

OECD Review of Higher Education in Regional and  
City Development

# State of Penang, Malaysia



## *Assessment and recommendations*

### *Penang: Moving up the value chain*

With a population of 1.77 million Penang is the leader in manufacturing activities and the growth centre for northern Malaysia. In 2007, 200 multinational corporations had large scale operations in Penang, making it the second growth centre in Malaysia, after the Klang valley. Manufacturing of electrical and electronic (E&E) goods have generated a dynamism for the last 25 years, keeping Penang's GDP growth ahead of the national average, above 7% between 1970 and 2005. The major contributors to Penang's growth rates are E&E manufacturing and services, such as utilities, telecommunications and tourism. Penang is an international tourist destination famous for its historic and scenic attractions and its diverse cultures with the Malay, Chinese and Indians constituting the major ethnic groups.

Penang's advantageous low cost and low wage scenario has been highly successful in its strategy to maximise opportunities in the global manufacturing chain. Since the adoption of export-oriented strategies, Penang has been exporting consumer products targeted at advanced economies. But the regional economy is at a crossroads: Penang is no longer a high growth economy and a low cost centre. Following the current economic crisis, Malaysia's traditional market will wane as consumers in the advanced economies are not able to consume as much as they used to. China, India, Indonesia and Vietnam produce cheaper consumer goods than Malaysia, having paved the way to frugal innovation. Penang's economic sustainability is threatened not only by low-cost countries but also highly-skilled countries with research and design capabilities in the region – Singapore and Taiwan. Multinational corporations have started moving

away, their independence from the local economy giving them the flexibility to move to locations with lower costs.

Both federal and state governments are working on a scenario which would bring back rapid growth and productivity to Penang. This is embodied in an intensified industrialisation programme grounded in technological transformation towards a knowledge-based economy producing higher value-added products and services. The focus of industrialisation is shifting from the assembly stage of E&E products of high technological value.

Furthermore, Penang's position in northern Malaysia has been reinforced by the development started under the Northern Corridor Economic Region (NCER) programme. The programme includes 21 districts in Penang island and the mainland, and the states of Kedah, Perlis, and northern Perak. The Northern Corridor Economic Region programme aims to accelerate economic growth and elevate income levels in the north of Peninsular Malaysia. It is part of a national strategy focusing on regions which can benefit from land, labour and natural resources, combining these with manufacturing experience and international linkages. The aim of the Northern Corridor Economic Region is to become a competitive, world-class sustainable economic region. It is expected that the Northern Corridor Economic Region would be a destination of choice for foreign and domestic businesses to invest in the electrical and electronic cluster, agriculture, tourism and biotechnology. Social development activities, community infrastructure and environmental integrity are expected to raise the overall standard of living for both Malaysians and foreigners to work, study, visit and live.

Skill shortages, inadequate infrastructure and regulatory bottlenecks have contributed to the reduction of productivity and overall growth. A critical challenge is to improve labour policy and reform of educational system to improve the flexibility of the workforce in the face of the rapid changes in the global economy and to guarantee inclusiveness and sustainability. Penang has a diverse higher education system but its full potential has not been mobilised for regional and local development. In this context, the region faces a quadruple challenge:

- *How to improve the educational attainment of the population?*
- *How to promote new business formation, indigenous innovation and the development of the local industry?*
- *How to address the problems of poverty and growing disparities, and health and environment needs of the population?*

- *How to capitalise on the existing assets, for example the co-existence of three cultures, new opportunities created by the Northern Corridor Economic Region and the UNESCO World Heritage site?*

### ***Human resources development in Penang***

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***A region that wants to be globally competitive needs to have a highly-skilled workforce and a knowledge-based economy that can absorb it. While Penang has made great strides in widening participation in education, it continues to face challenges in developing and retaining human resources to meet aspirations for the region's future economy and quality of life.***

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Malaysia and Penang have made great strides in widening participation in education. During the period 1985-2008 primary, secondary and tertiary education saw an unprecedented increase in enrolments. Higher education showed the greatest growth at 93.1%, representing a yearly increase of 4.1%. Enhanced access is reflected in the percentage of the higher education enrolment in the 19 to 24-year-old age cohort which grew from 0.6% in 1970 to 24.4% in 2007. According to the Ninth Malaysian Plan (2006-10), it is expected that 1.6 million students or 40% of the relevant age cohort are enrolled in tertiary education in 2010 and 50% of these at private institutions.

The educational profile of the labour force has also changed in Malaysia, revealing a gradually growing proportion of population with tertiary education. However, with 80% of the work force having secondary education, Malaysia faces a major challenge to retain its global competitiveness in terms of the knowledge and skills of its population. Only 25% of Malaysia's labour force is composed of highly-skilled workers compared to 49% in Singapore, 33% in Taiwan, and 35% in Korea. There is also evidence of brain drain, with an estimated 350 000 Malaysians working abroad in 2008, over half of whom had tertiary education.

The development of Penang since the 1970s has been driven by a policy of low-skill, low-wage manufacturing. In 2000, only 8.9% of the regional population had achieved tertiary level education. The economy has depended on importing labour from throughout Malaysia as well as from

other countries. Within the Northern Corridor Economic Region, the State of Penang has a better educated population than the other three states, but in international comparison Penang is a low-skilled region. While there is a push to move to a high-skill, high-wage economy, Penang remains dependent on low-skill industries and occupations. The level of educational attainment remains significantly below that of OECD countries in the region. Furthermore, the region faces a number of human resource issues: there is a shortage of skilled personnel, a shortage of highly qualified people and a loss of talent.

The ability of Penang to compete on the basis of low-skilled labour is increasingly limited by competition from other countries in Southeast Asia and restrictions on foreign workers. Penang also faces competition from Singapore and other countries that have the human resources and access to research and innovation needed to compete at the high-end of the value chain. The problem is not only an inadequate supply of graduates but the lack of an economy and other regional amenities that retain graduates who are otherwise attracted to Kuala Lumpur, Singapore and other major economic centres.

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***Penang has a diverse education sector dominated by Universiti Sains Malaysia. USM is shifting the balance of enrolments from the undergraduate to the post-graduate level. Combining the aspirations of world class excellence and regional engagement will require special attention from the university leadership.***

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The greater Penang-Seberang Prai area is well endowed with tertiary education institutions. The 23 public and 31 private tertiary level institutions include a regional institution (Regional Centre for Science and Mathematics), public tertiary and post-secondary institutions such as Universiti Sains Malaysia (USM), Universiti Teknologi MARA (UiTM), located in Seberang Prai, two teacher training colleges and the Open University Malaysia. There are also a number of non-public education and training institutions such as the Penang Skills Development Corporation, Wawasan Open University and Kolej Damansara Utama college (KDU). In general, however, the private sector institutions act as “feeder” organisations to universities in Kuala Lumpur accelerating the loss of human resources.

