Higher Education in Regional and City Development

The Galilee, Israel



OECD

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Foreword

Universities and other higher education institutions can play a key role in human capital development and innovation systems in their cities and regions. Reviews of Higher Education in Regional and City Development are the OECD's tool to mobilise higher education for economic, social and cultural development of cities and regions. They analyse how the higher education system impacts local and regional development and help improve this impact. In addition to human capital and skills development, technology transfer and business innovation, the reviews examine higher education's contribution to social, cultural and environmental development and regional capacity building. The review process facilitates partnership building in regions by drawing together higher education institutions and public and private agencies to identify strategic goals and work together towards them. To know more about the OECD review process and requirements, visit Higher Education and Regions' website at *www.oecd.org/edu/imhe/regionaldevelopment.*

These reviews are part of a wider multi-annum work of higher education in cities and regions coordinated by the OECD Programme on Institutional Management of Higher Education (IMHE). In 2004-07, the OECD/IMHE conducted an extensive study with fourteen regional reviews across twelve countries. This resulted in the OECD flagship publication *Higher Education and Regions: Globally Competitive, Locally Engaged* (OECD, 2007) with recommendation to benefit both higher education institutions as well as national and regional governments.

In 2008, the OECD/IMHE launched a second series of OECD reviews of Higher Education in Regional and City Development to address the demand by national, regional and local governments for more responsive and active higher education institutions. As a result, 14 regions in 11 countries have undergone the OECD review process in 2008-10. The reviews have been carried out by the OECD/IMHE in collaboration with international organisations and associations and other OECD programmes and directorates. This work has supported the OECD Innovation Strategy and OECD Green Growth Strategy, and will now provide input to the OECD Skills Strategy.

Acknowledgements

This OECD review of the Galilee is part of the second round of OECD reviews of *Higher Education in Regional and City Development.* This was the first OECD review carried out in Israel fully focussing on education.

Numerous national and regional stakeholders and representatives of higher education institutions provided valuable insights during the OECD review visit and in the form of comments. The OECD would like to thank in particular the lead co-ordinators in the Council of Higher Education and other active local counterparts in the Galilee higher education institutions, particularly those that the team visited: The Gordon College of Education, Nazareth Academic Institution, ORT-Braude, Sakhnin College of Education, Tel Hai Academic College, Western Galilee College and the Technion.

This publication draws on interviews carried out during a week-long review visit in 21-27 November 2009, on the findings of the Galilee's Self-evaluation Report prepared by John Golub and using additional information provided to the review team. The OECD Review Team had a full and intensive programme and were received openly by a wide range of stakeholders. This publication also draws on other OECD reports on Israel, such as the OECD Economic Survey: Israel (2009) and the OECD Review of Labour Market and Social Policies: Israel (2010) and has tested their conclusions and recommendations within the higher education sector in the Galilee.

This publication was co-ordinated by Jaana Puukka from the OECD programme on Institutional Management in Higher Education (IMHE). The members of the Peer Review Team – Patrick Dubarle (former OECD Secretariat, France), Aims McGuinness (National Center for Higher Education Management Systems (NCHEMS, US) and Ami Volansky (School of Education, Tel Aviv University, Israel) – contributed to this report. In addition, Francisco Marmolejo (Consortium for North American Higher Education Collaboration (CONAHEC, US) participated in the review visit. Further details about the Review Team can be found in Annex 1 of this report. Rachel Linden supervised the publication process, Fionnuala Canning and Austin Delaney provided invaluable assistance in the editing phase.

Acronyms

BERD	Business expenditure on research and development
BIEM	Brandenburger Institute in Entrepreneurship and small and medium-sized enterprises
BIRD	Bi-national Industrial Research and Development Foundation (US-Israel)
BRITECH	Britain-Israel Technology Foundation
CBS	Government of Israel, Central Bureau of Statistics
CHE	Council for Higher Education, Israel
CHEPS	Centre for Higher Education Policy Studies, The Netherlands
CIII	Centre for Implementing Innovation in Industry in the Eastern Galilee
CIIRDF	Canada-Israel Industrial Research and Development Foundation
EMC	Electron Microscopy Centre
EUREKA	European network for the promotion of collaborative R&D in technology
Eurostars	EUREKA Programme for the funding and support of small and medium-sized enterprises
EWG	Empower Women in Eastern Galilee
FDI	Foreign Direct Investment
GAL-EDGE	Galilee Economic Diversification and Growth of Enterprises
GDP	Gross Domestic Product
GERD	Gross Expenditure on R&D
GIF	The Galilee Innovation Fund
HDI	Human Development Index
HEFCE	Higher Education Funding Council for England (UK)
HEI	Higher Education Institution
HEIF	The Higher Education Innovation Fund, UK
HERD	Higher Education Research and Development
IBS	The Institute of Baltic Studies
ICT	Information and communication technology

