

OECD Review of Higher Education in Regional and
City Development

Antioquia, Colombia



Assessment and recommendations

Antioquia: from uneven growth towards inclusive and sustainable development

Despite its “economic miracle” and robust growth for more than a decade, Colombia continues to struggle to overcome social and economic disparities. Third largest country in Latin America in terms of population and fifth largest in terms of area, Colombia is rich in natural resources, but has not created enough jobs for its 46 million strong population. It lags behind Mexico, Chile and Brazil in terms of human capital development, economic diversification, innovation and productivity. In 2010, depending on the definition, up to half of the population (49.5%) lived in poverty. Sustained growth and development are necessary for improving the quality of life of the population, particularly those from lower socio-economic and rural backgrounds. The central government is committed to long term reform to modernise the economy and to expand participation in education at all levels through the “Education Revolution”.

Antioquia, the second biggest of Colombia’s departments, is one of the economic engines of the country. With a population of over 6 million (13.3% of Colombia’s population), Antioquia’s GDP per capita and growth rates are above national averages. Antioquia’s economy is based on natural resources, manufacturing industry and a growing service sector. Industrial activity, tertiary education, R&D investments, population and income are all concentrated in the Medellin metropolitan area, which along with the cities of Bogota and Cali forms “The Golden Triangle”.

Historically based on mining, energy and textiles, the regional economy is in the process of transformation. The textile industry is in decline because of international competition and has not yet been replaced with other labour

intensive economic activities. Three sectors – commerce, manufacturing and personal services – employ 72% of the workers, but absorb just 6.7% of the region's net investments. At the other extreme, utilities, transportation and financial services absorb 85% of the investments, but only employ 10% of the labour force.

At the same time, almost half of the population is below the poverty line. Antioquia's unemployment rate is high and about half of the workforce is outside the formal labour market. While poverty is concentrated in the rural, sparsely populated areas, more than 50% of the population in the Medellín metropolitan area is poor and nearly 60% work in the informal labour market or is under-employed.

While Antioquia has made great strides in education and performs better than Colombia in general in key education indicators, it still has a long way to go to reach the OECD averages. The tertiary education participation rate has reached 35.5%, but overall educational attainment level remains low with significant disparities between rural and urban areas. At the same time, the average years in formal education in Antioquia are 8.74 years, but 6.33 years in the rural areas. Similarly, illiteracy rate in Antioquia is 5.1%, but in rural areas 10.6%.

After decades of armed conflict, social instability and violence, Antioquia finds itself in a constructive period, oriented towards economic and social development. Efforts are being made to move up in the value chain, diversify the economy and use human capital more intensively. In this context, the key challenges for the Department of Antioquia and its tertiary education institutions are:

- How to develop a more inclusive labour market and education system to address long-term challenges of poverty and inequity?
- How to create an economy that can absorb both highly-skilled and low-skilled segments of the population?
- How to improve the equity, quality and relevance of education and turn the potential of the tertiary education sector into an active asset for regional development?

To address these challenges, the Department of Antioquia needs a skills development and innovation strategy with a vision, measurable goals, milestones, co-ordination measures and a robust evidence base seeking complementarities with the national, local and institutional actions. Long-term collaborative efforts and investments in improving quality of education are necessary to lift population out of poverty. Tertiary education provision

needs to be better aligned with the needs of Antioquia through stronger university-industry links that can boost new enterprises and jobs, and efforts that can facilitate transition from an informal to formal economy. Finally, at the national level, tertiary education reform should be reintroduced after a period of review and consultation with stakeholder groups. In order to improve regional development outcomes, evidence-based decision making at all levels and institutions need to be adopted. The existing good practices in widening access and supporting students from low income households, in university-industry collaboration and in rural and social development, and should be scaled up into a system within and between institutions.

Human capital and skills development

Antioquia's large, diversified and rapidly expanding tertiary education sector represents an important concentration of human capital and skills development in Colombia. It is absorbing a growing proportion of students who have completed secondary education. As a result of national, departmental and local initiatives, coverage, participation and equity are improving.

Antioquia provides an ample supply of tertiary education which is differentiated among autonomous public and private institutions, and between universities and non-university institutions which have different missions and responsibilities. There are 41 tertiary education institutions, 36 of them in the Medellin metropolitan area, as well as the fee free training provided by the National Learning Service (SENA). In addition, there are 11 branches of tertiary education institutions and 5 Regional Centres for Higher Education (CERES), promoted by the National Ministry of Education.

Over the last decade, tertiary education participation has expanded in Colombia as a result of national government's commitment to the "Education Revolution," policies that support broadening access to tertiary education and a strong push to support technical and technological education. The national plans have aimed to improve the supply of human capital in terms of participation, quality and relevance. This has resulted in a broad range of programmes and initiatives to increase and widen access to tertiary education and to follow-up the progress, such as scholarships and student loans through ICETEX, propaedeutic cycles, bridging programmes between secondary and tertiary education etc. Many of the initiatives are

nationally-driven, but there are also bottom up joint efforts by the Department of Antioquia and large municipalities, particularly Medellín. Innovative programmes include “Access with Equity” (*Cobertura con Equidad*), a public-private partnership that brings together the government, a group of private universities and private sector employers to offer the opportunity to study in Antioquia’s private universities to academically qualified low income students who could not find a place in a public university. The students get a scholarship equivalent to 75% of the tuition costs and receive a loan from ICETEX (Institute for Student Loans and Technical Studies Abroad) for the remaining 25%.

These efforts have improved access to tertiary education at the national and regional levels. In Colombia, the tertiary education expanded from 1 000 148 students in 2002 to 1 674 420 in 2010, resulting in an increase in the undergraduate coverage rate from 24.4% in 2002 to 37.1% in 2010. In Antioquia, the tertiary education student population increased from 128 441 in 2002 to 206 782 in 2010, almost reaching the goal set out in the National Development Plan. Gross tertiary education enrolment in Antioquia was 40.9%, below the leading regions of Bogota (73.7%), Quindio (50.4%), Santander (48.0%) and Norte de Santander (42.8%), but above the national average of 37.1%. The absorption rate – which measures the students enrolled in undergraduate programmes over the number of students who take the final test of compulsory education (Saber 11°) – showed progress from 54.1% in 2002 to 82.4% in 2008, and compares favourably with the national level (53.6% to 73.8%, respectively).

