

OECD Review of Higher Education in Regional and  
City Development

# State of Veracruz, Mexico



## Assessment and recommendations

### *The State of Veracruz: from a lagging region to a centre for human capital development*

Mexico is an emerging economy that has undergone a period of economic transition and reforms over the last 20 years. Thanks to the North America Free Trade Agreement (NAFTA), revenue derived from Mexico's oil production, a large domestic market, political and macroeconomic stability, policy reforms and remittances from its diaspora, Mexico has emerged as the second-largest economy in Latin America after Brazil. However, the current economic and financial crisis has severely affected Mexico. In 2009, GDP decreased by 6.5% causing widespread unemployment and reduction in public spending.

Poverty and social exclusion remain serious concerns in Mexico. In 2006, 42.6% of the population suffer from some form of poverty; there is also a high degree of social inequality. Sustained economic growth is necessary for increasing the quality of life of the population, particularly of people from lower socio-economic backgrounds. Mexico's human capital, measured by years of schooling is one of the lowest in the OECD and its academic results are lagging behind the OECD average, according to the PISA results. The chances of Mexico achieving sustainable growth will significantly depend on its ability to improve its education system.

The State of Veracruz is located in the south east of Mexico, along the Gulf of Mexico. With a population of 7.1 million, Veracruz is the third most populous state in the country. However, the state's population growth rate is below the national average due to negative migration balance: the state loses both highly-skilled and low skilled population. While the population is young and mainly urban, its rural inhabitants still make up 40% of the total population, compared to 27.6% nationwide. Veracruz also features the third

largest indigenous population in the country. Poverty levels are high among the low skilled population.

The regional economy of Veracruz is dominated, on the one hand, by small and medium-sized enterprises operating in the traditional economy, particularly in the agricultural sector, and on the other hand, natural resource-based industries, such as electricity production, oil and gas extraction, which are mainly controlled from outside of the region. Recently, progress has been made in improving efficiency in production processes and product quality but overall, the productivity and the industrial capacity remain limited.

Despite considerable expansion of the education sector, Veracruz lags behind the Mexican averages in key education indicators, which in turn are significantly below the OECD average. The poor performance of the education system results in a relatively small pool of well-educated graduates from secondary and higher education systems. The economic structure in Veracruz and the underinvestment in human capital development have resulted in low income levels and high poverty rates. In the Mexican context, Veracruz is a “lagging and under-performing region”.

Veracruz is faced with the need to develop a knowledge-intensive economy, to increase the prosperity of the state and to address poverty and inequality. The low-skilled population is an obstacle to the economic development as it slows down the development of knowledge-intensive industries. Veracruz must therefore achieve improvement throughout its entire education system. In the context of the gaps in both economic development and education outcomes, the key challenges for Veracruz and its tertiary education institutions are:

- How to improve the overall education attainment levels and ensure that education provision is aligned with the needs of Veracruz?
- How to leverage the current economic base and promote new business formation?
- How to tackle poverty and social inequality in Veracruz?

To address these challenges, the State of Veracruz needs joint efforts in regional development including a human capital and innovation strategy, with a vision, measurable goals, milestones, co-ordination measures and robust evidence base. Tertiary education provision needs to be better aligned with the needs of Veracruz, by building stronger links between institutions and industries in the region. National and state authorities and tertiary education institutions need to join efforts to improve access and success in education by providing stronger academic, social and financial support for students and engaging in long-term collaboration with schools. Pathways

between the technical education sector and universities need to be strengthened. Research, development and innovation efforts need to build on the existing and emerging advantages of Veracruz.

## **Human capital development in Veracruz**

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*The State of Veracruz has made commendable efforts to strengthen the regional economy through investments in education and by providing up-skilling opportunities for the labour force. The tertiary education sector has expanded significantly and the access to education has increased mainly as a result of the establishment of technological institutes. Today, Veracruz is the leading state in Mexico in terms of the number of state technological institutes.*

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The Mexican's education system has radically expanded and diversified over the last fifty years. Nonetheless, Mexico's human capital capacity is limited and the average year of study is only 8.1, one of the lowest in the OECD area. The efficiency of the primary and secondary education system is low in light of the increased education spending per student. Mexico underperforms in international tests of secondary education learning outcomes such as the OECD Programme for International Student Assessment (PISA). In tertiary education, the number of students has increased from 1.25 million students in 1990 to 2.7 million in 2008-09, but at 34%, the tertiary education enrolment rate remains considerably below the OECD average (of 56%).