The establishment of University Sains Malaysia (USM) in 1969 outside the traditional core region reflects the Government of Malaysia’s effort to use higher education as an instrument to redress ethnic inequity and regional

imbalances. Today, Universiti Sains Malaysia plays a major role in the Penang higher education system. With the goal to become one of the top performing higher education institutions worldwide as an APEX university, USM has set forth an agenda, *Transforming Higher Education for a Sustainable Tomorrow* in order to “support the drive to improve the well-being of humanity, the bottom billion.”

As a result, University Sains Malaysia is shifting the balance of its enrolments from the undergraduate to the post-graduate level. The strengthening of the post-graduate programmes, in medical health, life sciences, health sciences, engineering and technology, and information technology is directly in line with regional priorities. Developing the pool of highly-qualified researchers and engineers is critical to the capacity of the region to compete on the basis of design and development and innovation in the electrical and electronics industry and other industries. However, limiting undergraduate education may have a detrimental impact on wider regional development. The percentage of students from the region in the USM has been declining and this trend is likely to strengthen as the APEX status will permit the university to recruit more widely to increase its global ranking.

The APEX university status is a significant achievement and has the potential to build the university into a globally competitive and locally engaged institution which can drive the development in Penang and Northern Corridor Economic Region. However, at the moment there appears to be a conflict with the university’s designation as an APEX University and the regional engagement mission. While Universiti Sains Malaysia strives to become a globally competitive research university serving “billions”, there is limited targeted attention to the needs of the population within its region.

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***Malaysia, the Northern Corridor Economic Region and Penang in particular need to move “up the value chain” from a low-skill, low-production economy to a higher skill, higher wage economy. But it is constrained by skills shortages and mismatches. There is a need to increase the relevance of education and its alignment with the regional labour market needs.***

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Penang is constrained not only by a shortage or inadequacy of available skills. Firms in Penang are being impeded in their R&D or produce/process development efforts by shortages of specialised skills. While the multinational corporations hire some technical personnel to work on design,

testing and product developments, the supply of R&D engineers and technicians is too small for them to expand their R&D in Penang.

Penang also suffers from a skills mismatch. Although the overall stock of human capital has increased in terms of outputs from tertiary institutions, there are deficiencies. About a quarter of graduates from local public universities remain unemployed for six months upon completion of study in 2008. Local graduates' wait period for a job has increased and their wages have stagnated, suggesting that tertiary and secondary graduates' skills do not match those required by employers. The contrast between the wage premiums of local graduates and those from abroad is significant and suggests a mismatch between local education programmes and labour market requirements. For the short-term, employers need to provide on-the-job general and specific skills training. In the longer term, the mismatch of skills suggests a critical need for stronger alignment of education and skills training with regional labour market needs.

Higher education institutions in the region do not have courses that are especially designed to meet the needs of the Penang region. There is no systematic regional strategy at the federal, supra-regional (Northern Corridor Economic Region) or state levels to engage higher education institutions in addressing the region's human resource challenges. In many cases, student internships and industrial placements are concentrated in engineering and technical disciplines and not across the breadth of the higher education institutions. Student engagement with industry and the region should be connected more strongly with the university's core academic programmes and curricula. Furthermore, industrial placements appear to be peripheral to the students' core academic programme and academic staff's responsibilities.

Skills mismatches are partly addressed by the industry-driven Penang Skills Development Centre (PSDC), a premier (skills) learning institution in Malaysia, dedicated to meeting the immediate human resource needs of the business community. The centre plays a critical role as a broker between the needs of employers and higher education institutions and other sources of training capacity. In addition to its traditional training functions, PSDC's new initiatives "School 2 Work," and "FasTrack" address the gaps in the current education system by providing school leavers a complete education-to-employment pathway for and university graduates the skills they need for employment.

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***While the focus on skills development for the benefit of industry is necessary, too narrow skills development will not serve Penang and its population in the long run. Stronger emphasis needs to be placed on general competencies that will allow people to adjust to rapid changes in the labour market and have the capacity for lifelong learning.***

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Educational attainment levels in Penang are higher than other states in the Northern Corridor Economic Region but inadequate to meet the demands of a knowledge-based economy. Due to rapidly changing skill requirements in working life, lifelong learning, skills upgrading and re-skilling are becoming increasingly important. For non-traditional learners, who combine work and study and/or family obligations, flexible ways of provision need to be in place through work-based, e-learning and distance education. In addition, attendance on the basis of non-formal and informal learning should be allowed.

In Penang, there is limited data available to understand the needs of the adult population or the efficacy of higher education in meeting these needs. Important institutions in fostering lifelong learning include the Penang Skills Development Centre and the Wawasan Open University. Wawasan Open University is dedicated to serving working adults, expanding access to university education using technology-enhanced open and distance learning. It emphasises flexibility to meet students' needs: access to students from any place and at any time; acceptance to the university, not to a particular programme; and enrolment by course (subject) not by programme. Furthermore, Universiti Sains Malaysia's School of Distance Learning was the first distance learning programme at the tertiary level in Malaysia.

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***One of the main issues impeding human capital development in Penang and the Northern Corridor Economic Region is the fragmented governance architecture in education. There is a lack of a region-wide co-ordinating structures and mechanisms to articulate a long-term vision and implement an integrated development strategy for all educational institutions.***

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Because education is a federal responsibility in Malaysia, the state governments have no direct authority for higher education. As a consequence, federal policy is vertically linked with each higher education institution with limited attention to horizontal relationships among institutions within a region. Central determination of curricula and other institutional policies promote uniformity and hinders adaptation to the unique needs of regions. As a consequence there is limited alignment of education provision to regional needs. Public and private institutions operate under different regulatory and financing rules, resulting in the absence of a unified education system. To date, development plans for these two sectors are undertaken separately. For example the Penang Educational Consultative Council (PECC) under the state government provides the mechanism for a coherent vision of an education system at the regional level, but this council is only for the private higher education institutions. There is also a lack of incentives for regional engagement of higher education and for collaboration among institutions and limited pathways for students through the education system. There is a need for 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.

***The following measures would promote human resource development in Penang***

***Recommendations for the federal/national policy***

- Develop a component of national strategy (New Economic Model) explicitly linking higher education institutions to regional human resource development.
- In higher education policy, add a regional dimension to criteria for academic programme/curricula approval and provide incentives for regional collaboration and student pathways.
- Add a regional human resource development element to criteria for APEX university performance e.g. increasing the percentage of the region's population completing undergraduate and post-graduate degrees in fields linked to regional priorities.