Even if access to tertiary education is far from equal, tertiary education institutions enroll a growing number of first generation students from low income families. Half of the families of students who enter tertiary education have an income of between one and two minimum salaries (USD 300- USD 600 in 2011). In Antioquia, the percentage of students from households with incomes below two minimum wages rose from 32.9% in 2002 to 52% in 2009, surpassing the national level. At the national level, the percentage of students with “low” marks (SABER 11) accepted by tertiary education institutions increased from 39% to 46% between 2006 and 2010.

While much of the progress is due to the growth in the provision of technical and technological education (T&T), more efforts are necessary to be better integrate it in the tertiary education system. Between 2006 and 2009, the participation in T&T education in Antioquia increased by 74.6% from 51 838 to 90 495 students, resulting in an increase from 31.1% to 41.3% in the share of the T&T students out of the tertiary education student population. At the same time, however, SENA, which delivers an important part of T&T programmes and does not charge fees to students, remains nationally oversubscribed so that only one out of seven applicants is

awarded a place and actually enrolls. Attached to the Ministry of Labour, SENA's programmes and students are often not included in national data on tertiary education. Pathways to facilitate student progression from T&T education to universities need strengthening at the national and departmental level. This could be facilitated by the implementation of the National Qualifications Framework and enhanced collaboration within the tertiary education sector for data collection, joint programmes and quality assurance as recommended by the OECD/World Bank review.

But access to and success in tertiary education remains a challenge to many students who are disadvantaged due to their socio-economic background and inadequate preparation at schools. More work is needed to continue and consolidate the gains achieved.

As tertiary education participation has grown, internationally high dropout rates undermine the efficiency and equity of the system. In 2011, Colombia's tertiary education dropout rate (the proportion of students who enter the first year of education but then leave) was 45.3%. SPADIES (the national information system specifically designed to track dropout and help identify its causes) shows that the biggest dropout occurs in the lowest level tertiary programmes, during the first semester, for students from low income families and with low SABER 11 test scores.

The quality of primary and secondary education systems determines how well students are prepared to take admission tests and how they progress in tertiary education. In Colombia, most of the students who graduate in secondary education have not developed the skills that are required to enter and successfully complete technical, technological and university studies. The academic standards that Colombian students have achieved by the time they enter tertiary education are generally low in comparison with other countries. Almost half (47.1%) of the Colombian students at the 15 year old level who took part in the Programme for International Student Assessment (PISA) in 2009 performed below the baseline for functional reading or comprehension.

Widening access to and ensuring success at all levels of education remain a key policy challenge in Antioquia. National and departmental authorities need to address the challenges in primary and secondary education in a comprehensive manner, by improving the quality of the education and mobilising appropriate levels of financial resources for public schools. Universities and tertiary education institutions can strengthen these efforts by engaging in collaborative long term collaboration with vulnerable

schools in order to improve the quality of teaching. In tertiary education, enhanced and better targeted academic, social and financial support for students from low income families is needed. The government is encouraged to continue its commendable work to ensure that ICETEX will be able to fund loans to eligible students and target its support more accurately.

Antioquia's tertiary education sector plays an important role by providing the local labour force with an inflow of highly qualified people. At the same time, stronger focus on quality and relevance of education is needed to ensure that students will acquire skills that will guarantee them lifelong employability.

Antioquia's tertiary education sector plays an important role in advanced human capital training by providing a labour force with an inflow of more than 21 000 highly qualified people annually, most of whom continue to work in the region. The labour market looks for and employs a high proportion of this group, recognising their value with a salary premium that shows a positive return on their investment to obtain a tertiary education degree. Among the departments of Colombia, Antioquia has the highest proportion of locally-trained graduates working (85.7%).

Antioquia's tertiary education institutions are beginning to link more systematically with stakeholders, both in the public and private sectors, understanding their requirements for qualified personnel and are taking steps to respond with education in the quantity and quality needed. Steps have been taken by the authorities and institutions to match supply and demand of skills and introduce institutional mechanisms of collaboration between tertiary education institutions and the industry. The University-Firm-State Committee (CUEE) is the most robust form of collaboration which has generated a baseline of trust on which Antioquia can build more concrete outcomes in the future.

Despite the generally good employability of tertiary education graduates and high private returns on education, there is considerable diversity among different institutions in terms of the labour market relevance of education. To strengthen the skills and competencies of students, and build stronger links with the labour market, a range of measures could help. High quality work-based and co-operative learning opportunities for students in collaboration with local industry and other employers, inclusion of labour market representation in the curriculum and course design, and the

governance of tertiary education institutions, using local private sector employees as instructors, and supporting mobility of university and research staff temporarily to the private sector would be useful ways of improving labour market relevance of tertiary education.

More attention should be given to students' learning and employment outcomes. As an immediate step departmental authorities and tertiary education institutions could make better use of the results of the *SABER Pro* test that not only measures the learning outcomes of Colombian tertiary education students, but also provides a signal to potential employers about the quality of skills. Furthermore, closer attention to data provided by the Labour Market Observatory for Education would help students and tertiary education institutions to: *i*) identify the most profitable employment sectors and tertiary education programmes; *ii*) forecast the regional demand and supply of human capital; *iii*) analyse regional relevance; *iv*) measure career success by universities (in terms of employment and salary levels); and *v*) monitor remunerations and income inequalities.

Antioquia's education system needs to become better aligned with the needs of the region, its labour market and population.

Antioquia has a dual economy, dual labour market and skill requirements. Almost half of Antioquia's population (about 47%) lives in conditions of poverty which is severest in rural areas. Unemployment and underemployment rates are high at 16% and 28%. As elsewhere in Colombia, where only 10.1% of the adult population have attended tertiary education institutions (ISCED 5 and 6), in Antioquia, poverty and poor labour market outcomes are related to the low levels of education and professional qualification of the population, and to the way in which the regional economy is organised, where the productive, capital-intensive sectors do not absorb labour. In this context, Antioquia's tertiary education sector should contribute to the efforts that enhance the global competitiveness of the modern sector, while the traditional rural sector requires research, development and innovation efforts as well as life long learning initiatives and anti-poverty programmes focused on job creation, economic empowerment and the development of skills that can support rural livelihoods. While the Regional Centres of Higher Education (CERES) have formed a major part of the strategy of the National Ministry of Education to decentralise the supply of higher education and to expand its coverage at regional level, especially in the most remote and vulnerable communities, it is important to evaluate the success of this initiative and to build on

successful examples to achieve better economies of scale, critical mass and improved quality and relevance of the programmes offered.

