years, there has been an increase in multi-disciplinary research programmes on environmental solutions promoted in partnerships

by different universities, despite the pressures from a competitive funding system. Collaboration among higher education institutions increases the critical mass, allows shared use of research equipment and efficiently pools the risk of pursuing uncertain research programmes. The collaborative projects tend to emerge around research areas of immediate relevance for the local environment. For example, "the Berlin Urban Ecology Research Project"[11] was launched in 2002 by three Berlin universities and two non-university research institutes, including the Helmholtz Research Association, and is being carried out in collaboration with French and US universities in three phases until 2011.[12] The aim is to optimise strategies for urban ecology with a focus on the quality of life for city dwellers (Graduiertenkolleg Stadtökologie, 2009). Scenarios take into account climate change, demographic and economic developments and their impact on nature and the environment in metropolitan areas and see Berlin as a living "laboratory" for research. The project involves active participation of doctoral students through scientific workshops, interdisciplinary conferences on urban ecology open to the public, lectures and publishing projects. These have also involved cross-cutting projects like urban geo-data management in co-operation with the Berlin Senate or projects with city administrations. For example an interdisciplinary teaching project on the City and the environment was launched in 2004 in co-operation between the Berlin Office of Municipal Sanitation and the environmental psychologists of the Berlin urban ecology project. The goal was to find out more about people's perception of and preferences for "cleanliness" of urban spaces, streets and parks (Sukopp and Wittia, 1998).

The effectiveness of the HEI-government partnerships for addressing climate change will depend on how the higher education institutions liaise with the industry and civil society. Collaborative platforms for eco-innovation can bring forward a more efficient exchange of information, reduce duplication of efforts, wider and more rapid adoption of new technologies by local industries. A challenge is also how to facilitate collaboration between higher education institutions and small and medium-sized enterprises to boost green growth.

Some higher education institutions in Berlin have already taken steps to engage in industry collaboration. These initiatives are mostly driven by individual departments or institutes and lack institution-wide support and collaboration with other higher education institutions, revealing under-utilised potential. For example, the Institute for the Promotion of Agricultural and Urban Ecological Projects (IASP), is located in Humboldt University Department of Agricultural and Urban Ecology which mainly cooperates with small and medium-sized enterprises in order to turn innovative research approaches into marketable products. Research focuses

on retrieval of biologically valuable material; non-food products from renewable resources; process development for exhaust air as well as regional development concepts for rural areas. IASP is also well known as an expert in tram track greening. In the universities for applied sciences, the Institute for Resource Conservation, innovation and Sustainability (IRIS), at the Hochschule für Wirtschaft und Recht (University for Economy and Law Studies Berlin), HWR, focuses its research and counselling activities mainly on firms in the region. Its new research and transfer programme called "Sustainable Economic Development in the Region" is conducted in co-operation with regional firms to enable these companies to develop their business processes and products in a sustainable way. It is co-financed by the European Social Fund and the Senate of Berlin for a three year period.

Targeted innovation vouchers could enable small and medium-sized enterprises in green industries to collaborate with higher education institutions by submitting research questions to them. This type of voucher has been successfully used for example in the Netherlands. Berlin could also learn from the positive experiences of Knowledge Transfer Partnerships in the UK. These networks are established and funded jointly by government, industry and the academia. They bring together organisations and provide activities and initiatives that promote knowledge exchange and innovation. Knowledge Transfer Partnerships in the field of eco-innovation have been initiated by the regional development agencies. A recent review showed that 75% of business respondents rated these services as effective; 50% developed new R&D and commercial relationships with people met through these networks; and 25% made a change to their innovative activities as a result of their engagement within networks (OECD, 2010).

The development of a "greener economy" in Berlin and Brandenburg will depend on the availability of skilled labour to fill the new jobs. Due to significant changes in the profiles, tasks and work methods of employees in traditional occupations, extensive retraining and upskilling is necessary. At the same time, there is also a need to develop a diverse set of skills ranging from vocational to higher level. At the time of the OECD review it was unclear to what extent Berlin and its educational institutions are prepared to face this challenge. Nevertheless, skill creation for green jobs could be more efficiently organised by pooling learning resources of educational institutions and industries in Berlin and enhancing pathways among institutions.

The sustainable development of transportation and environmental activities in the Berlin and Brandenburg regions benefit from the strong contribution of higher education institutions to R&D in these fields. Policy initiatives aim to further develop the wider area of transportation with its different components as well as renewable energies, while fully integrating

environmental concerns. The specific Berlin context since reunification has provided an opportunity that has been capitalised on by policy makers, higher education institutions and the private sector, giving the city a leading edge in strategic areas as compared not only to other German cities but to other global metropolises. This accumulated know-how and wealth of experience makes Berlin a "living laboratory", particularly in the area of public transportation and, increasingly, also renewable energies opening significant global market opportunities particularly in view of the ongoing challenge of climate change. The challenges in this domain include avoiding duplication and fragmentation of efforts, facilitation of industry-university collaboration and developing skills for the "green jobs".

4.2 Cultural and creative industries

Berlin has a strong image as a creative city and an "Unfinished City", which today can be compared with New York in the 1960s and 1970s. In many ways Berlin is the "New York of Europe" when it comes to the importance of creative industries, the range of the cultural scene and the presence of artists and creative talents (Florida, 2002). It has a vibrant cultural scene with theatres, operas and concert halls where world class ensembles perform. The city has a claim to be number one in Europe for film production attracting international productions. Berlin could also claim to be the art capital of Europe with a large number of art museums, galleries and as home to artists from all around Europe. This can be attributed to the rich cultural scene, low-cost housing and low living costs and the "people climate": openness, diversity and multi-ethnicity.

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. In 2005, Berlin had more than 22 500 creative enterprises, mostly small and medium-sized enterprises. Their total turnover was more than EUR 18.6 billion, making up about 20% of Berlin's GDP. With nearly 170 000 employees, including freelancers and independent contractors, the creative industries are important to Berlin's job market (Lange *et al.*, 2008). Also many activities of the R&D division of Deutsche Telekom can be classified as part of the creative industries.

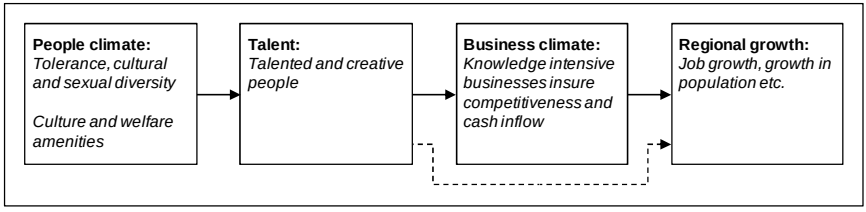
At the same time, the cultural and creative industries face industry-specific challenges and difficulties in framework conditions. Although the

number of employees liable for social insurance increased in Berlin between 2006 and 2007 by 5.3% (4 106 jobs), the national trend shows that the cultural and creative industries will not drive the creation of "traditional" jobs. The expansion of activities in cultural and creative industries are 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 struggling 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.[13] Micro-entrepreneurs and small and medium-sized enterprises face specific challenges in growing their business 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.

Cultural and creative industries also contribute to the growth and development of Berlin in an indirect way, 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).[14]

In terms of talent attraction Berlin should do well. According to a poll taken by the Hubculture website, Berlin is ranked high in the Zeitgeist-metropolises among the influential creative personalities worldwide. Globally, the city came second just behind Los Angeles in 2007 and again in 2008, making it Europe's number one city for creativity. Berlin's attractivity is likely to increase with the new Berlin-Brandenburg International Airport. Partly due to foreign talents moving in, Berlin's population is now starting to grow.[15] In addition to talent attraction, there are also promising signs of companies relocating in Berlin. The most notable example is Deutsche Telekom's decision to relocate its R&D department from its headquarters in Bonn to Berlin. This decision was partly based on the view that it would be easier to recruit global talents in Berlin than in Bonn. Of the 150 researchers employed by its R&D department, a third comes from Germany, a third from other European countries, and a third from outside Europe. Another example is the publisher Suhrkamp's move from Frankfurt to Berlin.

Figure 4.1 Schematic line of argument of the creative class approach



Source: Adapted from 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.

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 (see Figure 4.1). The Berlin Senate is aware of the assets and opportunities in the cultural and creative fields and 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 (Lange *et al.*, 2008). 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 subsectors. The goal of the Steering Committee is to increase and enhance the knowledge exchange and co-operation 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.

In recent years, 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.

Higher 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 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 Co-operative 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 (see Box 4.1).

Box 4.1 Berlin universities of applied sciences contributing to creative industries

The Berlin higher education institutions provide a wide range of relevant study programmes for both "creative professionals" who work in management, business, finance and legal issues, health care etc., and in the so called 'creative core' i.e. those working with computers, architecture, arts and science and education. In addition, the higher education institutions offer dedicated studies in performing arts, for example jazz courses by the Jazz Institute Berlin (JIB) and contemporary dance courses by the Co-operative Dance Education Centre.

The Jazz Institute Berlin was established in 2005 through a fusion of the jazz departments of the Berlin University of the Arts (UdK) and the Hans Eisler College of Music. This bundling of capacities has enhanced the institution's status in the international creative scene. The JIB strives to assist each student to find his/her own artistic identity as a jazz musician. The JIB provides individual free spaces that allow for exchange of attitudes and ideas. In addition to musical knowledge of diverse cross-cultural variety, international networking offers students important professional points of contacts. The Berlin Jazz scene and the music industry benefit from the JIB. In the Winter semester, the JIB moves into its own building on Einsteinsufer which was renovated with European Union funding. Its centre piece is a concert hall that seats 300 guests. There is also a professional sound studio with excellent acoustics, rehearsal rooms and a café.

The Co-operative Dance Education Centre, created in 2006 at the initiative of the Berlin Senate, a collaboration of the Berlin University of the Arts and the Ernst Busch School of Performing Arts integrates education and vocation in contemporary dance and choreography. The centre is financially supported by the Berlin Senate, the Foundation for Cultural Training and Consultation as well as Tanzplan Deutschland. This approach and form of institutional anchoring has been nationally recognised as a model for art education.

The Berlin University of the Arts (UdK) offers a non-consecutive postgraduate Masters programme 'Art in Context' directed at people who seek to position their artistic work in the context of society. The "Art in Context" Programme was first established in 2002 and offers four specialisations: artistic work with social groups, artistic work with cultural institutions (including art museum studies), artistic work in public space and artistic work in the context of media and academia. The institute has 70 to 80 students of which 60% are non-German, and almost three-fourth female. The institute cooperates with different partners, such as museums, city institutions and private organisations.

Source: Schreiterer, U. and L. Ulbricht (eds.) (2009), "The City of Berlin, Germany Self-evaluation Report" OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/30/10/43942109.pdf*; and SenWTF (Senatsverwaltung für Wirtschaft, Technologie und Frauen) (2008), *Creative Industries in Berlin: Development and Potential*, SenWTF, Berlin.

Although the level of qualifications and training of professionals in art and culture is at a high level, there are a number of challenges. Further education opportunities do not currently meet the needs of the diverse sector. There is a growing requirement to keep expertise up-to-date, especially for freelancers involved in creative professions. There is also a need to provide entrepreneurial education since a large number of graduates become self-employed. Moreover, education courses for creative industries should become more multi-disciplinary and ICT-based. Initiatives are on the way to improve the situation, for example all art schools offer seminars on how to start a business and a career and transfer service centre has been established in the Berlin University of Arts (UdK) (see Box 4.2).