***Recommendations for the sub-national level: Northern Corridor Economic Region***

- Establish goals and benchmarks linked to year-by-year progress toward the 2020 goal of increasing the educational attainment of the region's population to globally competitive levels e.g. percentages of the population ages 25 to 64 with tertiary education (A and B) compared to OECD countries.
- Establish a public/private investment fund to provide competitive grants for higher education institutions contingent upon: i) collaboration with industry and ii) collaboration between and among institutions, including public and private universities, polytechnics, community colleges, Universiti Teknologi MARA Training Centres, Penang Skills Development Centre etc.
- Give increased priority to building a long-term regional teaching/learning capacity linked to the future regional economy and quality of life by developing higher education institutions with a mission and flexibility to serve the region.

***Recommendations for the sub-national level: for the state of Penang***

- Continue forward-thinking strategies aimed at developing the region's human resources.
- Focus on creating the conditions (environment, cultural resources, housing, public safety and health) that will make Penang an attractive place for students from the region, the rest of Malaysia and other countries.
- Take advantage of initiatives of the Northern Corridor Economic Region for *the* benefit of Penang; recognise that Penang's human resource needs are inter-related with the wider region (Northern Corridor Economic Region) and support initiatives to narrow disparities between Penang and the Northern Corridor Economic Region.
- Establish a state-level human resource development fund (public/private) to promote collaboration among institutions/providers.

***Recommendations for the universities***

- Develop a data/information capacity to monitor and report on how each university serves the region's population, *including but not limited to data on: i) major disparities in regional participation in tertiary education, ii) percentage of students from each region enrolled in and completing degree programmes at undergraduate and post-graduate levels and iii) undergraduate and post-graduate degrees and scholarship granted related to regional priority fields.*
- Use research and engagement with industry as a means to leverage institutional change in the university. *Modify curriculum to strengthen and deepen student learning through greater integration of research and engagement with industry and community within the curriculum. Increase regional dimension in student experience through problem-based learning, internships, etc. Use short-term training and projects in centres/research as tool for professional development leading to changes in curriculum/teaching and learning.*
- Strengthen the alignment of study programmes with the needs of the region and increase the supply of technical workers. *Firms in the region suffer from the shortage of qualified personnel and inadequate skills offered to the labour market. University students' skills need to be upgraded in transferable and soft skills, such as communication, team working and analytical thinking. There is also a need to increase industry involvement in curricula development and a general need for the private sector to invest in longer periods of training for new recruits.*
- [For USM] Use the flexibility of the Malaysia APEX Designation to leverage change in core teaching and learning capacity. Revisit the university mission by adding an addendum: *Not just "bottom billions" in the world but also "bottom thousands" in the region. Not just sustainable university, but sustainable region in terms of the globally competitive educational attainment of the region's population.*
- [For USM] Take the lead in shaping tertiary education strategy for Penang and the Northern Corridor to develop the region's human resources by engaging all public and private higher education institutions and other education providers and develop a limited number of priority initiatives stressing collaboration. *The initiatives could focus on enhancing student pathways among institutions, increasing the percentage of students from low-income and minority populations gaining a tertiary education certification/degree or increasing*

*opportunities for adult/mature students to pursue and complete tertiary education.*

### ***Regional innovation in Penang***

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***Malaysia 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 R&D and innovation intensity. Within this context, Malaysia is encountering difficulties to translate scientific knowledge into technological capabilities. Although an important player in knowledge diffusion and S&T activities, universities have not yet enlarged the national research potential and reached the quality of R&D performed in the OECD countries.***

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Malaysia underperforms in R&D compared to the OECD average and the South East Asian average. The country has been over-performing in terms of publication intensity, but among ASEAN economies, its scientific publications are less frequently cited and its researcher population less numerous. Malaysia has a better record than its neighbours for patenting activities. However, numbers are far lower than the OECD average. Furthermore, the majority of patents are held by foreign company affiliates in Malaysia.

Most of Malaysia's S&T personnel are employed in the education sector and Malaysian universities are important drivers of the innovation processes. They, nevertheless, face administrative constraints and their R&D base is narrower than those of OECD countries. In terms of research quality, Malaysian universities underperform with regard to main competitors in Singapore, Taiwan and Hong Kong.

Within the framework of the Ninth Malaysia Plan, the government has focused on science and technology activities. The government has been concerned not only with FDI investment, the acceleration of technology commercialisation and boosting business spending on R&D, but also with the need to increase local innovation capabilities and it has concentrated its interventions on the elaboration of R&D tax incentives and the encouragement of strategic investment. Numerous schemes have been

launched but so far the volume of grants channelled to university research has remained modest.

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***Penang is one of the key drivers of Malaysia's economy. However, the overreliance of the regional economy on multinational corporations and underinvestment in innovation are undermining the region's growth trajectory. Local HEIs could become instrumental in helping the economy to follow a more knowledge-based path of development. They have a major role to play in training entrepreneurs that will invest in, and manage new knowledge-based enterprises.***

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Penang state GRP contributes to approximately 8% of Malaysian GDP while Penangites enjoy an average income that is above the average for Malaysia as a whole. Continuous inflows of foreign direct investments since the 1970s accelerated by the establishment of a free trade zone have consolidated Penang's economic growth. At the same time, the dependence on labour-intensive and low to medium-skilled industries has grown.

While continuing to promote key industries such as E&E, food processing, furniture and jewellery, the Penang state government is making efforts to attract high tech and knowledge-based investments in green industries, display technologies or medical devices and biotech. The service sectors identified as potential areas for development include healthcare, education tourism and logistics. But the shift is possible only if Penang is able to count on a reservoir of capable entrepreneurs willing to invest in these industries. Penang should therefore not only improve the technical content of its education system, but also pay attention to the injection of an entrepreneurial dimension in its R&D and higher education system.

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*The Universiti Sains Malaysia (USM) plays a dominant role in the RDI activities in Penang. USM has embarked on a broad range of research programmes that cover numerous multidisciplinary fields including multimedia, renewable energy, microelectronics, marine technologies, astronomy and medicine. USM is committed to accelerate the transfer of technology from university results. While a strategy is being elaborated to increase patenting and commercialising public R&D, it is still limited in scope and at early stages of development.*

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Universiti Sains Malaysia has provided leadership in R&D over four decades, setting up research centres and institutes in diverse areas such as the Centre for Policy Research and International Studies, AIDS Action Research Group, Women's Development Research Centre, Centre for Drug Research to name a few. Its transdisciplinary approach to research has contributed results and outcomes beneficial to Penang. In research generation, it leads other Malaysian universities in terms of publication output. The quality of its R&D is similar to those of the best Malaysian universities. It, however, lags behind the main Singaporean and Hong Kong universities in terms of research quality and quantity.