IMHE	OECD Programme on Institutional Management in Higher Education
IIT	Israel Institute of Technology
ILS	New Israeli Sheqel
IMD	IMD Business School, Switzerland
IRC	Innovation Relay Centre, managed by MOITAL
ISERD	Israel – Europe Research and Development Directorate for the EU Framework Programme
ISI	Institute of Scientific Information
ITTN	Israel Technology Transfer Organisation
KATAMON	MOITAL programme to promote water technology projects by co-operation between industrial company, academic research group and water infrastructure company
KORIL-RDF	Korea-Israel Industrial Research and Development Foundation
LAG	Local Action Group
LEADER	*Liaisons entre Acteurs du Développement Économique Rural* (EU)
LLL	Lifelong learning
NAI	Nazareth Academic Institution (formerly Mar Elias College)
NAM	Project to widen access of ultra-Orthodox Jewish and outstanding Arab youth from northern Israel
MATI	Centre of Entrepreneurship Promotion in Galilee
METI	Industrial Cluster Programme of the Ministry of Economy, Trade and Industry, Japan
MOITAL	Ministry of Industry, Trade and Labour
MAGNET	MOITAL Programme to support consortia of industrial companies and academic institutions to jointly develop generic, pre competitive technologies.
MAGNETON	MOITAL Programme that promotes technology transfer from academic institutions to industry
MATI	Centre for Promotion Entrepreneurship
MATETOP	Israeli Industry Centre for R&D
MIGAL	Galilee Technology Centre
NASDAQ	National Association of Securities Dealers Automated Quotations
NOFAR	Pure academic research programme for basic and applied research to encourage industrial companies to access information for investing in R&D
NGT	New Generation Technology (a Jewish-Arab incubator)

OCS	Office of Chief Scientist
OECD	Organisation for Economic Co-operation and Development
PBC	Planning and Budgeting Committee
PIMA	Andalusian Modernisation and Innovation Plan, Spain
PISA	OECD Programme for International Student Assessment
RAAK	Regional Action and Attention for Knowledge Innovation, The Netherlands
RDI	Research, Development and Innovation
RETA	Network of technology centres in Andalusia, Spain
RIS	Regional Innovation System
SESAR	The SESAR project (formerly known as SESAME), European air traffic control infrastructure Modernisation programme
SIIRD	Singapore-Israel Industrial Research and Development Fund
SME	Small and medium-sized enterprise
TNUFA	MOITAL programme that supports technological entrepreneurship and innovation at pre-seed stage
UTEP	University of Texas at El Paso, US

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Assessment and recommendations

The Galilee: from talent attraction to nurturing endogenous assets

Israel has enjoyed high economic growth rates supported by entrepreneurial drive. Israeli society has also absorbed and integrated immigrants from 79 different countries, who speak 39 languages.

However, there is a growing social and economic divide within Israel between the centre and periphery – the Galilee and the Negev – and between different population groups. The socio-economic gap is evidenced in the rate of unemployment, the low level of salaries, the lack of absorptive capacity in traditional industries, negative migration, poverty which is highest among the youngest and most rapidly growing population groups, and the fundamental disparity between the Arab and Jewish populations groups. The uneven development poses a threat to long-term sustainable development of Israel.

The Galilee is located in the northern-most part of Israel. The regional economy is dominated by traditional sector such as agriculture, construction and manufacturing. The region is to a large extent characterised by a low skills/low wage economy. One third of the population – Haifa sub-districts excluded – live below the poverty line. The unemployment rate is higher than the national average and average wages lower for both the self employed and salaried employed. There is a high degree of diversity of ethnicity and religion and a separation of different population groups.

The Arab population continues to face structural obstacles and constraints in entering higher education and labour market. The gaps in educational attainment are particularly noticeable in the Northern part where the share of Arab population is closer to 50% against 20% in the country as a whole. The disparities in education outcomes generate income inequalities and result in a waste of talent for the economy. At the same time, the current underinvestment in human capital represents a considerable untapped resource for the Israeli society.