Box 4.2 Career and Transfer Service Centre of the Berlin University of the Arts

The Career and Transfer Centre (CTC) was established in 2001 as the first career centre developed from a German institution of art education. It provides information and counselling to students and recent graduates of the Berlin University of the Arts (UdK), The Berlin-Weissensee College of Arts, the Hanns Eisler College of Music and the Ernst Busch School of Performing Arts. Students receive counselling regarding their career options and self-employment opportunities, The CTC also works to expand the professional competencies acquired during the studies to include personal, social and methodological competencies. CTC offerings take into account the changing environment in the cultural industries. Since the CTC's founding more than 4 000 artists have participated in over 380 workshops covering the areas of marketing; financing and public support; skills portfolios; patents and trademark law; social security for professional arts and crafts workers; taxation; contracts and negotiations and presentation techniques. The CTC activities are co-financed with contributions from the European Social Fund.

However, the experienced, older and self-taught professionals are not the target audience for the career centre, while further education courses in the private sector are often expensive.

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

Cultural and creative industries are becoming more R&D-based which calls for greater collaboration in the field. This trend is evident for example in game software and new media. In Berlin the development is led by the Technical University of Berlin and the Berlin University of the Arts which collaborate, integrating computer design with style and fashion. Other examples include the media programmes at Humboldt University and the

Free University. There is a growing need for co-operation between creative industries, art schools and technical universities. Collaboration is, however, often constrained by differences in institutional cultures and regulations linked to accreditation, etc. In practice, launching new educational programmes can be both time-consuming and cumbersome. In addition, the fact that only universities, not universities of applied sciences, are allowed to award doctoral degrees can constrain the possibilities for art and technology working together. In Berlin, one attempt to overcome the constraints is the PhD programme for practical artists initiated by the Einstein Foundation and placed at one of the art schools. International examples to boost interdisciplinary collaboration in creative industries come from Finland with the new Aalto University established in 2010, and Copenhagen where a dedicated IT-university combining art and ICT was established in 1999. The creation of the Aalto University has coincided with the new university legislation removing the constraints for more business-oriented management of universities (see Box 4.3).

Box 4.3 Aalto University in Finland and IT University of Copenhagen, Denmark

Aalto University in Finland was founded in January 2010, when the Helsinki University of Technology, Helsinki School of Economics and University of Art and Design Helsinki were merged as a flagship project in a national shake-up of higher education. It is a university, located in Espoo and Helsinki, where science and arts meet technology and business to create a multidisciplinary, integrated seedbed for innovation. The university has been named after Alvar Aalto, Finland's pioneer designer and architect, but its working title was "Innovation University".

The creation of Aalto University is part of university mergers in Finland which concentrate funding and academic efforts. At the same time, the new university legislation has introduced more efficient, more business-dominated governance for universities and more freedom for institutions to raise money from outside sponsors. In addition, university professors' status as civil servants has been abolished. The Aalto merger has had its critics: opposition politicians and other regions have feared that the Aalto University will attract a disproportionately large proportion of both state and external funding (EUR 318 million per year). The merger is providing a regional hub which has also received international recognition. Recently, the EU Committee of the Regions selected the region of Helsinki-Uusimaa as the European Entrepreneurial Region (EER) for 2012. The EER award recognises areas with credible plans of action to promote entrepreneurship with realistic foresight and outstanding political vision.

Box 4.3 Aalto University in Finland and IT University of Copenhagen, Denmark (continued)

The government, academics and Finland's business community, which is strongly represented on Aalto University's board, hope to capitalise on the country's record in industrial and product design. The aim is to create an internationally competitive, business-focused higher education institution that takes inter-disciplinary working to an extreme. The three founding universities all have excellent records in graduate employment rates and close links with companies. The university board is, however, steering the faculty towards new contents and expansion of masters and other postgraduate degrees. Students' learning will be increasingly organised through project-based, problem-solving study in co-operation with professionals from different fields. Three interdisciplinary factories, Design Factory, Media Factory and Service Factory, are already in operation. In addition "Aalto Entrepreneurship Society" was established by students and is now operating within the Design Factory.

The IT University of Copenhagen was founded in 1999 as the IT-university college (Höjskole), but changed its name in 2003. It aims to transform Denmark into a world leading nation with regard to value creation by exploiting information and communication technologies. Today, IT University is producing more IT graduates than any other Danish university. IT University is an independent higher education and research institution, dedicated to the digital world ranging from games and communication to business and software development. The university has a strong research environment including a comprehensive PhD programme which is one of the largest in Denmark. It offers a variety of full time research based study programmes as well as part time and individual courses within the field of information technology.

The IT University also offers a broad range of study programmes. More than 1 500 students are attending the various programmes at the university, including five fulltime two-year Master of Science in Information Technology; three part time Master courses in Information Technology; and one part-time graduate diploma course in Information Technology.

Source: Aalto University (2009), University's website, *www.aalto.fi/en/*, accessed 12 February 2010; ITU (IT University of Copenhagen) (2009), "About the IT University of Copenhagen", *www1.itu.dk/sw489.asp*, accessed 4 January 2010.

Berlin is a magnet for many students, researchers and artists from other parts of Germany and abroad, with direct impact on the regional economy. The city is a clear leader in cultural and creative industries which form a pillar of its economic development and future prosperity. The Berlin Senate has excelled in cluster development and networking in the cultural and creative industries. The positive experiences in the cultural and creative

industries should be celebrated and disseminated to other clusters. Challenges in this domain include the facilitation 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 higher education students and graduates.

4.3 Integration of migrant populations

Berlin has a significant foreign born (14%) and immigrant background population (23.8%) which include both highly skilled and unskilled people. The city's open-mindedness toward different cultures can help it in global talent competition. For this to happen it is necessary to take active measures to fight social and cultural exclusion of migrant populations. As noted in Chapter 3, widening access to higher education is one of the broad policy goals pursued by the Berlin Senate. It means reaching out to a large population segment that is characterised by lower German language proficiency, lower secondary education attainment, high unemployment and often poor living conditions in one of the Berlin's distressed urban areas.

The participation rates of people with immigrant background in higher education are low and the access to higher education in Berlin is becoming more and more restrictive. This competitive environment limits access of Berliners with immigrant background to higher education institutions as they usually do not present the necessary secondary schooling grades that would ensure entry into the higher education system. In addition, the attrition rates for people with immigrant backgrounds may also be higher as they are often less well-prepared for higher education, because of insufficient mastering of the German language and difficulties stemming from their socio-economic condition.

Some higher education institutions have programmes addressing the needs of immigrant students and/or geared towards cross-cultural issues. Overall, as the number of student places in Berlin will continue to increase over the next funding period starting in 2010 and that funding is linked to headcount for each individual higher education institution, there is great untapped potential for acquiring more students right in the heart of the city. 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 (see also Chapter 3).

Given the nature of Berlin as a global city with a high proportion of immigrants, it would be expected that Berlin's higher education institutions would excel in the study of immigration, integration and the metropolis. An

example of a successful initiative can be found in Amsterdam, where the University of Amsterdam's Institute for Migration and Ethnic Studies (IMES), and the Amsterdam Institute for Metropolitan and International Development Studies (AMIDSt) engage 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 Berlin where individual academics and/or departments are taking new steps to address Berlin's immigration experience in that direction, often inspired by simple considerations of equity. It is, however, unclear to what extent the higher education institutions in Berlin have perceived the opportunities of making Berlin a 'living laboratory' for their research in this domain (see Box 4.4).

Box 4.4 Berlin higher education institutions reaching out to migrant communities

Humboldt University (HUB) Institute of European Ethnology[16] originates in the former Institut für Volkskunde created during the German Democratic Republic. Now part of the "Faculty Department of History and Philosophy", the "Department of European Ethnology" covers folklore studies, ethnology and history. The department carries out research in these fields and educational activities in European Ethnology at the master degree level. The department participates in the PhD programme "Comparison of societies" which is a joint activity of the sociologists, ethnologists, and historians of Humboldt and Free universities. About 600 students are enrolled at the Institute of European Ethnology. The teaching staff is comprised of 20 lecturers, of which twelve are permanent. Students and researchers examine in particular the construction of ethnic identities and the cultural effects of economic globalisation. Finally, Humboldt University has also recently launched a German-Turkish Master's Programme in Social Sciences and even plans to open a German University in Istanbul.[17]

Berlin's universities of applied sciences have improved the participation in higher education of the migrant population. Hochschule für Wirtschaft und Recht (School of Applied Sciences for Economy and Law), HWR, started a mentoring programme for female students with a migrant background in 2008. The aim was to provide this group of 20 with special support during their studies and especially during the difficult transition into employment. From 2009 on the programme has been extended to male students, bringing up total enrolment for the second year to 35. .

Box 4.4 Berlin higher education institutions reaching out to migrant communities (continued)

The groups are accompanied throughout their studies, their employment search and their first steps into the labour market by a group of women organised in ZONTA, an international professional women's NGO. The women of the Berlin branch of ZONTA engage as mentors for the students and the first experiences are very positive, as reported from both sides. The mentoring project, developed and accompanied by professors in the Fachhochschule für Wirtschaft in Berlin[18] (Berlin School of Economics), FHW, and administered by the HWR's career service is mainly funded via the Berlin Master Plan for Higher Education. The responsible agents in the career service work on extending the number of mentors on the basis of a collaboration with the "Berlin association of merchants and industry" (Verband Berliner Kaufleute und Industrieller). The programme has also proven attractive for employers: the Berlin branch of a big international corporation has recently joined the programme. HWR also runs an evening Programme for Business Founders, particularly targeting migrant entrepreneurs, with 30% of its students at the bachelor level.

Alice Salomon Hochschule (ASH)[19] geared by mission towards social concerns and societal issues is developing cross-cultural approaches in different programmes. It offers a master's degree in Intercultural Conflict Management, an international programme taught in English designed to bring students from a variety of backgrounds together to facilitate cross-cultural learning experiences. Students are provided with an overview of challenges faced in multicultural societies, developing comprehensive intercultural skills and the ability to work in a multi-ethnic environment. The programme emphasises conscious self-perception and cultural awareness and develops students' practical skills in intercultural communication, mediation and conflict resolution in the application of human rights. Another Master's degree offered by ASH (with the Moscow University of the Humanities) is in the field of "Intercultural Social Work". It targets the second largest immigrant group in Germany that comes from the former Soviet Union. The Master programme fosters bilateral co-operation in social work and improves intercultural skills of students in both countries, spending half of their studies in Berlin and half in Moscow. Students are taught in Russian and German

Alongside these programmes, there are different initiatives, often *ad hoc* and driven by enterprising academics, students or departments to reach out to people with an immigrant background. For example, Alice Salomon Hochschule promotes social work careers in secondary schools in distressed urban areas of Kreuzberg, Mitte and Neukölln with a project involving eight students who act as "ambassadors". There are increasing needs for healthcare personnel with immigrant backgrounds in Berlin, as at least one

third of patients in Berlin's hospitals are also from immigrant families, entailing specific care or language requirements. The Faculty of Philosophy of Humboldt evaluates the results of teaching Latin in a Neukölln high school, showing that these immigrant pupils improve their German language skills. Students of the Technical University Berlin collaborate with the Berlin University of the Arts in the "Street Lab" in Neukölln to reach out to migrant children with the help of modern media. This initiative combines the key elements of Berlin higher education institutions' outreach activities in addressing the needs of the migrant population: the project is small in scale, it has a small budget and it is carried out by enthusiastic volunteers (see Box 4.5).