Recommendations for the national level

- Continue the efforts to improve access and success to tertiary education, and enhance the relevance and quality of education at all levels. Pursue the goal of achieving 50% gross tertiary participation by 2014, emphasising the connections between equity, quality and relevance.
- Expand ICETEX student support and improve targeting on the least advantaged groups, by improving the accuracy of socio-economic classification for all education-related purposes. Ease the loan repayment burden by an income-contingent loan repayment system or a graduated repayment system.
- Develop and implement a National Framework of Qualifications (NQF), supplemented by a national credit transfer system to promote student mobility and create clearer and more universal pathways between tertiary levels and institutions. Integrate SENA fully into the tertiary system and into national databases.
- Commission an external evaluation of CERES to identify the strengths and weaknesses of CERES programmes relative to other T&T programmes (including those at SENA centres), with particular reference to quality of programmes, cost to students, value for money, impact on employability and long term financial sustainability and governance.
- Improve teaching quality in tertiary education institutions by attracting highly-qualified new staff and upgrading the qualifications of existing staff, encouraging peer observation of teaching, and developing indicators of teaching quality to be included in performance appraisals of tertiary institutions.
- Build strong links between institutions and industry at all tertiary education levels. Ensure that tertiary education programmes include work placements and build broad competencies, such as analysing problems, organising time, writing skills, working in teams and groups.
- Commission an external review of the supply of and demand for tertiary education graduates at all levels. The review should take into account

employment rates and salary levels related to field of study as well as qualification level. Address disparities between regions in tertiary enrolment, by increasing the number of municipalities with their own provision and expanding distance learning.

- Maintain and improve the state examinations for higher education quality (ECAES) known today as *SABER Pro*, a valuable experiment in Latin America, which together with the information of the Labour Observatory (*Observatorio Laboral de la Educación*), provides valuable instruments to guide institutional and Departmental policies in tertiary education, its relevance and quality.
- Enhance the quality of training programmes for primary and secondary teachers, design induction and professional development programmes for new school teachers and leaders. Given the unsatisfactory results obtained by Colombian students in the PISA assessment (2009), it is important to focus on teacher training issues such as recruitment for pedagogical programmes, initial teacher preparation at the tertiary education level, special accreditation of teacher training programmes, professional accreditation according to high standards in all subjects and levels and further education opportunities.

Recommendations for the departmental level

- In collaboration with tertiary and other education institutions and key public and private stakeholders of the economy and society work to develop a Regional Human Capital and Skill Development System to define region-wide goals, policies, priorities, measures and milestones for the medium term strategic development. As part of this system, establish a tertiary education co-ordinating body that develops a vision and strategy in a collaborative effort by the system participants to ensure support and legitimacy to sustain political cycles that affect the departmental, municipal and local governments. It is vital that such an organisation is autonomous, can rely on its own resources to commission studies and evaluations and is run with complete independence from the corporate interests of its participants.
- Develop a portfolio of robust data on graduate labour market related to the regional context and the situation of individual tertiary education institutions to support decision making at the regional and institutional levels. The most effective region-wide graduate labour market systems are based on the collection of comprehensive labour market

intelligence, on-line publication of the data in a single place to improve students' ability to make rational choices about their studies and to help graduates and employers come together and increase students' chances of finding employment. Use the data strategically to identify regional priorities and respond to the data in terms of course offerings and the provision of employer/cluster-specified skills by educational institutions.

- In collaboration with tertiary education institutions continue and expand efforts to improve the access and success of students from lower socio-economic backgrounds (strata 1 to 3), and strive for greater efficiency in education, by reducing dropout rates as well as by increasing graduation according to the minimum time for degree completion. These efforts should build upon the best international practices related to effective academic, social and financial support for students; long-term collaboration with secondary education institutions to improve students' learning outcomes; efforts to raise aspirations among students; and adoption of more student-centred learning methods. International experience shows that early warning systems, as well as individual tutorial programmes, are effective for students at risk. These systems entail attendance at remedial and compensatory classes, the identification of key subjects in the different fields that are difficult to master for at-risk students, student welfare measures that provide emotional support and counselling services, and the organisation of teams to support students in danger of dropping out.
- Improve links between secondary and tertiary education and between education and work, thereby making education programmes more attractive and relevant for young people who expect to enter the labour market quickly. Antioquia has achieved relatively high levels of absorption but, in some sub-regions it is still registering high desertion rates between secondary and tertiary education. Follow the example of the national “Programme for the Development and Strengthening of Links between Secondary, Technical and Tertiary Education” (*Programa para el Fomento y Fortalecimiento de la articulación entre la Educación Media, Técnica y la Educación Superior*), which - through agreements and alliances among secondary institutions and different tertiary and postsecondary institutions – allocates subsidies to those enrolled in both secondary and technical-professional programmes in areas with a high occurrence of dropouts.
- Focus efforts on improving the quality of education at all levels. The OECD evidence shows that economic growth is not driven by a greater

number of years of schooling and wider coverage of subjects, but by the quality of that education. A tertiary education system with increased absorption and enrolment rates must develop strategies at the departmental level to address quality issues.

- In collaboration with tertiary education institutions, take steps to significantly expand tertiary education opportunities for working age adults. These steps should create clear and transparent pathways to advance education for adults, including the ability to attend multiple institutions, obtain short-term education and training that can later be applied to degrees, and re-skilling and up-skilling courses and programmes designed around the particular needs and interests of adults who often combine work and study. Consider establishing an agency to help recognise prior informal and non-formal learning.
- In collaboration with employers encourage entrepreneurship as an inherent feature of a society and economy. To meet the goals of the Development Plan for Antioquia (2006-2011) to stimulate academic training in entrepreneurship and to create and consolidate a culture of productivity and competition in different sub-regions, provide entrepreneurial training both at the secondary and technical levels, as well as in the technological and university levels, with particular emphasis on the less developed areas.
- Ensure sustainable and balanced sub-regional provision of tertiary education by conducting a region-wide assessment of current and planned capacity against anticipated student numbers, and identify gaps in staff and infrastructure. When developing or rationalising the network of education providers, ensure to have access to lifelong learning and industry-related services through flexible multi-provider learning and extension centres that draw on a range of providers, including both universities, T&T institutions and CERES, and are supported by adequate IT infrastructure that ensures high speed, low cost connectivity.