In the context of low skills, ethnic and religious diversity and globalisation, the key challenges for the Galilee and its higher education institutions are the following:

- How to fuel local growth by developing relevant skills and improving educational attainment level across the multi-ethnic, multi-religious population?
- How to leverage the current economic base and promote new business formation?
- How to mobilise higher education institutions for regional and local development and boost collaboration between institutions?

In order to address these challenges, Israel needs to establish long-term measurable goals for narrowing gaps between key populations. It should widen access to education by ensuring equitable education infrastructure and quality service delivery to all population groups. Increasing the accessibility of tertiary education among underrepresented groups will also require a structural change in tertiary education to improve vocational education opportunities. Regional engagement and sustainability should be guaranteed by appropriate incentives structures for higher education institutions and their faculty.

Furthermore, the Galilee needs more concerted efforts and an approach to regional development including a master plan with vision, goals, milestones, co-ordination measures and robust evidence base. The good practice examples currently seen within the region in widening access to higher education, community engagement and industry-university collaboration should be disseminated, extended and scaled up. Employability, creating jobs and providing access to employment opportunities should be seen as the primary goals of innovation and human capital development. In addition, higher education institutions should move towards more demand-led education provision and use the region as a "laboratory" for students' learning and challenge-driven research and community outreach.

Human capital development in the Galilee

Israel has a high average educational attainment level but significant differences between population groups. Low outcomes in education are concentrated among the fastest growing Arab and ultra-Orthodox Jewish populations. Half of the age cohort fails to

achieve qualifications to access higher education. In the absence of substantial changes, by 2020 a significant number of new workers will enter the Israeli labour force without relevant skills.

The Israeli population has a high average level of educational attainment across all age groups. About 43% of the 25-34-year olds and 45% of the 45-54-year olds have completed tertiary education (OECD Education at Glance, 2011). The 1993 Council of Higher Education Master Plan doubled the share of first-year students from 23% of the age cohort to 43% in 2008. An additional 12% were enrolled in tertiary education towards associate degrees in 2009. The number of higher education institutions grew from 21 in 1990 to 66 in 2009. Private returns on education are, on average, at a high level: in 2007 gross average income of academic professionals was NIS 12 672, compared with NIS 7 374 for those with 9-12 years of education. However, returns on education for Arabs are considerably lower.

Much of the expansion in higher education has been achieved through the establishment of colleges which offer undergraduate education. The number of students in the colleges in the periphery has increased considerably: the percentage of undergraduates studying in institutions in the Northern and Southern Regions grew from 8.7% in 1990 to 22.7% in 2006. This increase was at the expense of the three metropolitan regions of Jerusalem, Tel-Aviv and Haifa, whose share in the student population went down from 87.2% to 60.7%.

Despite this progress, significant differences remain in educational outcomes between population groups. Low levels of educational attainment are concentrated among the fastest growing Arab and ultra-Orthodox Jewish populations. While the opening of colleges in the periphery has increased the access of the Arab population, particularly for women, the overall participation and attainment levels still lag behind: only about 20% of Arab population aged 15 and over has attained tertiary education, compared to 45% in the Jewish population. Furthermore, the share of first-degree graduates from low-income households is small, even taking consideration the differences in secondary education grades.

The Israeli education system is characterised by segregation. Pre-primary, primary and secondary education in Israel consists of four main streams: Hebrew speaking schools that include state, state-religious and ultra-Orthodox Jewish schools, the Arab-speaking stream and a small stream for the Druze. All streams are supervised and fully funded by the state, apart from the ultra-Orthodox stream which is independent but receives state funding.

Israeli students in secondary schools perform poorly in international student tests, such as the OECD's programme for International Student Assessment (PISA). While poor international ranking in PISA is evident in all streams of supervised education, the Arab schools have the lowest scores of all. While the most recent PISA results show some improvement, the science and math scores have declined. Modest learning outcomes can be partly explained by low levels of public spending on education per student in Israel. Furthermore, budgetary spending per child (0-17 years) in Arab localities is only half of that of in Jewish communities. Arab primary and lower secondary schools have bigger classes and fewer teaching hours: in elementary Arab schools teaching hours are about 75% of those in Jewish schools. In ultra-Orthodox schools the challenge is not so much the time but the content of education which provides limited skills for the labour market.