Box 4.5 Technical University of Berlin (TUB) and mobile technology "Street Lab"

Technical University of Berlin within its Telecommunications Department, is running a joint masters programme with the Berlin University of the Arts (UdK) linking design and ICTs (information and communications technologies). It includes a Street Lab which aims to understand young people in an urban context through experimental and human-centred design research. To enable the research about authentic experiences in daily life, the laboratory was "moved" onto the street, combining a semi controlled environment with a situation of permanent field research. Street Lab focuses its research on heterogenic urban neighbourhoods and looks on how to employ mobile ICT to facilitate creativity, understanding and sustainability.

In 2009 a group of design students took the initiative to establish a future laboratory for mobile communication in Neukölln in Berlin. In a month, researchers and designers collaborated with children, aged 6 to 16 years, mainly from immigrant backgrounds and some handicapped. This Street Lab connected play and music in the design of mobile technologies. The contents of 20 workshops ranged from "Handy-Hacking" where old mobile phones were rebuilt, to "Traum Handy" ("Dream Handy") were children developed new ideas for mobile technologies. Children were encouraged to freely express their ideas concerning the mobile communication of the future, designing handsets that would integrate their life-styles.

Some of the ideas developed by children are now being further developed by a company that is sponsoring the master's programme (Deutsche Telekom). The outreach has also raised aspirations for higher education among children who might think of university studies in a specific field (design, technical), simply because the institution reached out to them in an informal way.

Some higher education institutions in Berlin have taken concrete action to reach out towards people with immigrant backgrounds. 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 since such efforts can produce results only over a long time period. In addition to up-scaling 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, such as 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. One way of mobilising Berlin higher education institutions to answer the needs of the migrant population in a more systematic way could be through a neighbourhood management programme which provides a well developed framework for community development in the city.

4.4 Neighbourhood management in Berlin

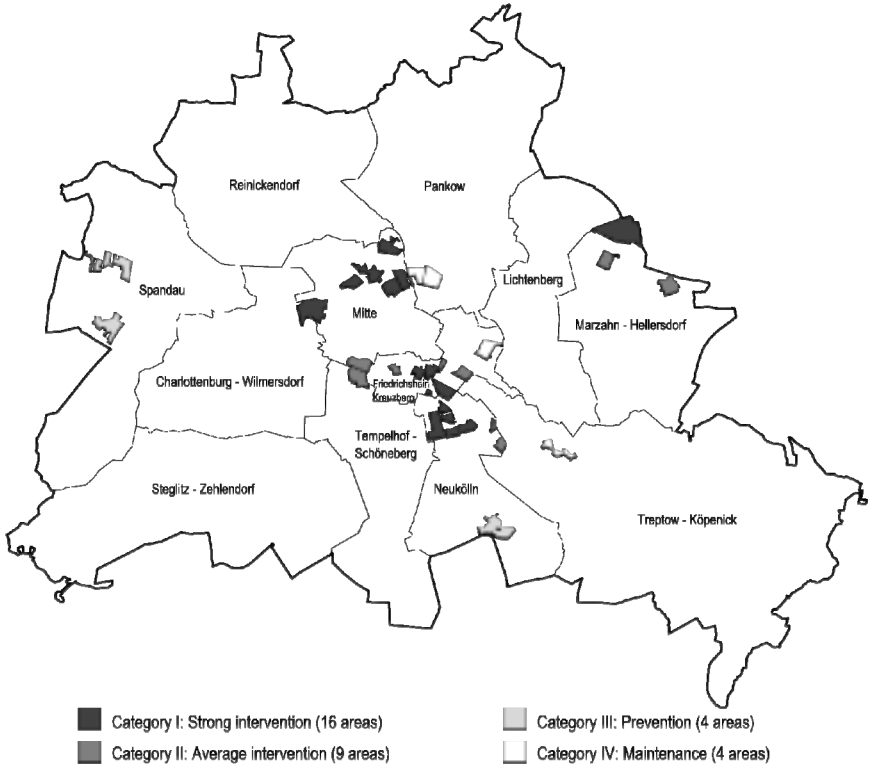
One of the major components of the German "Social City Programme" is *Quartiersmanagement* (Neighbourhood Management), co-financed by the Federal government and the *Länder*, with an EU contribution of around 30% from the Regional Development Fund.[20] The programme, now in its tenth year, involves 35 active city areas, mostly in central Berlin[21], as compared to just 15 at its inception (OECD, 2003). Each area is classified into one of four categories (see Figure 4.2) 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), the smallest with 8.5 ha and the largest 248 ha. At the end of 2008 there were 400 000 inhabitants in these neighbourhoods, around 10% of Berlin's population, the smallest comprising less than 3 000 inhabitants and the largest, 24 000 inhabitants. Whereas the Berlin average for foreigners is of 14%, in these neighbourhood management areas, it reaches 28.74% to which an estimated 15% of Germans with immigrant background can be added. The number of inhabitants in these areas living on transfer payments reaches 36.33% (Berlin average 19.83%).

The principles of neighbourhood management rest on a few basic assumptions. First of all, neighbourhood inhabitants know best what is important and what needs to be decided. This means that local people, organisations, small and medium-sized enterprises and civil society are to be empowered so as 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. 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").

Figure 4.2 Map of neighbourhood management areas in Berlin

As of February 2010



Source: SenStadt (Senatsverwaltung für Stadtentwicklung) (2009), Neighbourhood Management website, *www.stadtentwicklung.berlin.de/wohnen/quartiersmanagement*, accessed 18 June 2010.

The Berlin higher 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. Individual academics and departments take part in monitoring and evaluation.[22] Neighbourhood management teams and the District and Senate administrations provide internships for students from different Berlin higher education institutions. Neighbourhood management is also a subject in seminars and academic gatherings.[23]

Bildung im Quartier (BIQ) ("Education and training in the neighbourhood") is one of Berlin's five local regeneration projects implemented through the Neighbourhood Management Programme and co-funded by the European Regional Development Fund for 2007-13. The aim is to enhance through local initiatives learning and training outcomes and to help identify and realise local innovation potential. The activities are targeted to direct education and training infrastructure to local needs and future perspectives. This includes the establishment of new governance and co-ordination mechanisms, such as local education and training networks. BIQ's approach is holistic: child daycare facilities and schools are working together with other training providers and local government in developing new pedagogical forms of teaching and learning, and in opening the education and training offer to people living in the neighbourhood. BIQ would provide an opportunity for much stronger engagement by Berlin higher education institutions through applied research, work-based learning and work opportunities for graduates.

Besides involvement of higher education institutions in the various neighbourhood management activities, three universities of applied sciences can play a potential important role by their location. Oberschöneweide, in former East Berlin where the Hochschule für Technik und Wirtschaft, HTW, is now situated, is no longer a neighbourhood management area, not only because of the success of the projects themselves, but also because HTW is locally providing information as well as educational and training opportunities to potential local students but also to small and medium-sized enterprises. For the same reasons, other distressed urban areas like Sparrplatz in Wedding (Beuth-Hochschule für Technik) and Hellersdorf Promenade (Alice Salomon Hochschule) profit from the presence of these universities of applied sciences. With the exception of highly engaged Alice Salomon Hochschule, it is, however, not clear to what extent the universities of applied sciences are involved in active community development in these areas. More generally, besides direct participation in neighbourhood management programmes and related career topics, higher education institutions could draw on the wealth of experience concerning immigration issues in these parts of the city that could be considered as living

laboratories for social and action research. Conversely, this work could benefit city development more directly provided that better knowledge sharing was in place. Currently, limited collaboration experiments exist between different higher education institutions and much more could be done to increase the scale of interventions.

Conclusions and recommendations

Higher education institutions play a valuable role in facilitating social, cultural and environmental development in Berlin. They contribute with research and education to the sustainable development of the city, its urban regeneration as well as cultural vibrancy and creative industries. They provide significant contributions to local development by bringing in training for social services and creative industries as well as the knowledge required for the analysis and evaluation of e.g. the climate change, globalisation and ethnic identities and the impact of neighbourhood management. Faculty and students are engaged in outreach activities.

However limited resources are spread thinly. 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 higher education institutions and between higher education institutions and their stakeholders to build capacity and foster joint efforts for regional development remain limited in scope and representation. In spite of broader initiatives such as the competence fields and clusters, the picture of the diverse programmes and projects with participation of higher education institutions is one of fragmentation built on non-co-ordinated initiatives. Finally, there is considerable under-utilised potential in terms of addressing the needs of migrant populations and distressed urban areas as well as in generating green growth.

Berlin has significant activities underway for the promotion of the cultural and creative industries, green transport and renewable energies with high hopes for success. These successes need to be better co-ordinated, institutionalised and profiled, within and beyond Berlin and on a European and global scale. To continue to deepen the higher education institutions' contribution to the social, cultural and environmental development in Berlin the OECD Review Team recommends:

- A systematic exchange of information and experience should be put in place between higher education institutions in terms of environmental sustainability, urban regeneration and integration of migrants, and cultural industries facilitated by the Senate and clusters around the competency fields. This would 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 higher education institutions. Such a forum could organise thematic events, with regular information retrieval and exchange facilitated by a dedicated website. As a first step, higher education institutions' current connections, initiatives and projects involving stakeholder collaboration, community development and/or outreach should be mapped and published in the collaborative platform.

- In view of climate change, Berlin should capitalise on its accumulated know-how and wealth of experience in public transportation and increasingly promote renewable energy openings into global market opportunities. Higher education institutions and industry collaboration should be enhanced, for example through targeted innovation vouchers for small and medium-sized enterprises. Collaborative platforms for eco-innovation, for example in the fashion of Knowledge Transfer Partnerships in the United Kingdom, could bring forward more efficient exchange of information, reduce duplication of efforts, enhance adoption of new technologies by local industries. Skill creation for green jobs should be more efficiently organised by pooling learning resources of educational institutions and industries in Berlin and Brandenburg and providing flexible pathways between educational institutions.

- In cultural and creative industries Berlin 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 higher education sectors and different institutions should be encouraged through reducing bureaucracy and encouraging the establishment of joint institutes, departments and institutions.

- Berlin should, in collaboration with higher 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. In addition to scaling up efforts to widen access to higher education, higher education institutions should also reach out and empower the migrant population to address their own challenges through community development programmes. One way of mobilising higher education institutions in this domain could be through Berlin's Neighbourhood Management Programme in areas with a high

proportion of migrants and people on transfer payments. Higher education institutions should be mobilised to better support the Quartiersmanagement activities, such as Bildung im Quartier (BIQ) ("Education and training in the neighbourhood"), and through targeted action research on Berlin's immigration experience and ethnic entrepreneurship programmes.