Recommendations for tertiary education institutions

- Develop policies, programmes and measures to improve, on a continuous basis, the quality and relevance of study programmes. Firstly, review the curriculum content and pedagogical methods of study programmes to align them with the needs of the labour market and the local and regional economies. The opinion of employers and

graduates should play an important role in the systematic and continuous revision of the education programmes of tertiary education institutions. Secondly, take full advantage of the results of *Saber Pro* examination that evaluate generic skills such as critical thinking, problem solving, written output and interpersonal understanding in curriculum design and the development of teaching and learning. Thirdly, create robust methods to monitor the student progress and graduate employment outcomes. Fourthly, monitor studies that analyse the entry of graduates into the labour market, using the information generated by the Labour Observatory for Education, which facilitates the identification of the most profitable employment sectors and tertiary education programmes, promotes awareness and monitoring of demand for different knowledge areas, assures follow-up with regard to regional demand and supply of human capital, publishes regional relevance analyses, measures career success by universities (employment and salary levels), monitors remuneration and income inequalities, undertakes follow-up studies on formal employment and stimulates awareness of the relevance, quality and supply of T&T education.

- Collaborate more actively with industry for stronger alignment of the educational provision with regional and labour market needs and in order to ensure the entrepreneurial skills of graduates and their employability. Engage employers in the curriculum development, invite professors from industry to deliver courses, and develop problem-based, interdisciplinary and work-based learning methods to develop employability, entrepreneurial and transferable skills. Place a greater emphasis on generic and soft competencies and on values that guide action, such as taking responsibility for shared goals and co-operating to achieve these.
- In order to improve the quality of all tertiary education programmes, gradually reserve academic positions only for candidates with a Masters degree or higher and fix a period for those who wish to follow an academic career to complete their doctoral studies. Provide comprehensive professional development programmes for university teachers. Provide regular short courses to improve teaching skills encourage assessment and feedback from students, and support and reward excellence in teaching. Increase the number programmes that pursue a high quality accreditation.
- Expand general education courses progressively in the first year of university programmes and reduce specialised materials to establish a curriculum structure of shorter duration at the undergraduate level with

later specialisation at the Masters level following the European Bologna model. Gradually introduce, in all programmes, a greater component of English teaching, more intensive use of ICTs to facilitate autonomous learning, and the development of key competencies linked to the capacity of learning to learn.

- Look to match global levels of excellence in supporting entrepreneurship in the curriculum and build comprehensive support programmes encompassing entrepreneurship training, practical experience of creating new businesses for groups of students, and incubation and hatchery facilities together with seed funds for new graduate ventures.

Research, development and innovation

National authorities have increased public support for science and technology, but innovation potential is constrained by many challenges.

The Colombian authorities have taken steps to strengthen the National Science and Technology System with the goal to increase human resources and investment in RDI to facilitate growth that would increase the per capita income of all Colombians. The target is to invest 2% of the national product in science and technology by 2019, with 500 PhDs graduated every year in strategic knowledge areas. At the same time, the authorities aim to stimulate innovation in the productive sector and channel funding to strategic sectors with high scientific and technological content.

Despite the progress made, Colombia continues to underperform in science, technology and innovation, ranking lower than the largest countries in Latin America. Colombia is on the 71st place in the Global Innovation Index, well behind the top performers, and also the highest performing Latin American countries. In 2007, Colombia spent 0.16% of its GNP on science and technology, compared to 1.1% for Brazil and 2.1% for the OECD average. Leading-edge research in Colombia remains underdeveloped with weak industry links, a low level of patents.

Antioquia is the leading region in Colombia after Bogotá in innovation capacity based on

science and technology production. But major improvements are necessary in research and researcher training, and support for RDI.

With a diverse set of tertiary education institutions and growing student enrolments, Antioquia is one of the prime locations for science, research and innovation in Colombia, based on indicators such as human resources, funding and projects, but lags behind the national capital. Out of the 17 000 people actively engaged in research in 2009, 16% were in Antioquia. Bogotá absorbed more than half (51%) of the national investments in science and technology, compared to 13% for Antioquia. Out of the 3 000 projects approved by Colciencias in 2009, 961 were from Bogotá and 782 from Antioquia, mainly in health, industrial technology, basic sciences, and energy and mining.

Antioquia's 206 000 students represent a strong innovation potential for the future, but, as elsewhere in Colombia, post-graduate training and research are in need of strengthening. In 2009, 2 270 students out of the 206 000 were enrolled in Masters and 388 in doctoral programmes. Between 2001 and 2008, only 147 doctors graduated from Antioquia's universities, less than 20 a year. In 2009, the University of Antioquia, the leading tertiary education institution in the region had less than 300 students enrolled in its 23 doctoral programmes and graduated only 19 PhDs.

Antioquia has pioneered a large number of initiatives from different public and private bodies to boost science, technology and innovation, but lacks a coherent regional innovation system.

Antioquia is one of the leading regions in Colombia in making science, technology and innovation a pillar of its economic development and future prosperity. Its departmental government and the business sector have excelled in goal setting, prioritisation and consensus building. It has developed partnerships among the public sector, companies and universities which show a gradual growth of R&D development capabilities. Antioquia has pioneered new agencies and organisational arrangements, such as the Science, Technology and Industry Directorate that was established to stimulate co-operation and to develop a regional Science, Technology and Industry Plan; the Regional Commission of Competitiveness; and the Council for Science, Technology and Industry, CODECIT, that will coordinate a fund to be derived from the 10% of the income generated by the General Royalty System. At the metropolitan level, Medellín is leading

cluster-based initiatives to transform itself into a centre of high technology, creative industries and tourism, but co-ordination with the Department of Antioquia and tertiary education institutions remains a challenge.

Structures have been developed to support university-industry collaboration and inter-institutional collaboration for local and regional development in Antioquia. Antioquia has pioneered in mobilising its tertiary education institutions for regional development through the nationally recognised University–Firm–State Committee, CUEE, which under the leadership of the University of Antioquia brings together 12 public and private tertiary education institutions, 21 companies, 7 regional research and development centres, the governments of Antioquia and Medellín, and the national associations of entrepreneurs and micro and small and medium-sized enterprises. Recognising the need for an integrated response to industry, the university has established five Centres of Excellence for Research and Innovation (CIIE) in collaboration with industry, social and governmental institutions and other tertiary education institutions to respond to regional and national focus areas in health, energy, biotechnology and ICT.

Despite a wide range of initiatives, programmes and networks Antioquia has not yet developed a coherent Regional Innovation System. It is unclear what departmental institution has the main responsibility for coordinating the regional innovation strategy. It is difficult to assess the total amount of investments in innovation activities or to ascertain their source whether regional, national, public or private. Linkages between universities and technological institutions remain underdeveloped, which has a negative impact on regional and local development.