In Veracruz, there are 174 270 tertiary education students, with 67.5% of students attending public universities and 32.5% private institutions. The leading institution is the Universidad Veracruzana (State Public University of Veracruz), a public research-based university that accounts for 36.5% of the total enrolment in the state. As elsewhere in Mexico, the geographical expansion of existing and new institutions and the diversity of the institutions have increased the tertiary education enrolment. For example, the Universidad Intercultural Veracruzana (Intercultural University of Veracruz) launched by the Universidad Veracruzana with the support from the Ministry of Public Education has established four campuses in remote rural areas and indigenous communities. More importantly, Veracruz has seen a 50% increase in student enrolment in the technological institutes in

the last five years, with 43 967 students representing 31% of the total enrolment of tertiary education students in the state. Today, the State of Veracruz features the highest number of state technological institutes (21) in Mexico. The technological institutes have higher than average enrolments in engineering which provide a strong basis for innovation in future.

These improvements will eventually have an impact on tertiary education attainment levels and contribute to reduced poverty rates in Veracruz, provided that a larger number of graduates will find employment in the region. Currently, about half of the tertiary education students come from the neighbouring states signalling the attractiveness of the Veracruz educational system, but also highlighting the underlying supply-demand problem. Many of the graduates leave the region in search of job opportunities.

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*Work is needed in order to continue and consolidate the gains accomplished, and improve the access to education.*

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The key education indicators in Veracruz remain lower than national averages and significantly lower than OECD averages: the average years of schooling in Veracruz is 7.2. The rate of completion of upper secondary education in Veracruz is 26.8% and the tertiary education enrolment rate is 25.1%. Poor outcomes in the primary and secondary education system combined with the limited capacity of tertiary education institutions undermine the efforts to enhance participation in education and economic development. Furthermore, only 5.4% of tertiary education students are studying at a graduate level, revealing a lack of capacity to train highly-specialised personnel for the regional economy.

Widening access to and ensuring quality and success at all levels of education remain a key policy challenge in the State of Veracruz. National and state authorities need to address the challenges in primary and secondary education in a comprehensive manner, by improving the quality of the education offered and mobilising appropriate levels of financial resources. Universities and other tertiary education institutions should strengthen these efforts by engaging in long-term collaboration with schools in order to raise aspirations among students and to improve quality of teaching.

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*To improve graduation rates and learning outcomes of students and to boost*

*entrepreneurship in Veracruz, the tertiary education system needs to become better aligned with the needs of the region and its population.*

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Universities in Veracruz are primarily focused on national labour markets and career-centred education provision. There is a need to move towards a more demand-led education provision, to reform the traditional teacher-centred learning models, to strengthen the development of competencies of the students and to build stronger links between tertiary education institutions and labour market. This could be achieved through a wide range of measures, including academic, social and financial support for the first generation students, work-based learning for students, for example through co-op education in collaboration with the local industry and other employers, participation of employers in the curriculum and course design, and tracking of student progress, achievement and labour market outcomes. In addition, the use of local private sector employees as instructors and supporting the movement of university researchers/teaching staff on a temporary basis to the private sector would be useful ways of improving the labour market relevance. Finally, improving active language skills of all students and faculty are necessary if the region wishes to position itself in the global market.

Positive development in improving students' learning outcomes and labour market relevance of education is taking place in tertiary education institutions that participate in national-level projects, such as CESAL-INNOVA and AULA, which aim to improve university teaching and train faculty in student-centred learning models. The Universidad Veracruzana has engaged in a long-term process to modernise its learning/teaching model. It has also launched work-based learning programmes, such as *brigadas en empresas* (enterprise brigades), along with the Anahuac University's mentoring programme. In general however, only a small proportion of students benefit from this type of initiatives which remain discipline-based, covering only undergraduate students and lack wider dissemination throughout the tertiary education sector in the state.

Collaboration with industry is more intense within the technological institutes that offer practice-oriented associate degree programmes in engineering-related fields. Employers participate in the institutional governance, design of programmes and curricula, and provide internships which are part of course requirements. Similar arrangements would benefit also the university sector, but to date appear less frequent.