Notes

1. The plans include adapting the management of the sewage system to a lower water level, and implementing measures to guarantee water quality, promotion of the culture of plants which are robust and adapted to a dryer environment, promotion of a diverse plantation variety of tree species and the minimisation of human interference in the tree population and extension of existing protective areas and installation of new ones.
2. Deloitte's 2009 survey on Global Trends in Venture Capital reports that, despite the crisis, 63% of surveyed venture capitalists anticipate an increase in their investment in clean-tech.
3. Berlin's transportation infrastructure had to be redesigned and rebuilt three times: in the post-war years, after the division created by the Wall and then over the last 20 years.
4. Rudolf Diesel pioneered the diesel engine in Berlin and today the region provides services, products and components for the automotive industry.
5. Most employment in this area is in Berlin but no breakdown of figures between the two *Länder* is provided in the 2008 Transport and Mobility in Berlin and Brandenburg report, published by TSB FAV. Figures for each Centre of Excellence are from the same report.
6. BBI: Berlin-Brandenburg international airport, extension and modernisation of Schönefeld airport.
7. FAV: *Forschung und Anwendungsverbund Verkehrsystemtechnik Berlin*, Research and Application Alliance Transportation System Techniques Berlin.

8. Wissenschaftszentrum Berlin für Sozialforschung (WZB) also engages in mobility research that has led to spin-offs: "Choice",created in 2003, is the result of the "Cash car" project whereby a car leaser receives points when lending the car to a third party, thus reducing the cost of the lease. InnoZ (*Innovationszentrum für Mobilität und gesellschaftlichen Wandel*), Innovation Centre for Mobility and Societal Change, created in 2006, is the outcome of a joint research project with Deutsche Bahn, Deutsche Telekom and DLR (German Space Centre) analysing demographic trends and impact on transportation.

9. The goal is to develop a traffic light control system based on camera data and image processing that enables flexible traffic management.

10. As part of a global network on global environmental change, PIK collaborates with many international partners: it has an active role in the International Geosphere-Biosphere Programme, the Intergovernmental Panel on Climate Change and the Millennium Ecosystem Assessment. As a member of the European Climate Forum, the institute has a direct and regular exchange with top level decision-makers in the fields of business, politics and civil society. PIK has close ties with the Berlin and Brandenburg universities, via joint research programmes and appointments. It has recently published, at the request of the Berlin Senate, a study about the probable impact of climate change on Berlin over the next 45 years, suggesting possible policy responses; *Klimawandel und Kulturlandschaft Berlin* (Climate change and the Berlin cultural landscape). *Bericht im Auftrag, Senatsverwaltung für Stadtentwicklung* (Report to the Senate Department for Urban Development) Abteilung I, Gemeinsame Landesplanung Berlin-Brandenburg, Berliner Forsten, Stadtgüter GmbH; *www.pik-potsdam.de/aktuelles/nachrichten/dateien/klimawandel_kulturlandschaft_endbericht.pdf*

11. See the article "Four types of knowledge integration management in interdisciplinary research on cities and the environment" published in 2008 by Harald A. Mieg, Wilfried Endlicher and Hadia Köhler, in Cities and the Environment, Vol. 1, Issue 1.

12. During the first term (2002-05) research was organised on a northwest-southeast axis through the Berlin metropolitan area. It focused on subjects such as urban air quality, soil conditions in urban areas, the habitat of certain types of fauna or community gardens. Research in the second term (2005-08) focused on urban vacant lots that offer temporary habitats for plants and animals as well as opportunities for real estate investment and urban restructuring. For the third term (2008–11), research is clustered

around four topics: biodiversity, reuse of former slab housing, temporary use of urban sites, and psychosomatic health of city residents.

13. For example, music market, due to increasing digitalisation of production and marketing, is undergoing an extensive transformation.

14. 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.

15. For example 300 Danish artists live in Berlin either permanently or semi-permanently.

16. See the Institute for European Ethnology website www.euroethno.hu-berlin.de.

17. In Berlin, there is a small (180 students) private university, SRH, founded by a Turkish businessman, with 50% of courses in German and 50% in English. 40% of students are foreigners or with immigrant background (25% are Turkish). It is attended by children from expatriates in Berlin and those belonging to the small segment of the Turkish middle class that can afford the monthly fees.

18. In April 2009, the Berlin School of Economics and Law (*Hochschule für Wirtschaft und Recht Berlin*, HWR) was founded through the merger of the Berlin School of Economics (*Fachhochschule für Wirtschaft in Berlin*, FHW) and the School of Administration and Law (*Fachhochschule für Verwaltung und Rechtspflege*, FHVR).

19. *Alice Salomon Hochschule* (ASH) targeted an initial rate of 3% of students with immigrant background, now attained and is aiming for 6%, with specific recruitment efforts such as the one indicated.

20. Total 1999-2008 budget: EUR 162 million (Land Berlin EUR 73.5 million; European Union EUR 58 million; Federal Government, EUR 30.5 million).

21. The developments that follow are based on information provided to OECD by the Senate Department for Urban Development that oversees the Social City programme.

22. Professor Häußermann from Humboldt University is involved in the bi-annual monitoring of the scheme through the "Res urbana" GmbH limited company, and the Institute of the Department for Educational Science (INA) of the Berlin Free University has evaluated the model projects "Families in the centre" and "Parent guides".

23. 2007/2008 Seminar for sociology students at the Technical University Berlin on "Quo Vadis Neighbourhood Management?" led by Professor Walther.

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Chapter 5: Building capacity for regional engagement

Interactions between higher education institutions and the city/region in which they are located are beneficial to both parties. For this interaction to take place capacity – skills and resources – needs to be built in regional and local agencies as well as higher education institutions. This chapter will highlight the capacity in the institutions and processes and the procedures of the Berlin Senate, various regional development organisations, science parks and higher education institutions. It will consider progress made to date in establishing a higher education "system" within Berlin that contributes to the economic, social, cultural and environmental well-being of the city and consisting of a set of higher education institutions which have a clearly articulated relationship with one another and contribute actively in different ways to various facets of the city's development. It will examine where current policies and practices can be improved. The chapter concludes with a set of recommendations to help capacity building for regional and local engagement in the Berlin higher education sector.

Introduction

A higher education "system" that contributes to the economic, social, cultural and environmental well-being of its city or region would consist of a set of higher education institutions which have a clearly articulated relationship with one another and contribute actively in different ways to various facets of the city's development. Developing and maintaining such a system requires:

- *a clear articulation of the demand side* by the funders of higher education and other stakeholders in the public and private sector as well as *mechanisms to guide institutional behaviour*
- *mechanisms and incentives to facilitate collaboration between higher education institutions* to address local needs and opportunities
- *structures and incentives within individual higher education institutions* to mobilise the research and teaching of individual academics to support city development
- *Actual teaching and research by individual academics and support from higher education administrators* which contribute to business and the city community

These four dimensions - the demand by the local stakeholders, the higher education collaboration, the capacity within an individual institution of higher education and people - are inter-related and should ideally "nest" within one another. In this context, the key questions for Berlin are:

- To what extent does the Senate, the body responsible for funding higher education in Berlin, have a clear strategy for its development and for steering the system to meet the city needs?
- Are there mechanisms in place for co-ordinating the activities of individual higher education institutions and national research institutes to maximise their impact on the city's development?
- Do individual higher education institutions have the structures in place to support and incentivise civic engagement?
- How does the teaching and research undertaken by individual academics contribute to the development of business, the labour market and cultural life of the city?

5.1 Higher education and research: the role of the Berlin Senate

Berlin has many universities, universities of applied sciences and independent research institutes. In effect, the size of the university and research institute "sector" far outweighs the size of the Berlin economy relative to the rest of Germany. As a net importer of students and by winning national and international research grants and contracts, higher education and research make a powerful direct and indirect impact on the city. Universities and research institutes are a key sector of the Berlin economy. The higher education and research sector accounts for 4.4% of the city's GDP. As a consequence, supporting the higher education and research sector is a top priority for the Berlin Senate.

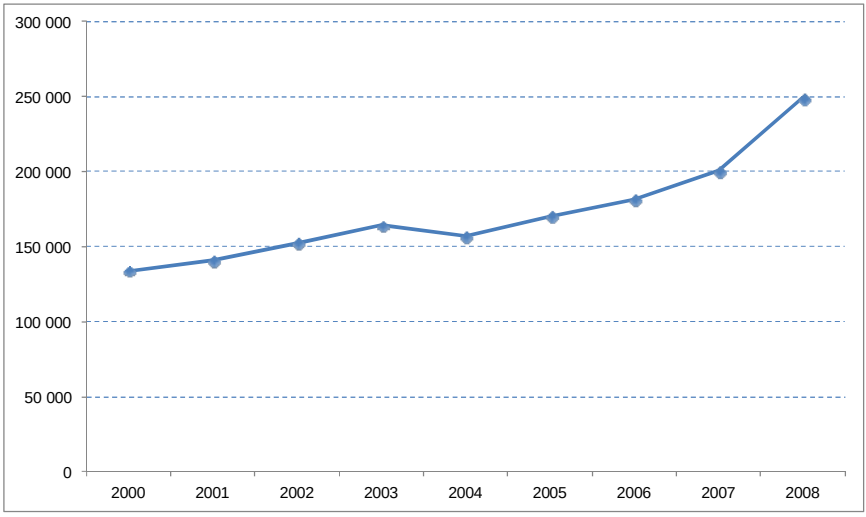
The primary responsibility for funding higher education in Berlin lies with the Berlin Senate and its Ministry of Education, Science and Research. Given the importance of the higher education sector for the economy, the Ministry for Economics, Technology and Women is also a major stakeholder focusing on the contribution of higher education to the economic performance of the city. In addition, a number of other ministries look to higher education institutions to contribute to their agendas, most notably those dealing with cultural affairs, health, urban development and the migrant population. While there is a co-ordinating inter-ministerial group chaired by the economics minister, it is unclear to what extent it addresses the broad range of issues linked to the contribution of higher education and research to city development.

The Berlin Board has been established by the Senate and composed of individual leaders from across the city. It recognises the role that higher education can and should make to city development. However, as an advisory body it has limited authority to draw together different parts of government, higher education and research institutes.

As a Federal obligation the Senate Ministry for Education, Science and Research is committed to promoting the national and international standing of universities in Berlin. The priority for the Ministry for 2006-12 was to ensure that the city's universities and research institutes were rewarded through the Federal Government's Initiative for Excellence. Under this initiative Berlin universities and research institutes were granted EUR 210.9 million and to which the Senate contributed 25% (EUR 52.7 million). The Ministry, facing its own budget restrictions, has welcomed the success of universities in plugging its own funding gap by winning national competitive grants and contracts to the tune of EUR 235.1 million in 2008 (Figure 5.1). While initiatives geared to building world class excellence in universities may also help them in their local economic development role, such outcomes remain incidental.

Figure 5.1 Total third-party funded research expenditure in Berlin HEIs

EUR million



Source: Schreiterer, U. and L. Ulbricht (eds.) (2009), "The City of Berlin, Germany Self-evaluation Report" OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/30/10/43942109.pdf*

Currently, there are few direct funding mechanisms to stimulate the regional engagement of higher education institutions in Berlin. So far, the Ministry of Education, Science and Research has used its core funding resources to steer universities towards regional engagement in a very limited way. The new contract funding arrangements introduced in 2008 could have, in theory, embraced an engagement agenda for the Berlin higher education institutions. But, in practise, this does not appear to have happened. On the contrary, the new, increasingly indicator-based system may lead to unintended consequences in terms of regional engagement through teaching and learning and related activities.