While there is a long-established co-operation between Universiti Sains Malaysia and some multinational corporations, in general, contract research between the business sector and higher education institutions remains underdeveloped. In the last three years, only 16% of firms surveyed in the state have partnered with a university when upgrading or acquiring a new technology, a figure that is actually lower in Penang than the national average.

Universiti Sains Malaysia has set up the Innovations Office to promote and co-ordinate technology licensing and commercialisation efforts. The establishment of a commercial arm, Sanggar SAINS Sdn Bhd, with a commercialisation and enterprise development programme, and the creation of an on-campus innovations complex have produced some promising results: 26 projects have passed the proof of concept phase and 11 projects/products have been introduced to potential commercialisation partners. Long-term success will depend on the ability to attract high calibre organisations such as federal research laboratories that are able to generate new intellectual properties as well as investors (domestic and foreign) to

support and grow start-up companies commercialising USM's R&D and innovation outcomes.

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***The Penang state economy is biased towards manufacturing (43% of its GDP) and the central government is struggling to retain foreign investments. The government is also seeking to move the economy up on the value chain with focus on new technology niches. University-industry collaboration is increasingly seen as a target for new policy measures. It is important to better align education with local industry needs. This would be easier if HEIs and skill centres improved their collaboration and partnerships.***

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The Government of Malaysia is increasingly aware of the intensified competition in a number of industries. In 20 years, the share of FDI directed to Malaysia and Penang within South East Asia has been divided by nearly a factor 3. As a response to this challenge, the regional strategy has been extended to the Northern Corridor Economic Region (NCER). It aims at reactivating the attractiveness of the country and the Penang state and to regain competitiveness. In that context, the higher education sector, particularly Universiti Sains Malaysia, are key assets that need to be more efficiently leveraged. The biotechnology research infrastructure in Universiti Sains Malaysia and the future microelectronic centre CEDEC could become anchors and R&D bases for future development.

In order to make such a strategy successful, a number of barriers need to be removed. First, higher education institutions are considered as a low source of technology and often not an option for partner search. Second, the government's research institutes and HE R&D often do not coincide thus limiting the potential for co-operation. Third, despite the relative abundance of venture capital, the number of deals is low and decreasing. Fourth, small and medium-sized enterprises only rarely embark on collaborative programmes with higher education institutions. The Government of Malaysia is called upon to take steps to reduce or eliminate these obstacles. Increasing the incentives for collaborative research would be particularly helpful. Higher education institutions should also become more transparent with regard to the research programmes they are involved in and more systematically communicate the results obtained.

The mismatch between the supply and demand of skills is an area that deserves special attention. While the industry-led Penang Skill Development

Centre is a model of shared learning among manufacturing and service industry and a one-stop human resource development centre, after two decades of its inception, it is still not fully integrated in the Penang higher education system. Co-operation is weak with universities in Malaysia and Penang and the PSDC diploma are not recognised in the public sector. These gaps are detrimental to the regional innovation system in Penang and contribute to its fragmentation.

***The following measures would promote regional innovation in Penang***

***Recommendations for the federal/national policy:***

- Enhance the regional contribution of higher education institutions. Given the expected budget cutbacks, *it is important to build on existing strengths and align research programmes with regional priorities to ensure future sustainability.*
- Launch an independent review of the educational and research programmes of higher education institutions in order to assess the alignment of these programmes with the regional priorities. *The Universiti Sains Malaysia's educational and research programmes should be reviewed in order to assess the alignment of these programmes with the regional priorities of the National Corridor Implementation Authority (NCIA). A similar exercise could be envisaged for Universiti Teknologi MARA.*
- Strengthen the Regional Innovation System by launching new initiatives at state and central level to help higher education institutions to forge stronger links with the business sector. *New initiatives are required at state and national level to strengthen the Regional Innovation System. First, policy measures should be taken to improve HEI services to firms and to develop communication policies about research results. Second, an incentive system should be established to favour the development of contract research. Voucher systems (such as those operating in Netherlands or Italy) could be a way to link SMEs and HE R&D units. Third, public grants to research programmes should be extended to priority sectors other than the E&E and biotech industry.*
- In collaborative research, research awards and research collaboration move away for direct allocations and subsidies as the major modus

operandi to competitive mechanisms in order to enhance outcomes and to increase overall productivity.

- In collaboration with the state governments, encourage and support collaborative research between the higher education institutions at the sub-national level and also with higher education institutions in neighbouring regions to better exploit the complementarities between the different institutions and to reach a critical mass in a number of disciplines. *In Penang, collaborative research programmes should draw together the Universiti Sains Malaysia, Universiti Teknologi MARA, Universiti Malaysia Perlis and other regional higher education institutions. Collaborative programmes taking advantage of complementarities between Universiti Malaysia Perlis, Universiti Teknologi MARA (engineering) and Universiti Teknologi Petronas could tap the interdisciplinary innovation potential of the region. This could be facilitated if higher education institutions were requested to elaborate joint regional strategies.*
- Strengthen the recently introduced requirement for compulsory field training in all study programmes and help higher education institutions establish quality frameworks for internships so that industries will manage them efficiently thus facilitating students' eventual entry to the labour market. *Internships programmes should be generalised to all students, including social sciences and arts in order to develop capacity for innovation services.*
- Increase the training potential and student enrolment within vocational tertiary education institutions, professional institutions and community colleges to enable the eligible age group to acquire (middle level) skills in non high technology sectors such as agronomy, engineering, equipment maintenance, handicrafts and culinary skills.
- Develop policies to provide ways in which higher education institutions can either cap enrolment in low priority areas and/or provide incentives in high national and regional priority areas.

#### ***Recommendations for the universities***

- [For UMS]: Rationalise – reorganise and reduce – the number of overlapping innovation offices and strike a balance between basic and applied research by introducing a research portfolio that is aligned with

the needs of Penang and more generally the Northern Corridor Economic Region.

- Define clearly the institutional regional mission and conceived strategies adjusted to regional needs.