Veracruz has high levels of self-employed but a low rate of knowledge-based business creation. Finding ways of increasing entrepreneurship could

be an effective strategy to facilitate graduate retention and job creation. Tertiary education institutions have taken steps to boost university spinoffs and graduate entrepreneurship, mainly through incubators, such as the Universidad Veracruzana's Incuba and the technological institutes' Business Incubators Network. However, the provision of entrepreneurship education should be scaled up, by using interactive and experiential teaching methods. The focus could be on growth-oriented entrepreneurship through technology incubators, as well as social and cultural entrepreneurship. Entrepreneurship education should be integrated into Masters and PhD programmes and work-based learning programmes.

Due to the rapidly changing skill requirements, skills upgrading, re-skilling and other forms of lifelong learning are becoming increasingly important. This is particularly relevant for Veracruz where the adult population has had limited opportunities for education. To date, the tertiary education sector in Veracruz remains more oriented to meet the needs of traditional students than those of adult learners. While the institutions are aware of the needs of adults and have some programmes in place for them, not enough robust data is available to understand the needs of this population or the efficacy of tertiary education in meeting them. Programmes aimed at non-traditional learners need to be expanded and scaled up to enhance the flexibility of the population to adjust to the rapid changes in the labour market and to improve productivity. Strong efforts should be made to extend the existing good practice examples, such as programmes provided by the Mexican Institute for Adult Education and by Monterrey Tech.

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*There is also a need to address the segmentation of the tertiary education system and the lack of pathways available for students to progress.*

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One of the main factors impeding human capital development in Veracruz is the absence of state-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. The current segmentation of university and technological education sectors act as an impediment for student mobility and human capital development. Measures to widen access should be supported with the development of clear and transparent pathways, for example between technological institutions and universities. Students, who have completed courses at technological institutions, should be able to transfer into university degree programmes. 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. A potential step in this direction could be the establishment of a national qualifications framework to facilitate progression from one degree type to another, to allow credit for previous academic and job-related experiences and competencies, and to ease transitions between areas of study.

***The following measures would promote human capital development in Veracruz:***

The OECD review team recommends the following measures are taken in promoting human capital development:

- The state government, tertiary education institutions, other educational institutions and key stakeholders of the economy and society should collaborate to agree on region-wide goals, policies and priorities for human capital development from primary to tertiary education, including also workforce development activities. Tertiary education institutions and the government should establish a co-ordinating body to address pathways between universities and technological institutes and different levels of education. Measures should be put in place to accommodate and encourage mobility within and between institutions by formal agreements to help students move from one institution to another.
- The state government and tertiary education institutions should expand efforts to increase the enrolment and success of students from low social and economic background. This would require the removal of the remaining geographical barriers to education, developing academic, social and financial support services for students and building close collaboration between the tertiary education and the primary and secondary education institutions.
- The state government and tertiary education institutions should significantly increase tertiary education opportunities for working age adults, building on the existing courses offered by INEA, Monterrey Tech (online programme) and other universities in Veracruz. The lifelong learning measures should include transparent pathways to advanced education, 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 needs of working adults. This involves the development of a qualifications framework with strong

credit recognition schemes, course and programme articulation agreements, clear and enforceable policies related to credit transfer and support for joint and collaborative programmes.

- The state government and tertiary education institutions should improve the data on student labour market outcomes and labour market needs and trends. Tertiary education institutions should systematically monitor student progress and achievement and labour market outcomes and graduate destinations (out-migration). The most effective regional graduate labour market systems are based on the collection of comprehensive labour market intelligence and the 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 the graduate chances of gaining employment. This data can also be use strategically to identify regional priorities and at an institutional level, to develop course provision and the supply of employer-specific skills.
- Tertiary education institutions should develop a stronger student-centred approach in their teaching activities. This should be built on the international best practice and the existing models in Veracruz. These new forms of education should be more interactive and more tailored to the individual needs and capacities of students and involve work-based and problem-based learning methods and programmes to develop employability, entrepreneurial and transferable skills and English language acquisition. The transferable skills should be embedded in degrees programmes across the academic disciplines (not just in business or accountancy degrees). This would boost the productivity base of the region and enhance its internationalisation efforts.