In the absence of strong incentives there is a risk that the various initiatives that have been put in place by higher education institutions will not be sustainable over the long term. Therefore, consideration should be given to the creation of a specific funding stream (allocated by formula against outcomes) and incentive-based special funds. For example, the Higher Education Innovation Fund in the United Kingdom has generated considerable changes in the institutional management of knowledge exchange in English universities. Although not explicitly a regional fund it

has contributed to a significant increase in the locally relevant activities of higher education institutions (see Box 5.1).

Box 5.1 The Higher Education Innovation Fund (HEIF) in the United Kingdom

The Higher Education Innovation Fund (HEIF) is designed to support and develop a broad range of knowledge exchange activities which result in economic and social benefit to the UK. The fund builds capacity and provides incentives for higher education institutions to work with business, public sector bodies and third sector partners, with a view to transferring knowledge and thereby improving products, goods and services. In September 2007 the UK Government announced a fourth round of HEIF, from 2008-09, with funding rising to a final year allocation of GBP 150 million for 2010-11.

Funds are being provided through a formula allocation to all eligible higher education institutions which are released once their knowledge exchange strategy has been assessed as satisfactory. The formula is based on two components: *i)* the first component (40%) has a focus on capacity-building and higher education institutions' potential and is based on full-time academic staff number; ii) the second component (60%) is allocated on the basis of performance, using various measures of income from business and non-commercial sources as a proxy for the value placed on higher education institutions' activities by users of knowledge in the wider economy and society.

Evaluation of the use of HEIF monies suggest that it has generated significant changes to the institutional management of knowledge transfer and increases in the scope of knowledge transfer and exchange activities. There has also been investment in development/training for academic staff and collaboration with one or more higher education institutions in the region.

Source: HEFCE (2009a), "Higher Education Innovation Fund 4", HEFCE, Bristol, *www.hefce.ac.uk/econsoc/buscom/heif/*.

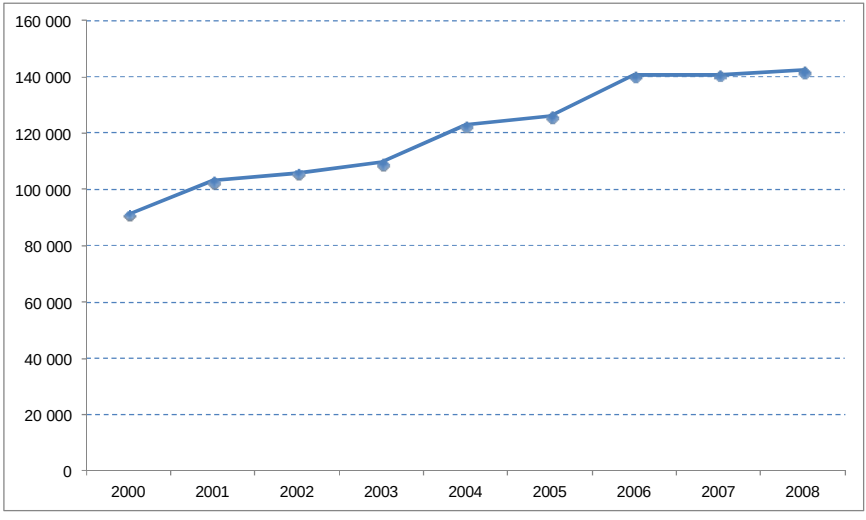
The Berlin Senate has attempted to incentivise universities with performance-related funding. It has also supported efforts to define clear profiles of higher education institutions to reflect their specific strengths. But, as the Berlin Self-evaluation Report points out the "*regional impact of co-operation does not count amongst the criteria applied to analyse and measure the higher education institutions' performance… HEIs were nudged to co-operate more closely in matters such as establishing new programmes of study, priority setting, strategic planning, deciding on the fields for key faculty positions and hiring new faculty and pitching for new contracts."* It is, however, unclear how far institutional development in

these areas takes account of the economic, social and cultural needs of the city. In this regard Berlin is following the model adopted in most German states. According to the Self-evaluation Report "*Most states allocate sources and funds to their HEIs by using indicators and formulae… Regional engagement and impact does not count as one of these performance indicators"*.

The Berlin Senate has also begun to implicitly introduce a regional dimension into the city's higher education, by shifting funding towards the universities of applied sciences, which by the nature of their missions, are committed to working with business and the community (Figures 5.2 and 5.3). For example, the funding framework for 2006-09 included a separate 'structure fund for the universities of applied sciences'. This fund enabled the universities of applied sciences to increase their total number of faculty positions from 638 in 2000 to 715 in 2007 (+ 12%). In contrast, universities had to cut back their positions from 4 082 to 3 447 (- 15%). In addition, resources have been provided to enable the universities of applied sciences to establish an umbrella institute, Institute of Applied Research to pool the expertise of the individual institutions and make them available to Berlin small and medium-sized enterprises.

Figure 5.2 Total public funding of Berlin universities of applied sciences

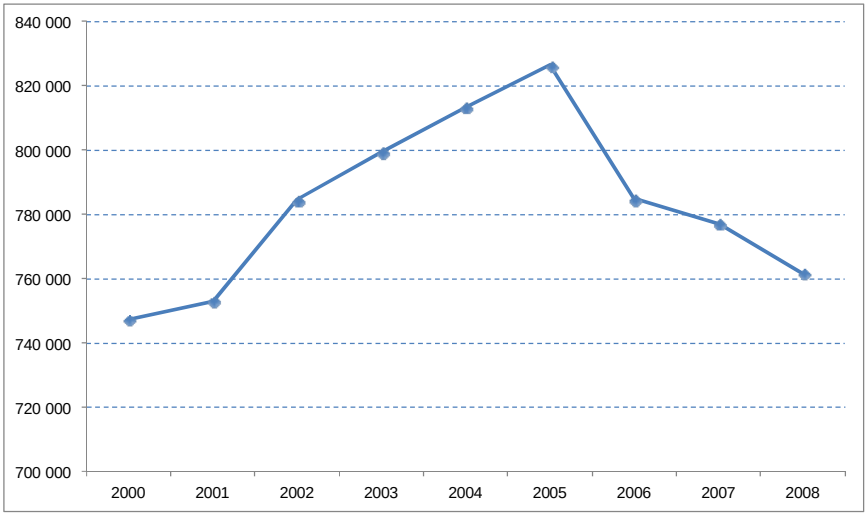
EUR million



Source: Schreiterer, U. and L. Ulbricht (eds.) (2009), "The City of Berlin, Germany Self-evaluation Report" OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/30/10/43942109.pdf*

Figure 5.3 Total public funding of Berlin universities

EUR million



Source: Schreiterer, U. and L. Ulbricht (eds.) (2009), "The City of Berlin, Germany Self-evaluation Report" OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/30/10/43942109.pdf*

5.2 Mobilising higher education research to support economic development

Berlin has a strong science-based economic development strategy. The Berlin Ministry of Economics, Technology and Women provides incentives to pull universities and research institutes into the city's economy and mobilise the demand side from within the business community. The Ministry has a clear strategy and set of priorities for the development of the city's economy in which the strength of the university and research institutes plays a key role. To boost the development of a knowledge-intensive economy, the Ministry supports; a number of delivery organisations, including the Berlin Investment Bank (Investitionsbank Berlin, IBB) and the Berlin Technology Foundation (Technologiestiftung Berlin, TSB), that interface with higher education and research; a network organisation which bring together universities and research institutes with business; a network of science-based business incubators in Berlin, and three major science parks.

The science parks at Adlershof and Buch are central to the implementation of Berlin's science-based economic development strategy.

Adlershof markets itself as a "city of science, technology and media" and houses twelve non-university research institutes. These focus on optics technology, materials research, micro systems technology, ICTs and sustainability and resources. Although independent, these institutions have come together to form The Joint Initiative of Non-University Research Institutions in Adlershof (Initiativgemeinschaft Außeruniversitärer Forschungseinrichtungen in Adlershof, IGAFA) whose aim is to "*create synergy and new knowledge in Adlershof by facilitating co-operationamong research institutes as well as with universities and the business sector*". Joint appointments between research institutes and the universities facilitate collaboration. The scientific facilities are major resources for companies and university researchers in Berlin and the rest of Germany and enable research institutes to attract significant additional resources. Underpinning the whole development is a science park company WISTA (Wissenschafts- und Technologiepark Adlershof/Park of Science and Technology Adlershof) which markets the park to inward investors, manages various facilities, supports science and business networks and runs several incubator units. With its hotels, conference facilities and retailing, Adlershof is without doubt a "science city" in its own right and will become more significant with the forthcoming Berlin-Brandenburg International Airport in the nearby Schönefeld site.

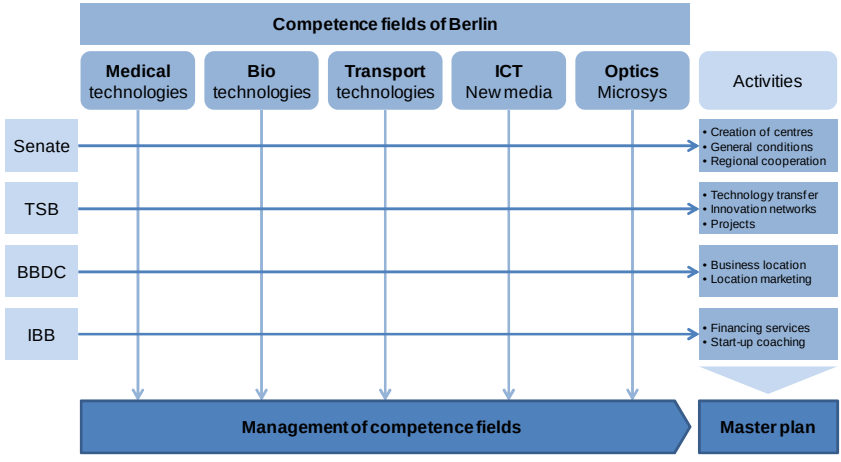
At Berlin's other major science park, Buch, where there is a clear focus on the life sciences, the links between research and its exploitation are even stronger. Buch is the home of the national Max Delbruch Centre for Molecular Medicine (Max-Delbrück Zentrum für Molekulare Medizin, MDC), the nearby newly-created joint medical school (Charité) of the Technical University of Berlin and Free University of Berlin and a number of small biotechnology companies. Buch does not have the same scale, location and management infrastructure advantages as Adlershof. In addition, it suffers from short term funding arrangements and a lack of "*Planungssicherheit*" (planning security). Yet, it is clearly part of a city-wide network of 194 companies employing 3 700 people and supporting intermediary organisations between business and research like Bio-Top and six smaller biotech parks. There is a local industrial demand side within major pharmaceutical companies to which the research base can respond.[1] As well as independent research institutes like MDC, the higher education sector is also embedded into this strategy. This is indicated at one extreme by the establishment of the joint medical school Charité and at the other by a Master of Business Administration at the Berlin School of Economics in healthcare management with a focus on pharmaceutical management.

In summary, Berlin has a strong science-led strategy for economic development and capacity for its delivery (Figure 5.4). This involves the

identification of key areas of strength in research and the development of technologies with considerable commercial potential. Although the business base of the city is limited, links between researchers and key firms have been supported by building capacity through intermediary bodies, numerous networking arrangements and providing spaces where business and research can work together and new business can be incubated. The investment linked to the research base has contributed to significant employment growth in the key competence areas. Success is most evident in the life sciences domain where, internationally, there are well established processes of science-led innovation linked to clinical practise.