### ***Entrepreneurship support in Penang***

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***Promoting graduate entrepreneurship is a national priority in Malaysia. Entrepreneurship support is provided through a networked system with more than a dozen ministries and over 30 agencies. A number of programmes have been created but so far results remain modest, only a few students developing businesses.***

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In 2007, within the framework of the Ninth Malaysia Plan, the Ministry of Entrepreneurship and Co-operative Development (MECD) launched a wide range of programmes to promote graduate entrepreneurship with the aim of producing 150 000 new graduate entrepreneurs a year. The development of “managerial and entrepreneurship skills” are also required for higher education programme accreditation. In 2007, altogether 17 public universities implemented entrepreneurship programmes. Despite the progress made, the results are still at a low level. In 2004, only 30 out of 2 275 graduate respondents chose to get involved in entrepreneurship either by running a business on their own or by being part of a team.

Entrepreneurship support in Malaysia is provided through a networked system that includes more than a dozen ministries and over 30 agencies. Several universities participate in the government’s incubator programme MTDC, the National Unipreneur Development Programme (NUDP) that stimulates technology-related start-ups and university-industry relationships, and the annual business plan competition (MIBPC). Furthermore, a range of funding mechanisms have been developed to provide medium- and long-term capital financing, such as the “Cradle Investment Programme” (CIP) and the “Start Your Own Business” by the Multimedia Development Corporation. The Malaysian Venture Capital and Private Equity Association targets high technology and knowledge-based enterprises of all sizes.

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***Penang higher education institutions are offering an increasing number of entrepreneurship courses. Penang has a rich support framework for new firm creation and increasing investments are being made to support the creation of new business formation in knowledge-based fields.***

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Universiti Sains Malaysia provides a wide range of entrepreneurship courses which are integrated in the curricular. During the period 1955-2009, courses on offer have seen an increase in student enrolment of more than 78%. There is also an increasing number of start-ups amongst USM graduates. Since 1995, 190 firms were started, of which 100 in the period 2005-09. Progress is being made in other higher education institutions too. For example, Wawasan university has recently launched a Bachelor of Business in Entrepreneurship and Small Business Management and the Entrepreneurship Development course. Followed by the success in national business plan competition, KDU College has increased in-house facilitators and coaches for student start-ups. Furthermore, the unemployed graduates with a Bachelor's degree have access to entrepreneurship training.

Well-developed start-up support programmes can facilitate business formation but do not create financial dependency. Increasing investments are being made to support entrepreneurship in Penang. In 2009, the Penang Skills Development Center (PSDC) received MYR 30 million from the Government of Malaysia to provide incubation services to start-up firms and young companies as well as to existing small and medium-sized firms that want to use PSDC laboratory space for innovation purposes. The Penang Cluster Alliance Sdn. Bhd. (PCA) announced in summer 2010 the opening of a new incubation facility for around 40 start-up firms in ICT in a new, 10 800 square feet "enterprise laboratory" worth MYR 1.7 million. Furthermore, the National Institute for Entrepreneurship INSKEN is launching a promotional campaign on graduate entrepreneurship in 2011, with a focus on the commercialisation of research related to *Halal* products.

Supported by its top leadership, Universiti Sains Malaysia focuses on promoting technology-intensive entrepreneurship and spin-off activities through the commercialisation of research results. Sanggar SAINS Sdn Bhd, one of its commercial units, has developed the "Innovator Programme" dedicated to provide guidance, advice and support to start-up companies commercialising R&D outcomes of the university. Sanggar SAINS is also at present managing business incubation facilities at the university's innovations park, [sains@usm](mailto:sains@usm) "USM Connectors" enhance technology scouting and increase collaboration with industry. USM is also offering the

winners of international business plan competitions the opportunity to locate in the USM's incubator space. Finally, the university's "3-Track promotion exercise" provides a tool to reward and incentivise not only leading-edge research and quality teaching but also community engagement and entrepreneurship support. The overall conditions for new business generation have become more beneficial.

***The following measures would enhance entrepreneurship support:***

***Recommendations for the national government***

- Continue forward thinking strategies to develop a more entrepreneurial higher education sector and to boost graduate entrepreneurship in Malaysia.
- Develop incentive and reward systems and accountability schemes for higher education institutions. *Governments at different levels wishing to see strong move towards entrepreneurship need to ensure adequate incentive and accountability schemes that can mobilise higher education institutions.*

***Recommendations for the sub-national level***

- Establish a joint resource centre, providing an on-line information system of pedagogical practices freely accessible for teachers, researchers, students and other organisations involved in entrepreneurship education in order to create a more entrepreneurial learning environment. *The tasks of the resource centre could be to produce innovative and pertinent teaching material (case studies, videos, games, course contents, syllabi etc.) and to organise regular events, also using on-line services, targeted at different and mixed audiences to enhance communication on, and exchange of, new and innovative approaches in entrepreneurship education.*
- Develop co-operation and referral between internal and external business start-up support providers. *Consideration should be given to establish a business plan competition in Penang, devised around the key opportunity areas for new firms resulting from the strengths and*

*weaknesses of the local economy. Penang has critical mass in terms of students and entrepreneurship support providers.*

### ***Recommendations for the universities***

- *Use entrepreneurial pedagogies in entrepreneurship education and organise it in a dynamic way by taking account of the needs and interests of students, real businesses and research results. Engage students as partners in, and creators of entrepreneurship support. Use a differentiated approach to reach out to students at different stages of their study process. Use performance assessment exercises, including regular feedback sessions with people from the business community, alumni entrepreneurs and students and to track and survey alumni with entrepreneurial careers. Build and expand linkages between research and teaching, for example by getting doctoral students to work on research topics related to entrepreneurship education. Recognise that compulsory courses may reduce genuine interest in entrepreneurship. Interdisciplinary team efforts in entrepreneurship education allow individuals to concentrate on what they know and like best and at the same time become familiar with new knowledge that can be associated in a new way of solving a problem or creating a new product or service.*
- *Develop the teaching methods in entrepreneurship and support. Provide “training the trainer” activities and engage entrepreneurs and business practitioners in entrepreneurship teaching. Invite international visiting entrepreneurship professors to enhance the research base and to improve the students’ learning experience. Promote entrepreneurial spirit by entrepreneurship educator development programmes and workshops, careers adviser awareness programmes, and faculty deans’ and directors’ development programmes and workshops.*
- *Link entrepreneurship education with start-up support efforts. Entrepreneurial professors and researchers can provide the link between education and start-up support, by being role models, sharing research results for commercialisation and acting as mentors for student projects. To facilitate this, start-up support needs to be embedded in education.*
- *Ensure university leadership support for the entrepreneurial mission and incentivise individual entrepreneurialism. There is a need for the university leadership to create synergies between education, research and entrepreneurship and to establish an institution-wide commitment*