## **Social service in Veracruz**

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*The challenges in Veracruz are manifold, ranging from poverty and social exclusion, ethnic diversity and urban-rural divide to environmental degradation and hazards.*

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The social conditions in Veracruz have improved in the last two decades. Still, in the national comparison, it is one of the states with the highest proportion of poor: more than 50% of the population live in various degrees of poverty, compared to a national average of 42.6%. Several

municipalities and the majority of the state are substantially below the national average in terms of UNDP Human Development Index that combines life expectancy, education attainment and per capita income. Veracruz is also ethnically and culturally diverse: it has the third-largest indigenous population in Mexico, over 605 000 people. Furthermore, economic growth and environmental hazards, such as oil spills, floods and hurricanes have led to increasing pressures on the environment that has one of highest concentrations of biodiversity in the world.

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*Tertiary education institutions see widening access as an important contributor to regional development. They also provide a wide range of services in the health and social sector.*

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Universities and other tertiary education institutions in Veracruz see widening access and increasing participation of students from lower socio-economic backgrounds as their key social contribution to regional development. Increased access of students in rural and remote areas has been facilitated by the Universidad Intercultural Veracruzana (Intercultural University of Veracruz) that has provided permanent university presence among indigenous populations in remote areas, the state government's innovative Vasconcelos project that uses mobile learning units and the establishment of technological institutes. Supported by the Ministry of Public Education and the State Government of Veracruz, tertiary education institutions have each developed their own projects and approaches to widening access and school collaboration.

Universities also provide a wide range of services to different communities, usually in the health and social sector. Valuable work is carried out in rural and remote areas where many tertiary education institutions reach out to the low income population. Most initiatives address sector-specific issues, but they lack a more integrated approach to local economic and social development in the region. Much of this outreach is conducted by students as part of their social service obligation.

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*Mexico has a tradition in community service and outreach through students' social services. Tertiary education institutions in Veracruz follow the national requirement that all university students must complete extensive*

*social service. Casas de la Universidad developed by the Universidad Veracruzana (State Public University of Veracruz) represents an example of good practice in this area. Despite innovative approaches to collaborate with communities that are harder to reach, there is a need for collaboration and co-ordination between universities, monitoring of results and a move towards sustainable community development.*

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In Mexico, the national requirement of mandatory student social service as a graduation requirement has generated good results in mainstreaming community service activities into the core business of universities and providing experiential learning opportunities for students. For example the Universidad Veracruzana has included a minimum of 480 hours of social service in the curricula. Participation of students in the university's service learning/internship programme averages 250 students per semester/year. Similarly, Monterrey Tech's campus in Veracruz has a community service programme which engages students in programmes that generate social, economic and education development in marginalised communities and social assistance organisations.

The programmes developed by the Universidad Veracruzana and other tertiary education institutions are notable for their partnerships with external stakeholders, such as municipalities, and capacity to work across all sectors in sustained commitment. However, there is limited evidence of collaboration across the tertiary education sector and systematic monitoring of results which would help evaluate the outcomes of outreach activities and facilitate scaling up good practice examples into a system. But the resources are spread thinly and the scope and impact of the activities are often constrained by short-term project funding and interventions.

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*There is also a need to empower disadvantaged communities to address their own challenges by strengthening the social economy, cultural identity and environmental development.*

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Community development programmes aim to build capacity by enabling communities to respond to social, economic and environmental challenges. The Universidad Veracruzana has taken an important step to develop long-term community presence through the *Casas de la Universidad* where students deliver wide-ranging services for the local population. Through multidisciplinary action, *Casas de la Universidad* could be developed into

community development centres that build capacity in the rural and remote areas to help communities to help themselves. The university is also supporting local development by bringing in training and knowledge required for the development and implementation of local strategies.

Universities and other tertiary education institutions, in collaboration with local and state authorities, could also play a more prominent role in training community development practitioners, providing lifelong learning and re-skilling opportunities, conducting research into specific issues and developing low-tech and low-cost innovations which could bring concrete improvements in everyday life. There is also considerable underused potential in environmental and cultural development as well as international collaboration beyond Spanish speaking regions.