Entrance to higher education is complicated, depending not only on the matriculation test (Bagrut), but also on a separate aptitude test (psychometric test). There is some evidence of cultural bias in these tests and significant differences between Jewish and Arab students. About half of the age cohort fails to receive qualifications that would enable access to higher education. Vocational education remains underdeveloped.

Military conscription delays entry to tertiary education or work but provides practical skills with market value to the Jewish population, apart from the ultra-Orthodox Jews who are in practice exempt from the military service. Conscripts benefit from army discharge grants and support to enter higher education. Equivalent post-school support should be made available to Arab students. Military conscription has also contributed to the development of wide array of pre-academic programmes.

Poor learning outcomes and low educational attainment levels for minority groups reflect the failure of the Israeli education system at all levels. Authorities are aware of the discrepancies, and have started to increase investment. In primary and secondary education over the 2007-11 period, 8 000 new classrooms are scheduled to be built and subsidised, of which 40% are for the benefit of the minority populations. The New Horizon educational reform has been launched to address quality and equity gaps and to improve the preparation of school teachers. In higher education a substantive reform programme was started in 2008, based on the SHOCHAT committee recommendations, but ground to a halt before the end of the year. While the higher education reform is now being revived with a six-year plan, policy needs to ensure that financial constraints do not act as a barrier to higher education. Sustained investment is needed to address the long-term shortcomings of the Arab population.

Low educational attainment levels limit the ability of the Galilee to develop and attract high-value economic opportunities. In recent years considerable progress has been made in widening access to higher education in the Galilee through the establishment of colleges. Despite the progress, higher education attainment levels continue to lag behind the national average and the enrolment of the colleges remains largely Jewish.

In the Galilee the access to higher education has improved significantly: in 1990, there were no accredited institutions authorised to grant academic degrees in the region, whereas in 2008 the region had 8.5% of the total number of students in Israel. A number of new colleges have been established to improve access to higher education. Nevertheless, the higher education attainment levels (associates degree and above) in the region lag behind the national averages and about 57% of the Galilee civilian workforce obtain only 12 years or less of schooling. The average net income in the Galilee is 47% less than in the centre of Israel. Unemployment rates are higher, particularly among Arab women (22.7% compared with the national average of 13.1%).

Educational outcomes of the Arabs population, who represent almost 50% of the population in the Galilee, are improving, but still lag behind those of the Jewish population even in the younger cohorts. The enrolments of the Galilee colleges remain largely Jewish, ranging from 65% to 70% at Gordon College of Education and Western Galilee College to more than 90% at ORT Braude. The low enrolment rates of Arabs can be attributed to the limited supply of relevant places, poor geographical accessibility to higher education, poor preparation at the primary and secondary education level due to underinvestment in Arab schools, insufficient language skills and lower rates of return to education for Arab population.

A systematic region-wide approach is needed to widening access to and improving retention in higher education. This calls for improved preparation for higher education through investment in schools, sustained collaboration between schools and higher education institutions, and measurable targets for colleges for enrolment and graduation rates of minority students.

To ensure sustainable development in the region, a higher percentage of the Arab population should be able to complete secondary education with the knowledge and skills needed for tertiary education and a knowledge-based economy. Higher education institutions could play a more prominent role in supporting the school reform. The ongoing initiatives in the Galilee: *i)* focus on teacher preparation, including professional development of school principals and teachers, *ii)* increase enrolment in pre-academic programmes for under-represented population groups, including programmes to improve proficiency in Hebrew and *iii)* target student community service for the underserved communities and schools. Extensive college engagement occurs through student community service and volunteer programmes, for example the Perach programme which engages students from all Israeli higher education institutions with children from disadvantaged socio-economic background in raising aspirations. The eight Perach programmes in operation in the Galilee involve approximately 1 000 higher education students.

Despite programmes, projects and initiatives in the Galilee, there is no systematic region-wide approach to widening access to and improving retention rates in higher education. The authorities need to address these challenges in the periphery in a comprehensive way and mobilise appropriate levels of financial resources to support public education at all levels and for all population groups. Measureable targets should be set for higher education institutions regarding the enrolment and graduation rates of the minority groups. Institution-wide measures should be adopted to improve the retention rates of the first generation students. There is also a need to increase the outreach efforts of the higher education institutions and share good practices among themselves in a systematic manner.