*to entrepreneurship with appropriate incentive structures for professors, researchers, administrative personnel and students. Provide soft incentives that stimulate involvement by professors and teaching staff by annual awards such as the “Best Entrepreneurship Innovative Pedagogy” and the “Best Entrepreneurship Professor”. Reduce the teaching load for those involved in “strategic” entrepreneurship activities, such as entrepreneurship ambassadors and mentors should be considered.*

### ***Health, cultural tourism and sustainability and green growth***

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***In Penang, the rapid and uneven growth and urbanisation have impacted the population’s health outcomes. Drug abuse, demographic changes such as ageing and ethnic diversity also pose challenges, while Malay, Chinese and Indian populations feature diverse health profiles. At the same time, Penang is making progress to become a medical tourism hub in South East Asia by providing high-quality but more affordable specialised medical procedures. There is a need to focus on preventive care and improve skills development in the health sector***

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The social conditions in Penang have improved considerably in the last two decades. Penang has been successful in reducing poverty with less than 0.3% of the population below the poverty line in 2006, compared with 29% in 1980. Despite the progress made, Penang continues to feature urban-rural divide and new urban poverty which have a negative impact population’s health outcomes.

The HIV/AIDS pandemic is a major health and social problem in Malaysia. In May 2010, there were 86 127 cases of HIV infected persons and 14 955 with AIDS, representing a significant increase since the first case was detected in 1986. In Penang, there were 3 524 people infected with HIV, 812 with AIDS, while 514 had died from HIV/AIDS. Responding to the local, regional and national needs, the AIDS Action and Research Group (AARG) at Universiti Sains Malaysia has grown into a multi-disciplinary centre of excellence, acknowledged by the federal and state authorities for its research, policy advice, counselling and community service.

Universiti Sains Malaysia (USM) plays a dominant role in research activities in health and medicine. It is the leading research entity with a health campus and research centres, such as the Pharmaceutical Research Institute and the Advance Medical and Dental Institute (AMDI). The research-based work carried out in medicine and health, supported by government programmes, illustrates that high quality research is not jeopardised by regional co-operation and application. USM's research centres provide the region with advanced technology and help retain and attract talent to the region. They have the potential to improve human capital and innovation outcomes in Penang.

It will be increasingly important that Universiti Sains Malaysia will help improve health outcomes of the diverse populations in Penang by using the region as a laboratory for its teaching, research and service. The scale and expertise in health and medicine should be applied to develop strategies to increase the quantity and quality of health care provision across Penang and the Northern Corridor Economic Region. There are many opportunities to improve regional development in Penang and the Northern Corridor Economic Region, for example by providing an opportunity to: *i*) address the regional health challenges, *ii*) undertake multi-disciplinary research on the inter-connections between improving education, social and economic conditions and improving health outcomes, *iii*) provide community-based medicine and ambulatory care facilities and *iv*) provide innovations in medical education and health care delivery.

The experience from OECD countries shows that innovation in medical education and health care delivery are more likely to succeed if supported by deliberate policies. The following are examples of strategies that can be used to support the new initiatives: *i*) partnerships with medical schools that have implemented community-based medical education to boost innovation in medical education or new forms of health care delivery; *ii*) competitive funds (with public and private support) dedicated to supporting a new research agenda (use information technology for innovation in health care delivery within the region). Without financial incentives, focus will remain on a traditional research agenda; and *iii*) incentive funding for recruiting and training the region's population in medical and health careers while at the same time attracting talent from elsewhere.

Penang is making progress to become a medical tourism hub in South East Asia by providing high quality but affordable specialised medical procedures. The region's goal is to be known as the centre for excellence in areas such as cardiac care and oncology, possessing globally-accredited hospitals and highly-qualified medical and healthcare professionals. Penang has strong public health and medical facilities, buttressed by international level private sector establishments. Private sector initiative and partnerships

have contributed to medical tourism in Malaysia which, in 2006, brought in USD 59 million, with Penang attracting 70% of this revenue. The Penang Health Association (representing a group of private hospitals) as well as good communication and travel facilities, low cost of services and availability of good accommodation have contributed to the growth of medical tourism. However, Penang's ability to build a health hub is faced with human resource challenges and intense competition in the wider region. There is acknowledged shortage of skilled health personnel, particularly nurses, a shortage of highly qualified people.

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***Tourism is the second largest contributor to the Penang economy and nationally it plays a significant role in the promotion and expansion of Malaysia's tourism industry. There is considerable growth potential in tourism through diversification into higher value-added segments.***

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In 2009, Penang's contribution to the Malaysian tourist industry was the third highest in the country with nearly six million tourist arrivals. Penang is an international tourist destination famous for its many historic and scenic attractions, beaches and diverse cultures. The Penang Investment Tourism Office is consolidating the shift from sun, sea and sand tourism to higher value-added segments. The aim is to leverage on the UNESCO World Heritage Status to effectively promote George Town and Penang and retain the authenticity of the city while making it more tourist-friendly. The state government stresses its cultural and ethnic diversity reflected in the language, costume, custom and cuisine and its historic links with the neighbouring countries such as Singapore and Indonesia.

State and federal governments can play an important role of supporting the cultural heritage of Penang and strengthening its tourism appeal. Universiti Sains Malaysia and other higher education institutions have supported this work by undertaking research, innovation and making their space available for events. There is, however, a lack of efforts to provide learning and skills development programmes in tourism and concerted efforts to develop and enhance entrepreneurship activities. There is also scope to increase knowledge transfer from higher education institutions to the tourism industry. Higher education institutions could for example help SMEs to better access global markets. Policy measures and collaboration by universities and other tertiary education institutions are needed to ensure that SMEs do not miss out in their ability to compete with larger suppliers. Higher education institutions could also support eco-efficiency and eco-

innovation in tourism, and help improve the measurement and evaluation of policy outcomes to estimate impacts of changes in tourism demand on the tourism sector and across the economy. An important challenge is to set up governance mechanisms to improve tourism's competitiveness and quality at the local level and to ensure coherence of policy development and implementation for a more balanced and sustainable tourism development in the region.

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*Penang faces many environmental challenges, such as congestion, rampant property development on hill slopes, and water and air pollution. The main economic pillars of the Northern Corridor Economic Region – agriculture, manufacturing and tourism – rely on and impact the conditions and sustainability of the environment. Penang is building a renewable energy economy and also in R&D efforts that can position the region internationally as a leader in new renewable energy technologies.*

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Penang faces environmental challenges because of the fragility and limits of its island environment, rapid population growth and economic development. Traffic volumes and congestion, floods, rampant and unsynchronised property development on hill slopes, water pollution from industrial effluent and air pollution from high usage of private transport are some of the results of rapid growth. A major issue is the lack of integrated management of water resources, energy and waste. The main economic pillars of the Northern Corridor Economic Region – agriculture, manufacturing and tourism – rely on and impact the conditions and sustainability of the environment. Sustainable practices need to be introduced to reduce the stress on natural resources in the region.