***The following measures would enhance the contribution of tertiary education institutions to the social, cultural and environmental development in Veracruz:***

- In addition to widening access and providing services to disadvantaged communities, tertiary education institutions should make use social service obligations to engage in long-term community development seeking ways to empower communities to find their own solutions to economic, social, cultural and environmental challenges.
- A systematic exchange of information and experience should be put in place between tertiary education institutions in social, cultural and environmental matters facilitated, for example by the state government in order to bring greater efficiency in social service activities. This forum could organise thematic events, with regular information retrieval and exchange facilitated by a dedicated website. As a first step, the tertiary education institutions' current connections, initiatives and projects in social service should be mapped and published in the collaboration platform.

## **Innovation in Veracruz**

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***In the last few years, progress has been made in establishing the elements of the regional innovation system in Veracruz. However, the low levels of R&D expenditure, limited absorptive capacity in the SME-based economy and the concentration of research in a limited***

*number of areas have slowed down the progress.*

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Mexico has one of the lowest levels of R&D expenditure in the OECD area, but has, in recent years, made progress in establishing a national innovation system. The National Science and Technology Council (CONACyT) also provides some incentives for regional engagement of tertiary education institutions to foster knowledge transfer and university-industry collaboration, and the Science, Technology and Innovation (STI) Policy is increasingly recognising the importance of regional innovation systems. However, national policies do not yet sufficiently support regional innovation systems or clusters and innovation resources remain concentrated in Mexico City. This slows down the capacity building at the state and sub-national levels and affects states such as Veracruz.

The State of Veracruz has been relatively slow in implementing the elements of a regional innovation system. The state innovation sector is under the supervision of the Veracruz Council for Scientific Research and Technological Development (COVEICYDET) which has produced the State Science and Technology Plan (2005-10). The resources dedicated to the plan as well as the institutional capacity to plan, develop and implement innovation policy are in need of strengthening. The Veracruz Council of Science and Technology (COVECyT) was established in 2006 as the last state-level innovation agency in Mexico. The financial resources for RDI remain limited and heavily concentrated on applied research, with limited focus on business innovation. Financial support, totalling about USD 10 million, has been channelled through the competitive FOMIX research programme which is funded by a combination of federal and state funds.

Given the concentration of innovation resources in Mexico City and Veracruz's aspirations for a knowledge-orientated economy, Veracruz and other developing states need to implement their own specific programmes to overcome innovation deficit. The State Government of Veracruz has taken up the challenge by launching an innovation fund which will replace fiscal stimuli. Provided that FOMIX and the new innovation fund will continue to operate, the state will have two powerful policy instruments at the service of innovation and can target at specific constituencies, such as different types of businesses, or develop sector-based strategic policies, aimed at agribusiness, environmental or energy sectors.

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*The current outcomes of research and innovation activities reveal considerable*

*underutilised potential and call for a stronger collaboration and knowledge exchange mechanisms between tertiary education institutions and firms.*

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The research system in Veracruz is composed of public research institutes and a few large firms. The Universidad Veracruzana dominates the research system and is a home to research centres, such as the Advanced Technology Lab in Xalapa (LATEX) and the College of Graduate Studies in Agricultural Sciences (COLPOS). There are also several technological institutes and a small number of federal research centres, such as LANIA (computer science), the Institute of Ecology (INECOL) and the National Institute of Forestry, Agriculture and Livestock Research (INIFAP). Infrastructure for developing R&D human resources includes nine public research centres and the National Registry of Scientific and Technological Institutions and Firms (RENIECYT), a network of 157 organisations engaged in S&T and innovation activities. There are 410 National Researchers System (SNI) researchers in the state. Veracruz has 1 230 students in graduate programmes supported by CONACyT, with 45% enrolled in doctoral programmes.

The State of Veracruz and its tertiary education sector have taken steps to build capacity for knowledge generation and transfer but the results remain modest as measured by the low level of scientific publications, patents and spinouts. This can be attributed to a range of reasons, such as the lack of university-industry collaboration, a narrow spectrum of research fields (mainly agri-food, basic metals, health, petrochemicals and energy), limited investment in R&D (not exceeding 0.1% of the state GDP), a small number of SNI researchers in technological disciplines and the university faculty's focus on knowledge generation (publication) rather than knowledge transfer.