While the public role of regional innovation system is likely to grow in future, there is a need to foster a sense of responsibility to show an overall positive return to public investment. The available data on the outcomes of various RDI initiatives by the government are limited and there is a significant discrepancy between the stated objectives and the end results. A wider portfolio of data related to the characteristics and performance of firms should be developed in conjunction with the promotion of cluster-building strategies and evidence-based decision making in general. Innovation authorities should guard against pursuing too many goals simultaneously and dispersing energy and efforts. The incentives for tertiary education institutions should be reviewed to find ways of influencing these towards more concrete participation in innovation activities and balance knowledge production with knowledge transfer.

Science- and technology-led innovation strategy is not enough to address Antioquia's key challenges and a low absorptive capacity for innovation in the local economy that is restructuring. Antioquia needs innovation in low and middle-tech firms that dominate the local economy.

Innovation, with a significant contribution from the universities, can help address the key challenges of poverty and unemployment in Antioquia. Antioquia's dual economy has an export-oriented part, dominated by multinational corporations with few linkages to local firms, and a domestic part characterised by low skills and low RDI intensity. Poverty and poor labour market outcomes in Antioquia are not only related to the low skills of the population, but also to the way in which the regional economy is organised, with most of the resources and investments concentrated in highly productive, capital-intensive sectors in the Medellin area that are not labour intensive.

The dynamism of the local economies depends on the ability of local firms to innovate and to adapt to changing markets and technologies by continually introducing commercially viable products, services and production processes. Large, internationally oriented companies in the areas of mining, energy and banking can source their technologies from the international market, and only in special conditions would need to develop their own local research and innovation capabilities. The kind of innovation most needed in Antioquia is not the high-tech, research-based knowledge produced in sophisticated research centres and laboratories, but incremental improvements in the way products are made and commercialised in low and middle-tech firms that are still the bulk of the economy.

Antioquia would benefit from an innovation strategy that supports not only innovation intensive sectors with high tech research, but also the wider SME base with low R&D investment and a weaker innovation culture. Tertiary education institutions could become instrumental in helping the economy to follow a more knowledge-based path of development in the sectors and areas which are currently suffering from low RDI intensity. They could play a stronger role in facilitating the cluster development in the existing productive chains in agro-industry, mining and energy, textile and fashion industry, tourism and health services and thereby help articulate the demand from SMEs for services offered by universities.

Technological institutions are often better equipped to engage with small and medium-sized enterprises in particular in managing the upgrading of technologies. To ensure that the T&T sector is well positioned to help

upgrade and diversify existing industries to expand into a new line of business, their focus on skill provision should be balanced with locally focused support for SMEs across Antioquia.

In Antioquia, many institutions are involved in the development of entrepreneurship but participation and collaboration needs to expand to optimise the effectiveness of available resources.

Finding ways of increasing entrepreneurship is an effective strategy to create jobs. Spin-off companies are also locally based and likely to have a local economic benefit. This is also an area where tertiary education institutions in Antioquia could have a stronger impact on the SME sector through support for enterprise within the student/graduate community and closer collaboration with other support activities.

Antioquia, and particularly Medellín, which has a strong entrepreneurial tradition, has many interesting examples of entrepreneurial development and entrepreneurship in various tertiary education institutions. These combine curriculum at the undergraduate level, promote practical work by students, link research to the productive sector and foster the transfer of knowledge and its dissemination amongst the community (EAFIT). Other initiatives include the Entrepreneurship Park, an initiative of Medellín and the University of Antioquia that identifies business opportunities based on research outcomes and organises a competition through which the municipality provides seed money for small entrepreneurial activities, with the goal of 1 500 new entrepreneurs in 2011. In partnership with universities and local governments, the National Learning Service (SENA) has stimulated small business creation by providing seed money on a competitive basis and tutorship, but so far results remain modest with only 10% of projects having received support and a 50% failure rate in the first years.

Universities could consider mainstreaming enterprise support with degree programmes and through supporting infrastructures. Better results could also be achieved through pooling of resources and stronger collaboration across the tertiary education sector. Provision of entrepreneurship programmes should be scaled up, focusing on growth oriented entrepreneurship, but not neglecting social and cultural entrepreneurship and assistance to move towards formal economy of firms and low income people. Experience elsewhere shows that the best support for graduate entrepreneurship comes from teaching undergraduate and graduate levels programmes where students from across the sciences,

engineering, business and arts disciplines work in teams to form real companies mentored by entrepreneurs.

Recommendations for the national government

- Increase investments in research, development and innovation; Stimulate research beyond the National University and Bogota, but avoid spreading resources too thinly by building critical mass and linking researchers throughout Colombia to established R&D groups. Through Colciencias support high quality and high potential centres of excellence in both academic and applied R&D. Stimulate national and international networking, collaborative projects among tertiary education institutions and university-industry collaboration.
- In collaboration with the departmental governments improve the evaluation and assessment of funded RDI initiatives to ensure accountability for the use of publicly allocated resources. These include criteria and measures of quality and relevance to the socio-economic needs of society such as: *i)* the continued relevance of the RDI programme to its original stated objectives; *ii)* programme results and the achievement of objectives; *iii)* the impact of the programme on its stakeholders; and *iv)* the cost-effectiveness of the programme. Develop a robust system of indicators, particularly of outputs and cost-benefit analyses, to evaluate and assess RDI initiatives.
- Through Colciencias and other agencies, strengthen the incentives for tertiary education institutions to engage in systematic and institutional collaboration with local business and industry to drive socio-economic development in Colombia and its regions. These incentives should encourage tertiary education institutions to undertake collaborative activities, such as applied research, consulting and partnerships with other regional stakeholders, in areas where the regions have a real or potential comparative advantage. Government policy should allow tertiary education institutions and their researchers to obtain additional resources and funding from external sources based on the projects in which they participate. This will facilitate tertiary education institutions to balance the current focus on knowledge production (through academic papers) with knowledge exchange and transfer and to participate in university-industry partnerships and other innovation activities.
- Ensure that the expected creation of a new research and innovation fund based on royalties from the production of oil and gas is used for the

commercialisation of promising research and technologies and for the creation of innovative firms. It is expected that these investments will pay back the public investment through the generation of increased private sector activity and valuable publicly-provided advancements that would not have come about without the initial government investments. It is necessary to ensure that resources are not used to subsidise current practices, leading to a situation of dependence and lack of local initiative, and that only projects with good prospects of becoming self-sustaining are supported. No benefits are gained by funding uneconomic innovations, unless the innovation has a value as a public good which can justify its subsidisation.