Improvements should also be made in the geographical accessibility of tertiary education. The existing Arab colleges should be strengthened and allowed to diversify their teaching, research and service portfolio to better respond to the needs of the region. Collaboration between higher education institutions should be encouraged to develop local solutions to regional provision through partnerships, to improve student mobility and pathways as well as a more cost-effective delivery of academic programmes.

Many of the higher education institutions in the Galilee are geographically separated from predominantly Arab communities. The Academic Arab College for Education in Haifa, Sakhnin Academic College for Teacher Education and the Nazareth Academic Institution (NAI) serve primarily Arab students, but their capacity remains low due to the limitations in their missions and resources. For example the Sakhnin College is confined to teacher education with limited ability to respond to the regional needs and the newly established Nazareth Academic Institution (NAI) has a small offer of accredited courses and receives no budget funding. Considering the current underrepresentation of Arab population in tertiary education, steps should be taken to provide adequate support to NAI, which is the first comprehensive Arab higher education institution in Israel. Support should also be provided to the Arab academic colleges for education to help them to diversify their teaching portfolios. Investing in Arab education would improve education attainment levels and generate mid- to long-term benefits for the regional economy including increased tax revenues and job creation.

There is a need to design tertiary education based on the particular local needs. The authorities should support the provision of colleges on the basis of the current and projected demand in order to provide the growth (or reduction) of services in locations where it is required. A region-wide assessment of current and planned capacity should be conducted against anticipated student numbers, identifying needs in terms of staff and infrastructure and taking into account related transport and student housing provision. In some cases, there is a need to enhance infrastructure-sharing arrangements between different education providers. When developing the network of higher education institutions, care should be taken to ensure that adequate IT infrastructure is in place for high speed, low cost connectivity.

Smaller colleges may suffer from increased costs associated with the small scale of operations, relatively low student numbers and a high proportion of students from disadvantaged socio-economic background. Therefore, strong collaborative links need to be developed between the colleges to improve their education, service and research capacity. Additional funding should be allocated to develop collaborative, local solutions to regional provision through partnerships with local stakeholders. Authorities could consider providing support for specific higher education extension learning centres served by several different colleges and possibly universities and the Open University, in villages with low tertiary education participation rates.

There is limited student mobility among higher education institutions in the Galilee. Reported reasons were the competition among institutions for a limited pool of students and the lack of a credit transfer system. Higher

education policy in Israel emphasises the objectives of differentiating the missions of institutions and discouraging unnecessary programme duplication. As a complement to these policies, there is a need for policies that provide pathways for students to move between and among institutions to take advantage of academic programmes that may not be available at their college of initial enrolment.

The Galilee provides an opportunity for Israel to enhance institutional collaboration so that the combined capacity of the colleges can contribute to more cost-effective delivery of academic programmes in the region. The authorities could pilot a credit transfer system that would make it possible for students at the colleges in the Galilee to transfer to another college to take advantage of an academic programme without the loss of academic standing or progress. When approving a new academic programme, the authorities could require that an institution provides pathways for students at other colleges in the region to transfer to the programme and to transfer credits for course work already completed. Priority could be given to academic programmes in fields in demand within the region such as the health professions or tourism/ hospitality. Changes in finance policy would be important to make such a transfer policy work. For example, both the sending and receiving institutions should not be penalised in the funding formulae of the Planning and Budgeting Committee (PBC) because of the loss or gain in enrolment resulting from student transfers. The authorities could also provide funding to support joint academic programme planning between the faculties of two or more colleges to facilitate student credit transfer.

The ability to fuel local growth by cultivating relevant skills is the best guarantee that the Galilee will thrive in future. Currently, there is a mismatch between the higher education supply and demand. Strengthening vocational education for Arab men and providing wider learning opportunities for women are necessary.

Employment by industry and occupation in the Galilee differs from other regions of Israel with higher levels of employment in traditional industries and lower levels of employment in occupations that commonly require education at the tertiary level. Employment patterns are different for Jews and Arabs, and within the Arab population, for men and women. A major challenge for the Galilee is to increase the labour market participation rate of Arabs. The participation rate of Arab women is very low and

stagnant: only 17.8% in 2005, when in 1995 the rate was 18.3%. A majority of the Arab female employees (approximately 53%) work part-time, which partially explains the gap between the average wages of Arab women and Jewish women.