The transformation of Veracruz's economy and the ability to increase productivity and competitiveness depend on whether its key institutions will have the capacity to develop their research and innovation. As the main research university in the state, the Universidad Veracruzana should consider creating a strong infrastructure for knowledge transfer/exchange and innovation, backed up by sufficient funding and promote spinoffs and encourage student and faculty interaction with businesses and industry. There is a need to improve incentive structures to mobilise universities and their faculty for regional development. In view of the significant progress made by the states such as Jalisco and Nuevo León in internationalisation, there is an urgent need to strengthen the international dimension of the Veracruz tertiary education sector.

The technological institutes have often stronger links with the productive sector, even if they have not reached the original target of attracting 25% their funding from the private sector. They have also undertaken the important task of capacity building in the firms and are developing their RDI capacity and international links. Stronger collaboration between university and the technological institutes would yield positive results for the regional economy. Tertiary education institutions in Veracruz should increase their efforts to participate in international collaborations projects in the field of technology with European and Asian countries which have a strong tradition in technological education. To achieve this goal, it is recommended that an international office at state government level (Veracruz Ministry of Education) is established to promote and co-ordinate international collaboration projects in the higher education sector.

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*The state and tertiary education institutions should reinforce the innovation system, focusing on sectors and clusters where there is regional economic potential. Collaboration between tertiary education institutions and local firms should also be encouraged in both educational and research-orientated tasks.*

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The development of a knowledge-intensive economy in Veracruz would benefit from tertiary education institutions and regional firms collaborating on research and innovation. The building blocks of an innovation system are in place with a research-orientated university, technological institutes and the regional research council. However, the regional innovation system does not encourage tertiary education institutions and regional firms to build on the existing industries and sectors in the areas of spin-off activity, knowledge transfer and provision of education and training courses. Greater co-operation could enable Veracruz to increase the labour productivity of their companies and to compete in the global economy.

Industry-university relationships work, when there is an interest and an ability from small firms to co-operate with academic institutions. Policy measures that boost skills development, people-based mobility between universities and industry and innovation purchasing can stimulate the demand for HE R&D. Local firms in Veracruz tend to be small and need to be exposed to the importance of innovation and collaboration with tertiary education institutions through initial awareness campaigns. Currently, firm innovation in Veracruz takes place mainly through relationships with business partners (clients and suppliers) and imitation of competitors. While

this strategy is well suited for incremental improvements, it is less appropriate for radical breakthroughs in the production process.

A state and institutional strategy for collaboration between tertiary education institutions and the private sector would enhance the impacts of such relationships on innovation and economic growth. Based on an analysis of regional existing or emerging strengths, the strategy should identify the driving sectors or cluster of the economy, for example chemical and plastic sectors given the local oil industry, biotechnology for the pharmaceutical sector, the environmental and energy sector, and tourism. The strategy should also secure funding and institutional collaboration between the tertiary education institutions and firms in these areas. The cross-fertilising potential of cutting-edge technologies should be better recognised and exploited to foster new value-added sectors. Non-high-tech industries and services should also be a target, but would require the university to better exploit its research potential in areas such as tourism, logistics, construction, waste management, water quality and solar energy *i.e.* areas congruent with Veracruz's real or anticipated comparative advantages. Finally the university should use the region and its diverse range of challenges as a "laboratory" for developing research and innovations.

***The following measures would promote regional innovation in Veracruz:***

The OECD Review Team recommends the following measures are taken in promoting innovation development:

- The federal government should improve the evidence base of the RDI performance by collecting robust data about the state-level performance. This data should be made available on-line in order to develop strategic intelligence at the sub-national level, to facilitate comparisons between the states and regions abroad, and to provide a catalyst for shared learning. The European Innovation Scoreboard could be a source of inspiration in this context. The federal government could establish guidelines that would help the states to refine their statistical instruments. Data should be improved in terms of human capital development (*e.g.* population with tertiary education, participation in lifelong learning, youth education attainment level), innovation throughputs (*e.g.* patents, spinoffs and start-ups) as well as output indicators.
- The state government in collaboration with the leading tertiary education institutions and the business sector should develop a clear strategy for regional development, innovation and growth. Such a

strategy should be based existing strengths and develop related sectors and technologies. The strategy should be backed with adequate level of investment in human resources and infrastructure to guarantee effectiveness. The strategy should draw on a diagnosis that identifies the key driving sectors of the economy. The government should ensure that research on clusters and demands of industry extend into service sector and include clusters such as tourism. Clusters should be conceptualised as cutting across the manufacturing-service divide – for example agribusiness clusters usually connect with tourism and manufacturing innovations incorporate service components.