The science-led approach that Berlin has adopted is, however, less appropriate in sectors other than those linked to the life sciences where innovation is usually more incremental and user-orientated rather than science-driven. These are areas where the universities of applied sciences with potential to respond to immediate business needs (particularly from the small and medium-sized enterprises that dominate the economic structure of Berlin) have a key role to play in building capacity in such firms to reach into the research base of universities and research institutes. This calls for a more balanced and broad-based regional innovation system for Berlin that combines science-driven and demand-led approaches and exploits these complementarities among Berlin higher education institutions across the city (broad-based regional innovation system has been discussed in detail in Chapter 2 with recommendations).

Figure 5.4 Berlin Science and Technology priority areas



Source: Schmohl, K. (2009), "Technology Foundation Berlin Group", presentation at the TSB Technologiestiftung Berlin, Berlin, 14 September.

5.3 Collaboration within the higher education and research sector

In order to mobilise the full potential of the higher education sector for local development of Berlin, it is important to build links on the one hand between universities and research institutes with leading-edge research and technological capacity, and on the other hand with universities of applied sciences with their links to small and medium-sized enterprises. Currently, the Senate of Berlin has limited top-down steerage to forge such links.

There are a number of multi-lateral bodies which ostensibly could facilitate collaboration across higher education in Berlin. However, these associations and organisations have limited capacity or authority to orchestrate collaboration across higher education institutions in support of city development. Furthermore, there is no overall drive to transfer learning from successful collaboration between higher education and the city from one higher education institution to another. While co-operation and information exchange within the university system appears to be well-developed in areas of strategic concern related to budgetary constraints, the participation of higher education institutions in fora linked to local and regional development is fragmented. There is scant information about involvement in activities related to regional development or social integration. While there is a website marketing science in the city its coverage is patchy and falls short of a comprehensive portal for the city into higher education and research.

There are a number of bodies which could in theory undertake this co-ordinating role. According to the Self-evaluation Report (Schreiterer and Ulbricht, 2009), the Conference of Presidents and Rectors of Berlin Higher Education Institutions "discusses issues of common interest and concern, such as higher education policy and governance but can hardly be called an effective pressure group for higher education institutions. If it seems appropriate it agrees on common positions to bring forward in public debate". This organisation seems to be equivalent to many higher education associations within OECD countries that focus on networking and profile-raising rather than acting as developmental organisation. Another organisation, the Permanent Congress of Berlin Universities (Ständige Konferenz der Berliner Universitäten) was established by the three universities in 2004 in response to the financial cut backs that these particular institutions were facing. The three universities met regularly in order to "best co-ordinate the restructuring and make the university's profiles as complementary as possible". It is unclear how far this restructuring took account of the needs and opportunities arising within the city. It is also unclear to what extent, the Permanent Congress of Berlin Universities, acts as an ongoing formal planning body working with its

members. A final body, the Berlin Higher Education Commission, was formed in 2005 to develop guidelines for the further development of research in Berlin and Brandenburg. Embracing a number of the universities and some independent research institutes, it appears to have had some impact, most notably the recommendations that led to the creation of a new Berlin Centre for Optics and Micro-Systems. Universities of applied sciences are excluded from the Permanent Congress of Berlin Universities and the Berlin Higher Education Commission. The independent research institutes have, however, established a very effective umbrella body to speak on their behalf.

There is no overall structure through which universities of applied sciences can co-ordinate and plan their activities across Berlin. However, the establishment in 2009 of an Institute of Applied Research involving all the universities of applied sciences is to be welcomed. This Institute has its headquarters in Beuth-Hochschule für Technik Berlin and laboratories in each institution. It will bring together the technology transfer and lifelong learning offices in each university to offer a one-stop-shop for Berlin business, particularly small and medium-sized enterprises. This is a challenging enterprise and the business model underpinning the distribution of income and costs between the individual universities has yet to be worked out.

Although multi-lateral mechanisms to facilitate the co-ordination of higher education in Berlin are limited, there have been significant bi-lateral developments that have benefited the city and particularly its spatial development. These have included: the establishment of Charité, the joint medical school between the Technical University of Berlin and Free University of Berlin and its campus adjacent to the Buch science park in the north east sector of the city; the relocation of Humboldt University's science faculty from the city centre to Adlershof in the south-east sector of the city; and the mergers leading to the creation of the HTW University of Applied Sciences for Technology and Economy (Hochschule für Technik und Wirtschaft Berlin) with its two campuses in the eastern part of the city.

With continuing financial pressure and the unfinished business of integrating higher education from East Berlin into a unified system, there is a need for an *ad hoc* albeit informal structure where the city's higher education and research institutes can meet with one another and with the Senate to consider how best to respond to the big challenges facing the metropolis, including spatial development and human capital development which require well functioning educational pathways between the institutions and different levels of education. Table 5.1 shows Berlin's progress so far.

Table 5.1. Berlin's competitiveness framework and higher education institutions' role

Essential ingredient	Target (Ideal)	Berlin (actual)
Strategy	To identify the region's distinct competitive advantage To align public and private actions necessary to seize it	Progress made in achieving a shared vision and engagement among key stakeholders in key competence areas and clusters Lack of alignment between public, private and non-profit investments Limitations in evidence base to monitor progress
Governance	To supply a framework to unite public, private and non-profit leaders as a collective guide and owner of the strategy	Co-ordinating inter-ministerial group within the Berlin Senate chaired by the economics minister Berlin Board: an advisory body with limited authority to draw together key stakeholders
Innovation	To link the region with new technologies and new ways of working and living that can transform the region's economic and social assets	Universities' science & technology activities focused on achieving world class excellence measured by research publications Innovation activities in science parks aligned to the region's economic assets
Entrepreneurship	To provide a fertile climate in which new ideas can be transferred successfully into the marketplace	Fragmented efforts to support small and medium-sized enterprises Higher education entrepreneurship activities at early stages

Source: Adapted from Drabenstott, M. (2008), "Universities, Innovation and Regional Development: A View from the United States", *Higher Education Management and Policy*, Vol. 20, No. 2, OECD Publishing, Paris, pp. 43-55

5.4 Structures and incentives within individual higher education institutions

In Berlin, as elsewhere in Germany, there is no explicit third task or regional development task assigned to higher education institutions, but regional engagement is left to the initiative of the individual institutions. For the three research-intensive universities in Berlin, the principal driver is scientific excellence and/or its applicability to business competitiveness wherever firms may be located.[2] Universities of applied sciences, however, have closer links to the labour market and through this, have the skills needed to underpin local and regional development. In the case of the federally funded research institutes, the formal obligation to city development is minimal.

Strong institutional leadership would help to mobilise the academic community and administrative services in support of city and regional development. This often reflects a desire on the part of external stakeholders for an institutional or corporate response to opportunities provided by the local environment. In the German university system, establishing strong leadership may, however, be difficult due to the independent status of the academic faculty. Academics as well as all the staff in higher education institutions remain civil servants or work under the statutory rules of public employment. There is also some evidence of accountability burden and bureaucratic structures that act as a constraint to building more entrepreneurial and responsive higher education institutions.

Overregulation of higher education institutions is not uncommon in mature higher education systems, usually arising from the increasing expectations on higher education, the multiplicity of interested parties, all of whom have accountability requirements, which when taken together can generate a significant burden on higher education institutions. It would be useful to investigate the extent of the accountability burden that is placed on higher education institutions in Berlin. Such a research project should identify and quantify the main sources and extent of burden as well as the potential to ameliorate it by data sharing, taking assurance from the work of others and a risk based approach to assurance. For experiences in the United Kingdom, see Box 5.2.

Box 5.2 Reducing overregulation of higher education institutions in the United Kingdom

Universities are subject to a wide range of regulatory requirements and conditions, reflecting the diversity and scope of their activities. Many of these are the general public regulations applied to all organisations operating in regulated areas, such as health and safety, planning, equal opportunities and Freedom of Information.

HEFCE (Higher Education Funding Council for England) commissioned PA Consulting to carry out three studies on the costs, impacts and burdens of accountability in English higher education in 2000, 2004 and 2008. The latest report, "Positive accountability", published in 2009, has found that costs to higher education institutions continued to fall between 2004 and 2008 by 21%. The PA study was based on in-depth research with 20 higher education institutions, involving more than 100 structured interviews with institution staff as well as extensive data analysis from institutions' management systems.

Box 5.2 Reducing overregulation of higher education institutions in the United Kingdom (continued)

According to the research, higher education institutions were subject to over 75 different sector-specific accountability requirements. PA related these activities and other costs to the work and costs that each institution would otherwise incur for its own internal management controls and governance processes (what the report calls "business-as-usual activities").

The progress made in 2004-08 follows a reported 25% reduction in administrative burden between 2000 and 2004. The 2004 review estimated the costs of compliance at around GBP 240 million (in 2008 prices). The equivalent costs to the 2004 estimate in 2008 were around GBP 190 million.

The studies have measured sector-specific accountability demands, where HEFCE and other bodies such as the Quality Assurance Agency for Higher Education (QAA) and Higher Education Statistics Agency (HESA) have worked with institutions to reduce burdens. Higher education institutions themselves have improved their systems significantly between the three studies, and this has further reduced their costs. A number of regulatory bodies have started to rely on the work of others and harmonised information needs. Universities have embedded many of the requirements such as risk management into their own systems. These were originally regarded as impositions by external bodies, but are now accepted as contributing to the effective management of institutions.

Source: HEFCE (Higher Education Funding Council for England) (2009b), "Positive Accountability: Review of the Costs, Benefits and Burdens of Accountability in English Higher Education", Report prepared by the PA Consulting Group for HEFCE, Bristol, *www.hefce.ac.uk/pubs/rdreports/2009/rd01_09*

The "Initiative for Excellence" has been designed to support new concepts for organising and enabling cutting edge research at universities and as such has the capacity to change the way universities work. There is evidence that it is bringing universities and research institutes closer together and improving collaboration. The strength of the "Initiative for Excellence" appears to be that it is driven by the topic rather than the faculty. However, there is a risk that another more responsive and professional "layer" is developed within the institutions while the reminder of the academic heartland is left untouched. It is also noteworthy, that programmes that enhance the skills of higher education leaders and their partners in the "know what" and "know how" of working together are not in evidence in Berlin.