Currently, the academic programmes provided by the Galilee colleges do not appear to be well aligned with the demand for skills in the region. There is a lack of tertiary education opportunities relevant to labour market. The mismatch between higher education supply and demand is caused by a lack of vocational-technical programmes relevant to the employment of Arab men and narrow education and employment opportunities for Arab women.

Israeli education system has a strong emphasis on academic preparation for higher education and limited focus on developing the vocational skills needed by industry. While military conscription is a source of vocational skills for the Jewish population, this channel is not available to the Arabs. In order to reverse the decline in productivity of traditional industry in the Galilee there is a need for increased availability of education and training programmes at the level of certificate or associate degree (tertiary level B) particularly targeted at Arab men, who provide the core human resources for the region's traditional industries.

A small number of Arab women attending the academic colleges in the Galilee are enrolled in academic programmes other than teacher preparation. Opening wider educational opportunities for Arab women will ultimately impact on their labour market outcomes and generate positive results for the Israeli society. In addition to providing adequate support to the existing Arab colleges, the authorities should ensure wider use of ICTs, distance learning and teleworking opportunities in order to enhance women's participation in education and labour force.

To reduce the brain drain from the region the labour market relevance of tertiary education needs to be improved. Skills diversification and stronger Life Long Learning opportunities would help adjustments to changes in the labour market.

Despite some notable exceptions, the higher education provision in the Galilee colleges remains supply- rather than demand-driven. Traditional lecture modes of instruction dominate and only a small proportion of students in a limited number of disciplines have access to work-based learning and internships. Limited efforts are made to integrate practical

experience or voluntary service in the curricula. Only a few systematic programmes linking graduates in the regional industry are in place. Furthermore while higher education institutions expressed concern about the lack of employment opportunities for graduates within the region, many did not have robust institution-wide systems in place to monitor the labour market outcomes of their graduates. Considerable number of students engages in voluntary work. With the exception of the Tel Hai College, this is not credit-bearing and considered not part of the curricula.

Due to rapidly changing skill requirements and the entry of migrant workers to the Galilee labour market, Life Long Learning, skills upgrading and re-skilling are becoming increasingly important. Upgrading the skills of the adult population would also have a more direct effect on the region's economic performance since adult learners are generally less mobile than younger students due to family commitments. While much of the demand is in the vocational sector, the Galilee higher education institutions could play a more active role in Life Long Learning. Currently they are more oriented to meeting the needs of traditional students than those of the working age adults. 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.

The following measures would promote human capital development in the Galilee:

- Authorities, higher education institutions and other educational institutions and stakeholders of the economy and society should work together to establish a Regional Human Capital Development System to define region-wide goals, policies and priorities to improve the educational attainment rates and to bridge the gaps between the population gaps. Region-wide as well as institution-specific clear measurable targets should be set for enrolment, graduation and employment outcomes of the students, with quotas for underrepresented groups.
- Authorities and higher education institutions should work together to improve the data on labour market needs and trends and student access and progress. Higher education institutions should systematically monitor student progress, as well as students' labour market outcomes and graduate destinations. The most effective region-wide graduate labour market systems are based on comprehensive labour market intelligence, on-line publication of the data in a single place to improve students' ability to make rational choices about their studies and to help

graduates and employers to come together and increases students chances of moving into employment; and using the data strategically to identify regional priorities and at an institutional level, to respond to the data in terms of course provision and the provision of employer-specific skills.

- Authorities and higher education institutions should continue to expand efforts to increase the enrolment of Arab students as well as the efforts to improve their completion rates. These efforts should build upon successful models of effective academic and social support services for students, increasing financial assistance to low income students, including both institutional and government aid.

- Authorities should conduct a region-wide assessment of current and planned capacity against required and anticipated student numbers and identify gaps in staff and infrastructure. Co-ordinated negotiation and planning process should be led by the authorities within the sub-regions. Support should be provided for extension learning centres that draw on a range of providers, including several colleges, possibly Open University and other universities, in villages with low tertiary education participation rates. When developing the network of education providers, care should be taken to ensure that the population continues to have access to adequate lifelong learning services. Adequate IT infrastructure should be put in place to ensure high speed, low cost connectivity.

- Authorities and higher education institutions should facilitate better matching between higher education supply and demand. They should make stronger efforts to improve education and employment opportunities for Arab women; to provide vocational-technical programmes relevant to the employment of Arab men; and to integrate regional engagement within the core teaching/learning and research missions of the higher education institutions. Efforts should be made to increase Arab faculty in the higher education institutions respecting the goals of the Civil Service Law.