- Tertiary education institutions in Veracruz should increase their efforts to participate in international collaboration projects in the field of technology with European and Asian countries which have a strong tradition in technological education. To achieve this goal, it is recommended that an international office at state government level (Veracruz Ministry of Education) is established to promote and coordinate international collaboration projects in the higher education sector.
- The state government should encourage more systematic and institutional collaboration between tertiary education institutions and local firms. This collaboration should focus on areas where Veracruz has a real or potential comparative advantage, for example chemistry and the plastic sector due to the presence of the local oil industry, biotechnologies for the pharmaceutical sector, rather than on a narrow sector specialisation. Technologies with cross-sector fertilisation potential should be promoted. Universities should work to ensure that local firms are aware of the benefits of hiring graduates.
- The state government should encourage collaboration between the tertiary education institutions and local small and medium-sized enterprises (SMEs). Policy tools include people-based mobility schemes, such as the Knowledge Transfer Partnership in UK, that improve the absorptive capacity of local enterprises and support for the forum role of tertiary education institutions to reinforce the regional engagement channels. A relatively low-cost policy measure that have been implemented in a number of countries, for example in the Netherlands, the UK and Ireland, is innovation vouchers that expose firms to innovation activities and stimulate a market for innovation. They are small-scale lump sums that firms receive to undertake simple innovative projects. Rules and procedures should be kept as simple as possible and the whole administration process

should be managed at the state level, preferably by COVECyT, to guarantee faster examination and approval. Alternatively, the system could be administered directly by a university. It should be noted, however, that this could raise potential conflicts of interest if the university is also an eligible “supplier” of innovation. At the operational level, innovation vouchers can be tweaked depending on specific needs and objectives. For instance, they can focus on specific sectors or technologies or business-to-business collaboration by only allowing applications from groups of firms. Different rounds of calls for applications can be organised to meet different goals and needs.

- Tertiary education institutions should establish a range of links with the local business community. Universities should consult more with the local firms to design research programmes and activities that are more strongly aligned with their needs and expectations. Collaborative research programmes could help improve links between the tertiary education and business sectors.
- Tertiary education institutions should clearly identify the goals and objectives of the business incubators before the launch of the incubator in order to have impact on the selection criteria of tenant firms and the evaluation of the programme. Business incubation schemes are economic rather than social tools and the limited evidence suggests that the most positive effect is on firm survival rates and employment generation (the latter applies mainly to technology incubators). A focus on broad sectors would better benefit tenant firms. Tertiary education institutions should also emphasise the element of flexibility in the provision of business support services in incubators to ensure that the tenant firms have access to an integrated array of services, whether available in-house or outside of the incubator. The selection of services provided by an incubator should depend on the services available in its vicinity. The provision of a full range of support services is not necessary and will unduly add to overhead costs. Likewise, specialised services can be contracted when needed.
- Tertiary education institutions, especially the Universidad Veracruzana should launch technology-based incubators. Technology incubators represent an increasing share of incubators in the world and are often linked directly or indirectly to local universities. Incubators can also be designed without physical facilities, with a focus on the provision of services, with often a

stronger emphasis on intellectual property protection and other legal aspects.

- The Universidad Veracruzana should make stronger efforts to improve the links with the local manufacturing sector in order to encourage the introduction of product and process innovations. It should improve its institutional capacity to engage with the local industry by developing a regional development strategy that would encompass technology transfer and innovation as well as new business generation. It should establish a professional technology transfer office that will actively reach out to local business and industry. It should mobilise its existing national and international connections for the benefit of regional development.
- In addition to providing services to various communities, tertiary education institutions should engage in challenge-driven research, using the region and its diverse range of challenges as a “laboratory” for developing research and innovations. Combining community outreach into training and challenge-driven research can generate improvements in life quality and low tech innovations.



## **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, 14 regions in 11 countries have undergone the OECD review process in 2008-10.

This OECD Review of Higher Education in Regional Development of the State of Veracruz in Mexico (<http://www.oecd.org/dataoecd/28/34/46826830.pdf>) 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](http://www.oecd.org/edu/imhe/regionaldevelopment).