Learning process in Berlin higher education institutions may include student projects within organisations relevant to their field of study. These are often organisations collaborating with the student's professors in research. There is, however, no system-wide publicly available data on the extent to which academics or students in Berlin higher education institutions are engaged with business and the public sector through their normal teaching and related research. Institutional level data is also scant although there are some exceptions, particularly among the universities of applied sciences.[3]

Almost all higher education institutions in Berlin have technology transfer offices, career centres and third-party funding counselling services that aim to facilitate industry collaboration and knowledge exchange. Many of these offices remain understaffed and poorly equipped to collaborate with the small and medium-sized enterprises. For example, in the case of Humboldt University, mechanisms are in place to foster business engagement through a powerful organisation for knowledge and technology transfer. Humboldt Innovation GmBH is now a wholly owned subsidiary company of the University which aids and facilitates sustainable collaboration between science and business, realising contract research projects and supporting scientific services in a competent, flexible and un-bureaucratic manner. It also supports spin-outs and undertakes all merchandising activities for the University. While this formal organisation has many advantages, it is evident that it has been established to overcome some of the bureaucratic features of the university management in Germany. Its capacity to collaborate with small and medium-sized enterprises is yet to be fully developed. In addition, its position outside the institution inevitably raises the question of its influence on the academic heartland of the university itself. It is therefore unclear how far the academic faculty buys into and contributes to a Humboldt University's vision to be "*at the heart of Germany's capital and close to the centre of politics*" (city and federal).[4]

All the universities of applied sciences are engaged, to varying degrees, with the development of the city. Their professors are required to have spent at least three years in practise before joining the faculty. Institutions themselves have management structures in place to ensure their teaching programmes and applied research meet external needs. On the teaching front, the dual (bachelors) degree programmes are of particular note. Offered by some universities of applied sciences in Berlin, these involve partnerships with employers, for example to train engineers and give them technical and management skills. Employers have a key role to play in programme design. For example the Hochschule für Wirtschaft und Recht Berlin (University for Economy and Law Studies Berlin), HWR, has a "Dual Commission" which includes representatives from partner firms, the

Berlin Chamber of Commerce, the employers association and a trade union. Its tasks are not only to develop new programmes but also to initiate major adaptations to established courses to meet the changing needs of companies and the labour market (see Chapter 3, Box 3.4 for more information.)

Several universities of applied sciences also have their own business interface units, for example "science-business co-operation centre" KONTAKT of the Hochschule für Technik und Wirtschaft in Berlin (University of Applied Sciences for Technology and Economy), HTW. Beuth Hochschule für Technik in Berlin (Beuth-Higher School of Technology Berlin), BHT, has its own founders shop, entitled Location4Innovation, to help graduates start their own business (see Chapter 2, Box 2.6 for more information). These are valuable initiatives.

However, the funding model for the universities of applied sciences is closely tied to student numbers and so restricts their capacity to invest in supporting this work. More significantly, the teaching load of academics (18 hours per week) mitigates against engagement with more speculative developmental projects that might benefit business and the community in the city. Unlike professors in the traditional universities, senior academic staff in the universities of applied science receive minimal research support to underpin their externally orientated work. Academic salaries are also linked to teaching rather than to research performance. In these circumstances, it is not surprising that in an institution like Hochschule für Technik und Wirtschaft in Berlin (University of Applied Sciences for Technology and Economy), HTW, only ten academic staff out of 250 account for between 70 and 80% of research activity. Under these conditions, it will be a challenge to spread an applied research culture through the universities of applied sciences.

Conclusions and recommendations

Higher education and research are strongly embedded in the economic, social and cultural life of Berlin. The sector, embracing universities, universities of applied sciences and schools of art and music as well as federal research institutes is a major factor in local development. The institutions collectively form a magnet which attracts students, researchers and business in search of talent. As a consequence, direct economic impacts of the higher education and research sector for the City of Berlin are significant.

However, while there is an abundance of projects and evidence of excellence, collaborative mechanisms among higher education institutions to build capacity and foster joint efforts for regional development remain

limited in scope and representation. The participation of higher education institutions in fora linked to local and regional development appears fragmented and there is scant information about involvement in activities related to regional development or social integration. The picture of the diverse programmes and projects with participation of higher education institutions is one of fragmentation built on separate and non-coordinated initiatives stemming more from specific circumstances rather than an overarching vision of needs. Tackling deep-seated spatial as well as social disparities in Berlin remains a challenge and the presence of higher education facilities in different locations across the city can contribute significantly to this task.

Berlin has significant activities under way for the promotion of city development as well as supporting innovation and creativity in business, public life and community. The OECD review team recommends that the chances for success can be increased if the following measures are taken to enhance networking and capacity building and streamlining the management processes for optimal impact:

- The mission of higher education institutions to engage locally and regionally, and specifically to contribute to economic, social and cultural development, should be made explicit in higher education legislation.
- Appropriate career and/or financial incentives should where possible be made available to encourage and reward academic staff engaged in local and regional development.
- The Berlin Senate should seek every opportunity to mobilise the higher education sector, including the research intensive universities, for local and regional development by creating incentives. This could be done in the form of long term core funding and additional strategic incentive-based funding schemes. Incentives for higher education institutions should be aligned to support regional development objectives in the form of time and money. The Senate now rewards universities both for winning academic research contracts and for work commissioned from specific users. This is a step in the right direction. In addition, for universities, stronger incentives are needed to ground international excellence and research in the city with regional benefit. For the universities of applied sciences, academic time should be available to undertake user-orientated research, otherwise, the financial incentives may have limited impact on the extent and scale of external engagement.
- The current costs of accountability of higher education institutions should be audited to identify and quantify the main sources and extent of

burden as well as potential to ameliorate it by data sharing, learning from the work of others and a risk-based approach to quality assurance.

- The Berlin Senate in collaboration with its key stakeholders including the higher education institutions should establish a clearly articulated long-term integrated strategy for economic, social, cultural and environmental development of the city. Such as vision and underpinning strategy is a fundamental prerequisite to a fully fledged engagement between the city and higher education and research.

- Berlin Senate, higher education institutions, other educational institutions and key stakeholders in the economy and society should work together to establish a Regional Higher Education and Research Strategy connecting top-down high-level strategies and bottom-up initiatives which guide the development of the overall higher education system to optimise its impact on the city. A forum linked to this strategy should enhance the dialogue between higher education institutions and the city regarding their interaction, help understand the drivers of each group and organise capacity building through targeted leadership development programmes for those filling "boundary spanning" roles between higher education and the wider society. The programmes should focus on developing greater collaborative skills in working through addressing practically some of the major challenges facing the city.

- Lateral co-ordination between higher education institutions and the Senate's various areas of responsibility could be strengthened in different ways. The Berlin Board could be developed into a forum where the wide ranging contributions of higher education to the city could be articulated, highlighting inter-connections between these areas and links to the various ministries which could contribute to and gain from the work of higher education institutions. The Berlin Investment bank (Investitionsbank Berlin, IBB), which provides a well-resourced business-oriented and specialised development vehicle, could also be developed into a single delivery agency in the field of economic development which, empowered to mobilise the support of higher education institutions and strengthen links with the business community.

- Clear links should be established between city regeneration and spatial planning and mobilisation of higher education to support city development. Geographical proximity can also be a catalyst for supporting links between higher education and business through both research and teaching. Adlershof is a success story and will become an even more significant innovation hub in south-west Berlin with the relocation of the airport. The linkages between the research institutes

facilitated by the IGAFA (Joint Initiative of Non-University Research Institutions in Adlershof) and underpinned by the management and marketing of WISTA (Park of Science and Technology Adlershof) are models of good practice. Similar hubs need to be developed at Buch and at Charlottenburg (perhaps under the umbrella of a single organisation built around WISTA). These hubs need to handle transport, housing and community relations issues as well as being underpinned by strong higher education and business intermediary organisations. This could be a task for a strengthened Berlin Investment Bank (Investitionsbank Berlin, IBB).

- Evidence-based decision making should be strengthened in the region by focusing on a dashboard of key performance indicators to assist managers and funders to steer higher education institutions and the overall system. This can result in a shared local knowledge base which will galvanise the development of a strong local strategy for change. Care should be taken to avoid accountability burden and over-emphasis on what can be measured (e.g. patents, licenses and spin outs) rather than what matters (e.g. creativity or social innovation) and lagging indicators (what has happened) rather than leading indicators (e.g. building capacity to act in the future).

- Higher education institutions should review recruitment, hiring and reward systems to include the regional development agenda. They should create systematic mechanisms to monitor and evaluate their activities in this area, to share good practice within the institution and benchmark this experience with other organisations and localities. In addition, they should invest in developing the skills of facilitators, i.e. those with boundary spanning roles who help create links between the higher education institution and other stakeholders.

Notes

1. Berlin has the advantage of being the home for top pharmaceutical companies, most notably Bayer-Schering Pharma. It has also persuaded Pfizer Germany to relocate its headquarters to Berlin.

2. Some reservations were expressed against collection of more robust data on the extent to which students and academics are engaged with business and public sector; it was suggested that the mandatory collection of such data by higher education management could damage a long-established practise of knowledge exchange through teaching which worked well. This practise could be undermined by academic leaders seeking data on what was going on in their institutions in order to strategically manage and mobilise it to respond to external demands.

3. According to Berlin Self-Evaluation Report, one institution, University for Economy and Law studies Berlin, *i.e.* HWR (Hochschule für Wirtschaft und Recht Berlin) /FHW (Fachhochschule für Wirtschaft Berlin/Berlin School of Economics), reports that in 2007 two-thirds of the students internships took place in Berlin-Brandenburg.

4. However, 1 000 public lectures and discussions each year and the idea of ranging from "*the children's university to the senior citizen's university"* suggest that Humboldt University is making serious efforts to present itself as an all round "civic university".

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Annex 1: OECD review team

Jaana Puukka 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 15 regions and city-regions in G8 countries and emerging economies. She is the co-author and editor of the OECD publication "Higher Education and Regions – Globally Competitive, Locally Engaged" (OECD, 2007). Before joining the OECD, Puukka had experience in higher education and regional development in Finland as a national and local government adviser, programme manager, practitioner and evaluator. She has management experience from both the university and polytechnic sector and has worked in university internationalisation, PR & communication and stakeholder management. In addition, she has experience in the corporate sector in the pharmaceutical industry.

Philip Wade, retired (2007) OECD Administrator, is an expert in regional and rural development, with specific knowledge in Information and Communication Technologies (ICTs). In OECD, Philip Wade was responsible for several national territorial reviews in Europe, which objective is to identify and analyse the factors of disparity between regions and the implementation of regional policy, so as to formulate recommendations aiming to improve its delivery and increase its impact. He also carried out specific regional tasks and authored several rural case studies, and before that, the OECD report "ICTs and Rural Development". Presently, Philip Wade is one of two experts, coordinating and supervising, under the aegis of the Government of Finland, a pilot rural development project in Mozambique. Prior experience in such countries was acquired in the field of technical assistance in Peru and Ethiopia. Philip Wade is a graduate in political science of Paris Sorbonne and ENA (economics, law and public administration). He holds a degree in Higher Latin American Studies (IHEAL). Before joining OECD, he worked in various international positions in the public and private sectors in France. Besides OECD

publications, he is the author of several books on broadcasting, ICTs and tourism development.

Bjørn Asheim is a major international figure in the area of economic geography. He holds the chair in economic geography at the Department of Social and Economic Geography at the University of Lund, having previously held the chair in human geography in the Department of Sociology and Human Geography at the University of Oslo. Professor Asheim is co-founder and deputy director of CIRCLE (Centre for Innovation, Research and Competence in the Learning Economy), a multidisciplinary Centre of Excellence in innovation research at Lund University. He is Visiting Professor at the Department of Geography at the National University of Ireland at Maynooth. Asheim's research interests are in the areas of economic and industrial geography, and regional innovation research, where his specialisations include: regional clusters, regional innovation systems and learning regions; SMEs and innovation policy; globalisation, and the geography of the creative class. Asheim has served as an international expert for UNCTAD, OECD and EU. He coordinated the EU project on "SME Policy and the Regional Dimension of Innovation" and is currently coordinating the European Science Foundation project "Constructing Regional Advantage".