- Authorities should encourage pathways for students between and among institutions to be provided in the Galilee through a pilot student credit transfer system and changes in finance policy to encourage institutional collaboration in promoting student mobility.

- Authorities and higher education institutions should take steps to significantly expand higher education opportunities for working age adults. These steps should create clear and transparent pathways to advanced education for adults, including the ability to attend multiple

institutions, obtain short-term education and training that can later be applied to degrees, and re-skilling and up-skilling courses and programmes designed around the particular needs of adults who combine work and study.

- Higher education institutions should focus on the employability and entrepreneurial skills of graduates; providing them with the skills and competences needed in a globalised knowledge economy. Work- and problem-based learning methods and programmes to build entrepreneurship skills would improve retention rates and graduation rates in the region. Similarly, stronger efforts in language learning could help the region in its internationalisation efforts.

Innovation in the Galilee

Israel is one of the top performers in developing pro-innovation policies and generating innovations, particularly in the ICT sector. But the national innovation system is characterised by sectoral and geographical imbalances which have resulted in a double economy and regional disparities. Despite a broad array of RDI programmes, the national policies do not yet sufficiently support regional innovation systems.

Israel is one of the top performers in developing pro-innovation policies and generating innovations, particularly in the ICT sector where it has the first mover advantage in advanced R&D. In international comparisons Israel leads R&D spending compared to GDP and is the third largest supplier of NASDAQ listed companies after the United States and Canada. It has a highly developed venture capital market and a world record in terms of venture capital backed investment as a percentage of GDP. Israel ranks high in terms of entrepreneurship outcomes and the angel business investment rate.

At the same time however, public support to academic R&D is at a low level and funds need to be funnelled towards research linked with the long-term priorities of the Israeli economy, including water, energy and health. There is evidence of brain drain and signs that Israel is losing ground as more and more countries are focusing on advanced R&D.

The national innovation system is also characterised by sectoral and geographical imbalances. In contrast to the OECD average of 20%, approximately 80% of Israeli R&D spending is concentrated on the ICT fields. These fields represent 15% of Israeli GDP but only 5% of employment. At the same time only 4% of government support to R&D is directed to traditional industry (2004 figures). While the Israeli ICT companies invest around 10% to 18% of their turnover in R&D, the corresponding figures for traditional industries are 0.1% to 3%. Less than 30% of business expenditure in R&D takes place in the periphery, the Galilee and the Negev.

The strong emphasis on high-tech fields, especially ICT, has resulted in a dual economy in Israel with significant income gaps and uneven development. Over-dependency on ICT makes the economy vulnerable to sudden changes and constrains the country's long-term balanced growth potential. There is a need to develop innovation and skills in traditional industries and public services that employ most of the population. Improvements in productivity and diversification in the productive base would require context-specific regional policies.

The Galilee is a peripheral region with a lack of dynamic clusters and a low level of applied R&D and innovation. The academic R&D assets are concentrated in the research-intensive universities in Haifa, but there are limited spillovers to the Galilee. The contribution of the colleges to the regional innovation is low due to the national policy that limits their capacity.

The Galilee economy is dominated by traditional sectors such as agriculture, construction and basic manufacturing, which are all under growing pressure in the global knowledge-based economy. High-tech industries are penetrating the Galilee, albeit at a slower pace than in the central region. Today, the Galilee is slowly developing a blend of low and high-tech industries in plastic, machinery, agro-food, chemicals, ICT, optics, life sciences and pharmaceuticals.

The Galilee combines many of the characteristics of peripheral and old industrial regions which are less innovative in comparison to central and agglomerated regions. The key challenges include a lack of dynamic clusters and a low level of R&D and innovation due to the predominance of small and medium-sized enterprises (SMEs) in traditional sectors and/or branch plants with limited absorptive capacity. There is nascent innovation culture

in the SMEs and a lack of tradition of collaboration between them. One consequence of this is a poor articulation of demand for services from the higher education institutions by the SME sector. The innovation support institutions have limited presence in the region. A number of science parks and incubators provide a basis for new economic development but in most cases, links with the higher education institutions are limited. Various forms of "lock-ins" are present in the region ranging from narrow orientation of knowledge providers, to a "low wage equilibrium" including low job creation. Population groups live and learn in separate communities limiting the innovation potential of a multi-cultural, multi-ethnic population.