Recommendations for the departmental level

- Apply a systemic approach in developing a regional innovation system with a well-organised co-ordinating body. A regional innovation system can overcome the current fragmented approach and facilitate stronger collaboration and networking, consensus-building for economic development and partnering between educational institutions and industry in order to create close collaboration across tertiary education and research and industry, particularly small and medium-sized enterprises.
- Foster entrepreneurship and the development of small and medium-sized enterprises, which are able to employ a larger number of people and make a significant contribution to the reduction of poverty and inequality. The OECD evidence of several case studies shows that governments should reorient their policies more towards individuals and individual behaviour and less towards SMEs as entities; more towards measures to develop the supply of competent entrepreneurs and less towards “picking winners” among existing firms or sectors; more in favour of measures to support the early phases of the entrepreneurial development process, including the nascent as well as the start-up phases; and more in favour of developing an entrepreneurship culture, while creating a more favourable business environment.
- In co-operation with the national government, play a stronger role in steering the resources for science, technology and innovation towards the needs of the region and in sectors in which the region holds a comparative advantage. This could include developing the existing funding models of the tertiary education institutions to improve their accountability, specialisation and efficiency. A performance-based

funding system which introduces competitive funds could provide greater incentives for industry and for the regional engagement of universities.

- Co-ordinate the policies, programmes and initiatives between the regional and local authorities in Antioquia and Medellin for encouraging and funding innovation activity in order to develop a more robust regional innovation policy and to reduce duplicated efforts and wasted resources and energy.

Recommendations for tertiary education institutions

- Widen the scope of innovation activities to focus also on low-tech sectors and on organisational and social innovation, and concentrate efforts on challenge-driven innovation related to key issues in the region, such as poverty reduction and health. Use the region as a “laboratory” for research, knowledge transfer and outreach to reach global levels of excellence. Combining community outreach with training and challenge-driven research can generate improvements in life quality and low-tech innovations.
- Improve capacity to engage in long-term collaboration with local businesses, technology transfer, innovation and new business creation. This co-operation can play an important role in improving the region’s innovative capabilities, particularly in terms of technical assistance and university-industry collaboration. Encourage single entry points for industry and SMEs within a tertiary education institution or a group of institutions to help businesses identify where best to provide support for innovation in the tertiary education sector.
- Collaborate with local business to design RDI programmes and other activities that are more strongly aligned with regional needs and allow not only for high-tech development but also for incremental advances. Ensure that local firms are aware of the benefits of hiring graduates. Within tertiary education institutions, foster linkages between science and technology departments and business departments and facilities, and with other disciplines to provide support for service and industry. Promote technologies with cross-sector fertilisation potential.
- The University of Antioquia should strengthen its efforts to build world class excellence in regionally relevant activities and strengthen its role as a regional institution by providing technical assistance and extension

activities which are locally relevant and undertaken in partnership with other institutions.

Social, cultural and environmental development

Antioquia's indicators for socio-economic and educational development have been improving, but challenges remain manifold calling for collaborative action with participation from the tertiary education institutions to develop complementarities.

Antioquia's tertiary education institutions have each responded, in accordance with their specific missions, to the social, cultural and environmental needs of the region, but the scope and impact of this action remains limited. Nationally all tertiary education institutions are obliged to devote 2% of their budgets to programmes to community wellbeing, often by increasing the participation of students from lower socio-economic backgrounds. Despite this significant resource allocation, the efforts remain insufficient, resources are spread thinly, and the scope and impact of the activities constrained, partly maintaining and reproducing the disparities between urban and rural areas. There is limited evidence of collaboration across tertiary education sector, a lack of focus on the implementation and monitoring of results which could help evaluate the outcomes of the outreach activities and help scaling up good practice example into a system. There is also a lack of co-ordination among activities, programmes and plans amongst the Department of Antioquia, the municipality of Medellin and tertiary education institutions.

There is a need to empower disadvantaged communities in rural areas to address their own challenges by strengthening the social economy, cultural identity and environmental sustainability.

A more integrated approach to local economic and social development would benefit Antioquia. While widening access to tertiary education will contribute to outmigration if the best and the brightest leave rural areas to find study and work opportunities elsewhere, and universities' service delivery will address the symptoms of poverty and inequality, but not their causes, there is a need to reach out and empower communities to address their

own problems by strengthening the social economy, cultural identity and environmental sustainability.

For sustainable results, tertiary education institutions, in collaboration with local, departmental and national authorities, could play a more active role in helping design and implement community development programmes that build capacity of the communities to respond to their social, economic and environmental challenges. They could play a more prominent role in improving the relevant skills in rural areas, providing lifelong learning and re-skilling opportunities, and training community development practitioners in addition to indigenous leaders. They could conduct challenge-driven research into key issues in the region, focus on preventive, multidisciplinary approaches to health promotion, and develop low tech, low cost innovation that bring concrete improvements in everyday life.

Recommendations for the national government

- Extend the obligation of tertiary education students in health and law to contribute to social development to all students to multiply interventions and to address social problems with an innovative, multi and transdisciplinary approach.

Recommendations for the departmental level

- Create a forum for the systematic exchange of information and experience amongst tertiary education institutions with regard to social, cultural and environmental matters. This forum could organise thematic events with regular information retrieval and exchange facilitated by a dedicated website. The forum would permit the tracking and monitoring of different initiatives and their outcomes, along with the identification of best practices for publication and policy fine-tuning. As a first step, all the social initiatives and projects of tertiary education institutions should be mapped and published in a shared platform. Build on existing examples of good collaboration between universities and the Department of Antioquia, most notably the “Cultural Round Table of the Institutions of Tertiary education” (*Mesa Cultural de las Instituciones de Educación Superior*), that could be used as a model for collaborative and joint intervention in other areas.
- In collaboration with a wide range of public and private stakeholders, widen access to tertiary education for the rural population. This should build on successful initiatives, such as the Regionalisation Programme of the University of Antioquia that brings educational infrastructure and

services to rural areas and leads the expansion of virtual education. Facilitate connectivity and access to digital devices, virtual learning materials and well trained personnel.