The State of Penang aims to become Malaysia's first green state and it is collaborating with the United Nations Environmental Programme (UNEP) to develop Penang into an eco town to ensure that commercial activities co-exist with nature in a sustainable manner. The state government is providing incentives to housing developers to adopt the Green Building Index (GBI) in order to retain the UNESCO World Heritage status. The Penang Transport Council was established in 2009 to improve public transport by moving people instead of cars, but the absence of public transport operators in the council limits its impact. The previous Penang Government commissioned an environment conservation strategy plan under its think tank SERI (Socio-Economic and Environmental Research Institute) but the strategy plan was

never adopted as a policy. At the local level, the municipality of Penang Island with jurisdiction over George Town, is concerned about the sustainable environmental development but lacks the instruments to implement a coherent environmental protection policy and the capacity to conduct comprehensive impact analyses of investment projects.

Universiti Sains Malaysia has a pool of experts in various disciplines, research centres and laboratories in environmental studies and research. The university's expertise and facilities are in high demand among the local industries and agencies. The environmental testing and analytical services use the equipment and facilities of various schools and centres such as the Environmental Technology Division, School of Industrial Technology, School of Chemical Sciences, School of Physics and various schools and centres of the Engineering campus. The university's broad portfolio of activities are connected under the healthy campus programme. USM's APEX university transformation plan is linked to sustainable development. USM has improved the design for new developments and mitigated environmental degradation in the region. The mobile unit of the Centre for Education, Training and Research on Renewable Energy and Energy Efficiency (CETREE) has introduced the issues of renewable energy and energy efficiency to 25 million school children in Malaysia and has carried out programmes to 150 000 members of public via community centres. Small scale recycling projects have brought tangible improvements in village communities.

Despite the commendable progress, the contribution of higher education institutions to sustainable development in Penang has not yet reached its full potential. The current programmes are often small in scale and fragmented among higher education institutions. Co-operation with the higher education community faces a number of constraints. There are many of projects but no coherently planned initiatives. The only institute fully dedicated to environmental studies and sustainability is USM's Center for Global Sustainability Studies (CGSS) which has limited resources. The municipality has made efforts to create a chair for urban studies within the USM that could have taken on board urban and environmental issues and amenity policy problem, but so far the university has not appointed a professor for this task.

There is a lack of dissemination of good practices across the higher education sector and scope to enhance joint RDI efforts to support the development of renewable energies and green growth, and outreach activities to support technical, organisational and process improvements for energy efficiency in the regional industry. Universities and other tertiary education institutions in Penang could increase their co-operation with local or regional one-stop-shop agencies for business support. By training the

trainers and other knowledge dissemination activities, universities could help these agencies acquire the specialised skills to advise firms on the cost-effective ways to reduce emissions. Furthermore, higher education institutions could strengthen their efforts in greening the SMEs in the tourism and E&E industry.

In the absence of a comprehensive regional approach and incentives, higher education institutions are less likely to make rapid progress in supporting green economy. There is also a risk that the main beneficiaries of technology transfer from higher education institutions will be the large enterprises, delaying the market penetration of zero-emission as well as water efficient technologies. Positive outcomes require action to identify opportunities for change, to create innovations in water management and to make low-carbon technologies more attractive, and develop skills to make wider use of green technologies.

Jobs related to renewable energy and energy efficiency are projected to increase to several millions worldwide by 2030, most of these new jobs in a small number of innovative regions. The development of a green economy depends on the availability of skilled people to fill the new jobs related to renewable energy and energy efficiency. Simultaneous development of diverse skills and extensive retraining will be necessary. Skill creation and re-skilling activities in green growth are delivered by Universiti Sains Malaysia and the Penang Skills Development Centre. Penang should take steps to anticipate the employment effects and labour reallocation needs across industries. Skill creation could be more efficiently organised by pooling learning resources of educational institutions and industries at the regional level. Stronger partnerships between tertiary education institutions and industrial associations could stimulate innovation in the modes of delivery of education and training. This would require transparent pathways between different levels of education and also between higher education institutions.

***The following measures would enhance social, cultural and environmental development in Penang***

**Recommendations for the national policy**

- Provide incentives for “challenge-driven” research to connect university research to community development. *In order to make the connection between the current research focus and a more broadly defined third mission, “translational research” could be adapted to address the critical issues that bridge the university and community.*

- Create a school of environmental research in Penang to train students in those disciplines and to embark on research that will be useful for Pulau Penang and beyond in the Northern Corridor Economic Region.

### **Recommendations for the sub-national level**

- Apply the university expertise in health to develop strategies to increase the quantity and quality of health care provision in the region. *Use this expertise to develop the region as a whole as an internationally recognised centre of expertise and innovation on health care practices and technical innovations that improve health care outcomes of the population but also attract health tourism. Scale up medical personnel training. Support university partnership with medical schools and health care delivery systems that have implemented community-based medical education to boost innovation in medical education or new forms of health care delivery.*
- Provide competitive funds (with public and private support) dedicated to supporting a new research agenda and incentive funding for recruiting and training the region's population for health careers.
- In view of the importance of the environmental protection and preservation of urban cultural heritage in Penang, define a comprehensive amenity policy strategy and launch initiatives to leverage assets for cultural and gastronomy tourism with the help of university expertise.
- Create an integrated approach to address the challenges of rapid urbanisation and unsustainable construction projects and promote inter-ethnic initiatives. *Consider the development of a school of environmental research should be created and the awareness on conservation and preservation fostered through increasing links with local communities in the region.*

### **Recommendations for the universities**

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

*and projects involving stakeholder collaboration, community development and/or outreach should be mapped and published in the collaboration platform.*