John Goddard, Emeritus Professor of regional development studies at Newcastle University UK, is one of the leading experts in the field of higher education institutions' engagement in regional development. He was previously Deputy Vice-Chancellor with responsibility for the University's links with the city and region, in particular the development of Newcastle as one of the UK's six Science Cities. He led the implementation of a major restructuring of the university. Goddard has more than thirty years experience in the field of regional development as a policy developer and ministerial adviser, programme manager, regional practitioner, researcher and evaluator. Goddard's academic background is in economic geography. He founded and led the University's Centre for Urban and Regional Development Studies and directed numerous academic and policy research projects on the role of innovation in territorial development. Within the UK, John Goddard contributed to the Dearing Review of Higher Education through a Committee of Vice-Chancellors and Principals report on Universities and Communities. Goddard's international work includes collaboration with the OECD and has led reviews of regional engagement by Finnish Universities sponsored by the Finnish Higher Education Evaluation Council.

Ulrich Teichler is professor at the International Centre for Higher Education Research (INCHER-Kassel) and at the Department for Social Sciences of the University of Kassel. He holds a diploma in sociology and a

PhD in philosophy from the University of Bremen. He is a professor in Kassel since 1978 and held positions as director of INCHER-Kassel, dean of faculty and vice president of the University. He has been professor on part-time or short-term basis at the North Western University (US), College of Europe (Belgium) and Hiroshima University (Japan); visiting professor of the Open University (UK), and has had other temporary teaching assignments in Argentina, Austria, Germany and Norway. His key research areas are higher education and the world of work, international comparison of higher education systems, and international co-operationand mobility in higher education. Additionally, he has carried out research on education and social selection, the academic profession, access and admission, continuing professional education, and evaluation in higher education. He is former or current co-editor of various academic journals, notably "Higher Education", "European Journal of Education", and "Das Hochschulwesen". He has served as an expert for UNESCO, OECD, World Bank, Council of Europe, European Commission, various national governments and international and national university organisations. He is Doctor honoris causa of the University of Turku, Finland and sponsors the Ulrich-Teichler Prize for the best doctoral and master theses in Germany on higher education.

Annex 2: Programme of the review visit

OECD Review Visit to Berlin, 14-18 September 2009

Monday 14 September

09:00-11:30 **Berlin Senate: Steering the higher education system**

- Mr. Harald WOLF, Senator, State Ministry for Economics, Technology and Women
- Mr. David WEISSERT, State Ministry for Economics, Technology and Women
- Prof. Jürgen E. ZÖLLNER, Senator, State Ministry for Education, Science and Research
- Mr. Frau BEHRING, Head of Section, State Ministry for Education, Science and Research

14:00-17:00 **Berlin strategies for economic development**

- Mr. Siegfried HELLING, Head of technology transfer and innovation management, Berlin Technology Foundation (TSB)
- Ms. Margarethe QUEHENBERGER, Company Development, Director, Berlin Investment Bank (IBB)
- Mr. Andreas BISSENDORF, Managing Director of Project Technology Coaching Centre, Berlin Investment Bank (IBB)
- Mr. Ulrich WIEGAND, CEO, Chamber of Crafts (KOMZET)
- Dr. Jost-Peter KANIA, Programme manager, Chamber of Crafts (KOMZET)
- Ms. Nele HESS, Confederation of German Trade Unions

Tuesday 15 September

09:00-11:30 **Creative industries: culture, design, media and tourism**

- Prof. Thomas SCHILDHAUER, Managing Director, Central Institute for Further Education
- Mr. Carsten BÄUMLER, Press relations, Private Media and Design School
- Prof. Ulf MATTHIESEN, Professor, Department of European Ethnology, Humboldt University of Berlin
- Ms. Ingrid WALTHER, Head of Communication, Media and Culture Economy Division, State Ministry for Economics, Technology and Women
- Prof. Gesche JOOST, Head of Design Research Lab, Deutsche Telekom Laboratories in Berlin
- Ms. Heike FÖLL, Institute for the Art in Context, Berlin University of the Arts
- Mr. Norbert PFEFFERLEIN, CEO, TCME Touristic Concept Marketing & Events International
- Prof. Gerhard HÖRBER, Founding Director, BBW University of Applied Sciences

14:00-16:00 **Health and life sciences**

- Prof. Walter ROSENTHAL, Scientific Director, Max Delbrück Centre for Molecular Medicine
- Ms. Cornelia LANZ, Administrative Director, Max Delbrück Centre for Molecular Medicine
- Dr. Christina QUENSEL, Scientific Coordinator, Max Delbrück Centre for Molecular Medicine
- Prof. Rudolf TAUBER, Vice-Dean of Research, Hospital and Medical School of Humboldt University of Berlin (HUB) and Free University of Berlin (FUB)
- Prof. Manfred GROSS, Vice-Dean for Education, Hospital and Medical School of HUB) and FUB
- Professor Volker HAUCKE, Professor, Free University of Berlin (FUB)
- Mr. Harald SAUMWEBER, Institute of Biology and Cytogenetic, Humboldt University of Berlin
- Prof. Andreas HERRMANN, Professor, Humboldt University of Berlin
- Mr. Ulrich SCHELLER, Administrative Director, BiotechPark Berlin-Buch (BBB) Management
- Mr. Herbert-Werner FRISCHMANN, Siemens AG
- Mr. Claus von STAUFFENBERG, Siemens AG
- Dr. Bernd ITTERMANN, PTB
- Ms. Monika LESSL, Bayer Schering Pharma AG
- Dr. Kai BINDSEIL, BioTOP Berlin-Brandenburg

Wednesday 16 September

09:30-14:30 **Knowledge transfer at Adlershof**

- Prof. Ingolf V. HERTEL, Speaker of IGAFA e.V. and Director at MBI
- Prof. Michael LINSCHEID, Vice-president for Research, Humboldt University of Berlin
- Prof. Wolfgang EBERHARD, Managing Scientific Director, HTZ/BESSY II
- Mr. Martin MAHN, Managing Director, Humboldt-Innovation
- Mr. Hardy Rudolf SCHMITZ, CEO, Wista-Managemt
- Mr. David Weißert, State Ministry for Economics, Technology and Women
- Dr. Ursula WESTPHAL, Managing Director, IGAFA e.V.

15:00-18:00 **Knowledge transfer in universities of applied sciences**

- Prof. Ulf MATTHIESEN, Professor, Department of European Ethnology, Humboldt University
- Prof. Hans-Herwig ATZORN, Vice-president, University of Applied Sciences HTW
- Prof. Klaus SEMLINGER, Vice-president, University of Applied Sciences HTW
- Bärbel SULZBACHER, Director of transfer office, University of Applied Sciences HTW
- Mr. WÜTHRICH, Transfer office, University of Applied Sciences HTW
- Mr. Wilfried LAMMERS, Head of the "Technik Akademie", Siemens Professional Education, Beuth University of Applied Sciences
- Prof. Gudrun GÖRLITZ, Vice-president for R&D, BHT
- Prof. Claudia LEMKE, Professor, Berlin School of Economics and Law (HWR)

- Ms. Annette FLECK, Administration, Berlin School of Economics and Law (HWR)

Thursday 17 September

09:00-12:00 **Environment, transport and urban ecology**

- Prof. Ingo KOWARIK, Professor Ecological Systems, Technical University, Institute for Ecology
- Prof. Gerhard GOLDMANN, Project sustainable development in regional companies, HWR
- Mr. Thomas MEISSNER, Director, Transport Technology System Networks
- Ms. Alexandra JUNKER, Ingenieurgesellschaft Auto und Verker, IAV GmbH
- Dr. Weert CANZLER, WZB/InnoZ

14:00-17:00 **Migrant population and social challenges**

- Prof. Pakize SCHUCHERT-GÜLER, Mentoring programme for students with migrant background, HWR
- Prof. Friederike MAIER, Director Mill-Institute for Economy and Gender Studies, HWR
- Prof. Elke JOSTIES, Alice Salomon University of Applied Sciences
- Prof. Theda BORDE, Alice Salomon University of Applied Sciences
- Prof. KRAMER, SRH University of Applied Sciences
- Ms. Nele HESS, Confederation of German Trade Unions

Friday 18 September

15:00-17:00 **Feedback session to the Region**

- Mr. Harald WOLF, Senator, State Ministry for Economics, Technology and Women
- Mr. WEISSERT, State Ministry for Economics, Technology and Women
- Mr. Ruppert STÜWE, Senate Chancellery, Planning Department
- Dr. Hans-Gerhard HUSUNG, State Secretary for Science and Research, State Ministry for Education, Science and Research
- Ms. BEHRING, Head of Section
- Prof. Jutta ALLMENDINGER President, Social Science Research Centre (WZB)

Annex 3: Berlin-Brandenburg Transport and Mobility Cluster

Railway technology: 18 700 people are employed in the railway industry and in research institutions (university and non university) excluding operators. All segments are present: track systems, vehicles (locomotives and cars) and services. Berlin hosts the Innotrans trade fair, established as the worldwide leading exhibition for the rail transport industry. One of the strategic aims for the sector is to become a European centre for education, research and development-engineering in railway technology based on large R&D projects.

Road transport, automotive industry: manufacturers and small and medium sized enterprises (SMEs) employ approximately 19 000 staff along 600 scientists in public research institutions. One of the main firms in this area is IAV, with a global staff of 3 000 providing engineering services to the industry. The goal of the centre of excellence is to increase employment in the area to 21 000 or 23 000 within four to six years by developing innovative networks and partnerships between research and industry.

Intelligent transport systems: this field is application oriented and based on telecommunications and telematics. It employs more than 5 000 people in 130 SMEs and 300 researchers in 30 public research institutions. The Berlin traffic control board and traffic management centres are the backbone for real time traffic management in the region.

Logistics: the sector comprises around 3 130 staff in SMEs and different organisations, along with 190 scientists in public research institutions. A further 56 000 jobs with operators make logistics one of the most important economic sectors in the region. The opening of the BBI airport will expand air freight capacities and infrastructure plans will also seek to position the region as a "backcountry" support location for Baltic seaports.

Aerospace: the sector employs 4 000 people in 50 organisations and enterprises. The strategic goal is to develop the sector so that Berlin and Brandenburg become the third major aeronautics and aerospace location in Germany behind Hamburg/Bremen and Munich. The main focus areas are engine development and small satellite construction.

Higher Education in Regional and City Development

Berlin, Germany

Berlin is a creative city attracting talent from around the world. The Berlin Senate has made great strides in developing innovation as a pillar of its economy. But challenges remain: there is long-term unemployment, a low absorptive capacity in small and medium-sized enterprises and a large migrant population that lags behind in educational and labour market outcomes.

How can Berlin's higher education institutions capitalise on their long tradition of professionally relevant learning and research to transform social, economic and environmental challenges into assets and opportunities? What incentives are needed to improve higher education institutions´ regional and local orientation?

This publication explores a range of helpful policy measures and institutional reforms to mobilise higher education for Berlin's development. It is part of the series of the OECD reviews of Higher Education in Regional and City Development. These reviews help mobilise higher education institutions for economic, social and cultural development of cities and regions. They analyse how the higher education system impacts upon regional and local development and bring together universities, other higher education institutions and public and private agencies to identify strategic goals and to work towards them.

The full text of this book is available on line via this link:
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