- In collaboration with the tertiary education institutions and other stakeholders, develop a strategy that sees arts and culture as an agent of development through: *i*) direct benefit in enhancing the quality of life for the culturally diverse population; *ii*) indirect economic benefits in attracting and retaining talent which can drive the knowledge society; and *iii*) a direct contribution to the creative industries through enterprise training, growth, productivity and employment. This strategy should address the needs of the culturally diverse populations in the region and also enhance Antioquia's internationalisation.
- Incorporate tertiary education institutions into the governmental bodies responsible for public health and ensure that municipalities do the same in the committees of epidemiology. Encourage tertiary education institutions to address public health problems in a preventive, multi-dimensional and interdisciplinary way, and not only by generating specialised knowledge and providing services through their human and medical infrastructure. Make child mortality, high rates of adolescent pregnancy and other issues of the regional health agenda, such as occupational security and solid waste management, priority areas for this collaboration.
- Collaborate with the public and private sector to support sustainable environmental and economic development through a comprehensive regional approach, where tertiary education institutions can contribute to the diagnosis of regional environmental conditions and sustainability, the ecological education for the community at large and research on solutions to existing environmental problems.

Recommendations for tertiary education institutions

- Improve the monitoring and follow-up of the success and results of their initiatives, projects and programmes to show the return on public investment. The lack of robust and comparable data constrains the visibility and impact of universities' activities. It also makes it difficult to measure the real success or failure of programmes.
- Align initiatives for social, cultural and environmental development with the plans designed by national and sub-national authorities in order

to have a stronger impact at the local and regional level. Collaborate with other tertiary education institutions in the design and implementation of extension activities.

- Develop the international dimension of extension activities in order to maximise their potential impact and promote exchanges and networking with other parts of the world that are experiencing similar problems. Mobilise international co-operation and networks for the social, cultural and environmental development of the region.
- In addition to widening access to education and providing services to disadvantaged communities, make use of the social service obligations to engage in long term community development by seeking ways to empower communities to find their own solutions to economic, social, cultural and environmental challenges.

Capacity building for regional development

Antioquia has pioneered in building capacity for regional and local development, but co-ordination and collaboration remain challenges. There is a lack of strategic anchoring of regional engagement of tertiary education institutions and a co-ordination deficit.

Antioquia has been a national leader in building capacity in regional development, human capital and skills development, and science, technology and innovation. It has developed a number of strategies, development plans and collaborative mechanism in collaboration between tertiary education institutions, business sector and public authorities. The Antioquia 21st Century Vision has become an overarching co-ordination mechanism among regional stakeholders. The Strategic Development Plan of Antioquia-PLANEA is implemented by the governor with more than 40 public and private stakeholders, including three university leaders. The Development Plan of Antioquia 2008-11 sets goals for tertiary education institutions in terms of access to and quality of education, and applied research. The Development Plan of Medellin has focused on increasing access to education in technical and technological fields to reduce poverty. Regional Higher Education Centres (CERES) have been developed by national, regional and local governments, tertiary education institutions, the

local business and industry and civil society in order to widen access and decentralise tertiary education provision. The University of Antioquia has established Centres of Excellence for Research and Innovation (CIIE) in collaboration with industry, social and governmental institutions and other tertiary education institutions to respond to regional and national strategic needs, and is also leading the award-winning University-Firm-State Committee (CUEE).

At the same time, the current extent of regionally relevant activities by tertiary education institutions in Antioquia, including industry collaboration and widening access initiatives are not fully reflected in tertiary education policy or institutional set-up, and remain limited in scope and impact. There is a lack of integration of regional and local engagement within the core teaching/learning, research and service missions of the institutions and a co-ordination deficit at the institutional and system level. Action is not reflected in the strategic development, curriculum development or budget allocation of the tertiary education institutions. Collaborative mechanisms among tertiary education institutions to build capacity and foster joint efforts for regional development remain limited. The system of information gathering about regional environment as well as success and failure of regionally and locally relevant activities by tertiary education institutions is underdeveloped, which make it difficult to evaluate the outcomes of policies and institutional practices.

If Colombia and Antioquia want to mobilise tertiary education for external and regional development, policy and funding mechanisms should be aligned with this goal. Policy incentives should be improved with focus on the allocation of funding, governance, accountability, review and approval of new academic programmes, and staff promotion.

Tertiary education institutions can play an important role in regional and local development by joining up a wide range of policies such as science and technology, industry, education and skills, health, culture and sport, environmental sustainability and social inclusion. If Colombia wishes to mobilise its tertiary education system in support of local and regional development, the tertiary education policy which embraces teaching, research and community service could include an explicit local and regional dimension.

In Antioquia and Colombia in general, the policies and incentive structures for mobilising public tertiary education institutions for external,

let alone regional and local development are limited. Public universities in Colombia, as well as in other Latin American countries, give a major role in institutional decision-making to academic staff, but little influence is given to external partners. Accountability structures are generally weakly developed. Tertiary education institutions are governed through collective bodies that represent their internal stakeholders and are subject to rigid budgetary restrictions typical of a civil service administration. Public resource allocation for tertiary education institutions in Colombia does not give adequate emphasis to performance or regional engagement. Despite the obligation to spend 2% of their budgets to community development, there is no explicit “third task” or regional development task assigned to tertiary education institutions.

A range of policy incentives could help mobilise the potential of tertiary education sector for local and regional development. One way of making the universities more focused on regional needs of the labour market and society is to bring regional stakeholders to participate in the top decision-making bodies of the institutions, and to ensure that this pattern of collaboration becomes more than a formality, leading to concrete results.

A second policy is to create funding mechanisms to provide incentives for regional engagement of tertiary education institutions. The resources received by the universities could be contingent upon their specific contributions to regional development. For this, the universities need to develop middle and long range plans and their top authorities should have the necessary autonomy to work in order to achieve these goals. The authorities could also consider a competitive way of allocating funding incentives to regional and municipal tertiary education institutions.

A third policy is to free universities from cumbersome civil service controls and regulations, to encourage them to adopt modern management practices and to ensure that regional engagement becomes a regular element of ongoing planning, development and funding allocation within the institution.

A fourth policy is to include regional perspective in the tertiary education programme review and approval process. These criteria could be re-examined to ensure that the tertiary education programme review and approval process is streamlined to allow for greater responsiveness to regional needs.

A fifth policy is to review incentives for faculty and staff by widening the criteria for recruitment, promotion and tenure to emphasise relevance and regional engagement. Currently, the criteria for staff recruitment and promotion in Antioquia’s tertiary education institutions emphasise research and publication and not a broader definition including regional engagement.