- *Improve the monitoring and follow-up of the success and results of their initiatives, projects and programmes to show return on public investment. The lack of robust and comparable data constrains the visibility and impact of universities' activities. It also makes difficult to measure the success or failure of programmes. Building on the existing successful models, capacity should be developed in regional data gathering, and sharing regional data repositories and technical skills associated with using regional data.*
- *Collaborate with authorities, schools and the private sector, reach out to socially underprivileged population to ensure social and economic cohesion. Current activities need to be scaled up in a systematic way, including long-term multi-stakeholder collaboration to raise aspirations among youth in socially unprivileged population and to improve their quality of life.*
- *Address regional health challenges in Penang and the Northern Corridor Economic Region. University Sains Malaysia's health-related centres should widen their focus on community-based medical education and new forms of health care delivery as well as generation of innovations.*
- *Provide advice and expertise for local planning and urban development by reactivating and revamping the USM urban studies within the university should be reactivated and revamped. This would facilitate training for local government and provide an opportunity to embark on consultancy services and to provide the skill basis for more proactive local government with strong commitment to sustainability. Basic foundations for stronger university involvement are already in place: the Universiti Sains Malaysia has issued a blueprint on housing and environment, while the Socio-Economic and Environmental Research Institute (SERI) is a useful think tank.*
- *Collaborate with the public and private sector in Penang to increase joint efforts to support sustainable environmental and economic development through a comprehensive regional approach to growth management bringing together diverse regional actors to sustainability process. Scale up their efforts to provide learning and further education programmes for "green" jobs and to act as a source of expertise through research, consultancy and demonstration. Provide analysis of the benefits and costs of controlling emissions from the wide variety of emissions sources, for example multinational corporations.*

- Strengthen and develop interactions between higher education institutions and non-governmental organisations in order to maintain and enhance civic co-operation in Penang. *The role of non-governmental organisations is critical and the higher education institutions are already in interaction with non-governmental organisations in connecting students with community learning opportunities.*
- Engage in long-term community development seeking ways to empower communities to find their own solutions to various economic, social, cultural, environmental challenges which are global, national and local in nature. *The region should be seen as a “laboratory” for developing research, students’ work-based and experiential learning and development projects in many different fields.*

## ***Capacity building for regional development***

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***Higher education institutions in Penang and in Malaysia in general do not have an explicit regional mission, but this is left to the individual institutions' initiative. For research-intensive universities, the principal driver is scientific excellence. There is a need to acknowledge the key role that HEIs can play in local and regional development and provide incentives at the institutional and individual level to mobilise the full potential of HEIs.***

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There is a need to acknowledge across the government the key role that the higher education institutions can play in regional 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 Malaysia wishes to mobilise its higher education system in support of regional development, the higher education policy which embraces teaching, research and community service should include an explicit regional dimension. There should be an acknowledgement that the diverse regional contexts within which higher education institutions operate and the national policies, especially funding regime, have differential regional impacts.

In Malaysia, public higher education institutions are established, financed and managed by the national government. They are accountable to the federal authorities, and, on the whole, more concerned with national development than with regional or local engagement. As in many other countries, higher education institutions in Malaysia do not have an explicit regional mission which is left to the individual institutions' initiative. For research-intensive universities, the principal driver is scientific excellence. There is no formal process for monitoring outcomes and assessing the impact of local engagement. As a result, a considerable amount of university research is theoretically-oriented with limited relevance to local and regional development.

Universities and other higher education institutions in Penang and Malaysia need greater incentives in order to play an effective role in regional development. Currently, public resource allocation criteria for higher education institutions in Malaysia do not give adequate emphasis to

regional engagement. Unless this becomes a regular element of ongoing planning and is accepted and approved by the authorities, it can be difficult to ensure an adequate alignment of higher education institutions' activities with local and regional needs.

The issue of incentives is also important at the individual level. Currently, the criteria for staff recruitment and promotion in Penang higher education institutions do not sufficiently encourage activities related to local engagement. As a result, staff members consider that their responsibility in terms of teaching and research is more relevant to national needs than to regional requirements. The Universiti Sains Malaysia has taken steps to introduce a "3-track promotion exercise" based on research, teaching and community engagement or industry collaboration to reward and incentivise community engagement and entrepreneurship support. This development is commendable and should be strengthened.

Higher education institutions in Penang are engaged in diverse collaboration with regional, local and industry partners. Nonetheless, much of this collaboration is at *an ad hoc* basis without long-term planning, adequate resources and monitoring of the results. In some instances, development agencies engage in regular dialogue with the higher education leaders but there is no appropriate follow up. Permanent long-term collaboration is needed to address the challenges and opportunities of Penang. Collaborative work should be supported by a detailed knowledge of the needs and opportunities of the region and the knowledge of the higher education institutions' research and education portfolio so that when opportunities arise, the development agencies can identify appropriate institution or part of it to be engaged in the negotiation process.

***The following measures would enhance capacity building for regional development***

***Recommendations for the national policy***

- Make regional engagement, and its wide agenda for economic, social and cultural development explicit in higher education legislation and policy.
- Provide incentives for higher education institutions' regional engagement in the form of long-term core funding and strategic incentive-based funding schemes on a competitive basis.

- Strengthen higher education institutions' accountability to society by developing indicators and monitoring outcomes to assess the impact of the higher education institutions on regional performance. *Include the contribution of higher education institutions to local and regional development in their annual evaluations.*

#### ***Recommendations for sub-national level***

- Establish a partnership structure of key stakeholders from local and regional authorities, business and industry, the community and higher education to provide a focus for dialogue with higher education in relation to its contribution to regional development and identify a and develop leaders within the public and private sectors to populate this partnership structure.
- Develop a clearly articulated long-term integrated strategy to drive the economic, social, cultural and environmental development of the city and the state. *Mobilise the resources of higher education institutions in the preparation and implementation of regional and urban strategies.*
- Mobilise university expertise for regional development by establishing Chairs in areas of special needs or opportunities. Help identify areas of research for regional development.
- Invest jointly with higher education institutions in programmes which bring benefit to regional businesses and community, *for example translational research facilities which are aligned with the needs and opportunities of the region, advisory services for SMEs, professional development programmes, graduate retention and talent attraction programmes.*

#### ***Recommendations for universities***

- Building on existing links and initiatives that align higher education institutions with the regional needs develop a common vision of local and regional development among higher education institutions, *support the vision with a strategy and milestones and funding in order to ensure that local engagement is part of higher education institutions' activities and reflected in their development plans.*

- Establish a permanent partnership organisation with own staff and resources *to link all higher education institutions in Penang in order to undertake substantive collaborative projects and programmes that address regional needs and opportunities.*
- Review staff recruitment, hiring and reward systems so as to include the regional development agenda. *Create mechanisms to systematically monitor and evaluate the activities in this area, to share good practice within their institution and benchmark this experience with other organisations and localities.*
- Develop senior management teams to deliver the corporate response expected by regional and local stakeholders without disincentivising entrepreneurial academic.

## 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 2008-11.

This OECD Review of Higher Education in Regional Development of the State of Penang, Malaysia (<http://www.oecd.org/dataoecd/62/6/47505889.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).