Recommendations for the national government

- Reintroduce the tertiary education reform after a period of review and additional consultation with stakeholder groups. Accompany with consultation and communication strategies any funding reform proposal to rally support from potential winners and reduce the political risks. Consider making external and/or regional engagement and its wide agenda for economic, social and cultural development explicit in tertiary education legislation and policy.
- Balance the institutional autonomy of tertiary education institutions (in terms of the use of human, financial and physical resources and responsibility over curriculum) with institutional accountability for results and decisions. Work with tertiary education institutions to develop an agreed accountability framework, which makes clear how each institution will play its part in the achievement of the national goals, and what mechanisms and performance indicators the institutions will use to report their progress. Review the composition of institutional governing boards to ensure adequate representation of the public interest, including the private sector and employers.
- Link financing more closely to performance (quality, outcomes, efficiency and relevance to national and regional economic needs). Introduce performance-based funding mechanisms for allocating a much larger part of public subsidies to redistribute resources to achieve a more equitable sharing of public subsidies across public tertiary education institutions, and to offer incentives to encourage institutions to be more efficient and responsive to development, labour market needs and needs of their regions. Mechanisms could include: i) long term core funding to support regional engagement, ii) strategic incentive-based funding schemes on a competitive basis, iii) formulae for block grant funding against outcomes, with higher weights for enrolment of students from within the region, from under-represented population groups or for enrolments in academic programmes related to regional labour market needs; iv) policies governing tuition fees that provide for lower fees for in-region students and policies for students' financial aid that provide higher amounts for in-region students and special populations; v) special or "categorical" funding contingent on evidence of regional engagement and focus; vi) requirements that institutions collaborate in order to obtain funding. This could provide incentives for tertiary education institutions to facilitate mobility of students (credit transfer within the region) and share programmes and other resources in efforts to serve the region; vii) special funds that

provide matching of funding obtained by tertiary education institutions from contracts with regional employers for education and training services; and viii) investment in the fundraising infrastructure to support regional engagement.

- Explore ways of simplifying administrative arrangements and financial management rules in public universities in order to bring about modern management practices and facilitate effective partnerships between universities and industry. Review tertiary education financial control systems, at both the national and institutional level. In collaboration with the Ministry of Finance put in place adequate regulations and monitoring capacity to ensure that private tertiary education institutions manage their resources according to transparent accounting practices and prepare annual financial reports that are independently audited.
- Improve the robustness and reach of the quality assurance system. Re-examine the criteria for the inclusion to the Register of Qualified programmes to allow for quicker and greater responsiveness to regional needs. Criteria emphasising regional engagement and responsiveness should be included in the review and approval process, for example: *i*) data documenting the specific gaps in access and opportunity for the population and important sub-groups; *ii*) data documenting relevant regional labour market needs and potential future needs arising from regional economic development plans; *iii*) evidence of engagement by regional stakeholders (employers, community representatives and representatives of under-served sub-populations) in programme planning and design; and *iv*) emphasis on regional engagement (internships, community service, student research on regional issues) within the curricula and student experience. The Commission should seek the advice of regional leaders (employers, community leaders, regional economic development officials) in the programme accreditation process.

Recommendations for the departmental government

- Update Antioquia's Vision and the Strategic Development Plan of Antioquia-PLANEA to consider the contribution that tertiary education institutions can make to regional development and to achieve the visions of the respective sub-regions.
- In collaboration with public and private sector stakeholders including tertiary education institutions, establish a co-ordination mechanism or

body to plan and implement strategic development plans for the region. The co-ordinating body should design a strategic development plan which, in a collaborative way, outlines policies, priorities and goals for tertiary education institutions that are linked to their teaching and research objectives and strengthen their capacities in regional and local development. This should also promote engagement and co-operation between regional and local institutions in achieving regional development objectives.

- Include in the regional development plans, policies for monitoring and assessing their strategic implementation and for developing a robust portfolio of socio-economic data about the region. This should entail an evaluation of tertiary education capacities for local and regional development and current practices in inter-institutional collaboration, outreach and community development.

Recommendations for tertiary education institutions

- Develop a clear and collaborative platform with other tertiary education institutions that focuses on the economic, social, cultural and environmental wellbeing of the region to address the needs of the region, promotes shared learning and assist in the implementation of the strategic development plans of the region. This platform could facilitate the development of inter-institutional learning programmes and research projects that address the major challenges for the region. Promote institutional co-operation by enhancing pathways between universities and technological tertiary education institutions and by developing mobility programmes among the tertiary education institutions.
- Improve contribution to regional and local development through aligning institutional planning, development and resource allocation with regional and local needs. Consider establishing a Regional Development Office to create links between tertiary education and other stakeholders from the government and from social and economic sectors in the development of joint projects that address regional needs. Review career incentives to faculty and staff members to include research and activities in collaborative projects for regional and local development. Remove any institutional barriers for multi-disciplinary and institutional collaboration, technology transfer and other forms of engagement in regional and local development. Ensure that the University-Firm-State Committee of Antioquia incorporates in its performance criteria

measures related to promoting regional impact, inter-institutional collaboration and capacity building for regional and local development.

- Establish an evaluation mechanism to assess institution's impact on regional and local development and publish the outcomes from this evaluation to ensure accountability and encourage the sharing of good practices examples both within an institution and with other tertiary education institutions.

OECD reviews of higher education in regional and city development

Universities and other higher education institutions can play a key role in human capital development and innovation systems in their cities and regions. In the context of global economic and financial crisis, OECD countries are seeking to mobilise higher education institutions (HEIs) to support more strongly their economic, social and cultural development.

In 2008, the OECD/IMHE launched a second series of OECD Reviews of Higher Education in Regional and City Development to address the demand by national and regional governments for more responsive and proactive higher education institutions. As a result, over 14 regions in over 11 countries have undergone the OECD review process in 2008-12.

This OECD Review of Higher Education in Regional Development of Antioquia, Colombia (<http://www.oecd-ilibrary.org/content/book/9789264179028-en>) explores a range of policy measures and institutional reforms to mobilise higher education for the development of the region. It is part of the series of the OECD reviews of Higher Education in Regional and City Development. The reviews analyse how the higher education system impacts local and regional development and help how this impact can be improved. In addition to human capital and skills development, technology transfer and business innovation, the reviews also considers higher education's contribution to social, cultural and environmental development and regional capacity building.

To know more about the OECD review process and requirements, visit Higher Education and Regions' website at

www.oecd.org/edu/imhe/regionaldevelopment.