The academic R&D assets are concentrated in the research-intensive universities in Haifa whose focus is global and national, rather than local and regional. The universities have developed mechanisms for engaging with business and industry by having dedicated offices for technology transfer and intellectual property but the links with the Galilee business and industry remain limited. The Technion would have the capacity to guide industry and innovation in the Galilee, but plays this role to a very limited extent. Some research projects driven by individual researchers or departments explore regional issues, for example in the social sciences, where the Galilee's diverse demographic landscape makes it a unique social laboratory, as well as in urban planning, water management, transportation and other engineering disciplines.

Regionally oriented applied R&D could be undertaken in colleges, but remains at a modest level due to the lack of critical mass and national policy that limits the colleges' ability to build capacity in knowledge transfer and industry collaboration. Some colleges have taken steps to build their capacity in this domain, most notably the Tel Hai Academic College and ORT Braude. Colleges see their role as regional change agents but deliver this role mainly through community service rather than applied R&D.

Support for innovation remains limited and fragmented within and among higher education institutions. There is no effective guidance system for business to identify where best to source support for innovation. There seems to be few attempts to connect up technologically-oriented centres with business faculties and with other disciplines to provide support for service and industry. Collaboration between higher education institutions remains limited. There were few attempts to set out the collective needs of the region in terms of innovation infrastructure or for the academic colleges or universities to co-ordinate their actions in meeting such needs.

The fragmentation of the regional innovation system of the Galilee is a challenge for the sustainable development of Israel. There is a need to upgrade the existing traditional industry and service sector and improve their capacity for innovation.

Whilst efforts have been made by the national government and private investors to support the research infrastructure and attract talent from the centre to the Galilee, the connection with indigenous human capital development, innovation and business formation is not yet adequately developed. Investment from the national government focuses on the research components of the system and tax breaks for industry. The wide array of RDI programmes does not fully benefit the Galilee. Main emphasis is on science and technology-driven innovation, while the traditional industry is in need of support for incremental demand-led innovation which could be provided by colleges if they were encouraged to engage in applied R&D in the same way as in many OECD countries. There are limited spillovers from the centre to the Galilee and an absence of an underlying culture of collaboration. The national policy and the research universities emphasise academic excellence and global impact rather than regional needs. The lack of a recognised regional mission for higher education institutions which would include clear goals and a significant role for academic researchers and the college faculty is a weakness in the present higher education and innovation system. Furthermore, there is a lack of information and data on innovation performance within the private sector and also within higher education institutions. There has not been a detailed investigation into the nature of innovation within the firms in the north, the barriers and problems and the experiences of collaboration with higher education institutions. Policy seems to be developed in the absence of evidence about the region's needs.

More focused policies and incentives would drive stronger regional engagement by higher education institutions and academic researchers. The Galilee and its sub-regions would benefit for a strategy that has an emphasis on traditional industry which is engaged in R&D. There is a need to encourage technological, marketing and organisational innovation in traditional industry and the service sector, for example through wider adoption of ICT. Focusing on challenge-driven research on water management, health and social issues could also provide positive outcomes for the region. A rebalancing of priorities would convey a clear message to the Technion, the University of Haifa and the academic colleges about the needs of the region for skilled human resources and for applied R&D. To be able to formulate and implement policy intervention and initiatives,

authorities should also have robust data about the specificities of the regional innovation system in the Galilee and the factors undermining its development potential.

While Israel is ranked high on entrepreneurship, there are wide regional disparities in business creation. There is room for improvement in the contribution of colleges to business creation in the Galilee.

The Galilee suffers from brain drain, which suggests that finding ways to increase entrepreneurship could be an effective strategy for job creation and talent retention. While Israel is ranked high on entrepreneurship, there are wide regional disparities: in the periphery and notably in the Galilee, business creation is at a relatively low level.

There is considerable underutilised potential in the colleges in terms of business creation in the Galilee as well as evidence of students' interest in entrepreneurship and willingness to stay in the region. Today however, the Galilee colleges provide students with little practical experience of new venture formation. Where entrepreneurship teaching exists it is largely conventionally taught, rather than embedded in the curricula. International experience shows that the best support for graduate entrepreneurship often comes from teaching programmes where students work in teams to form real companies mentored by entrepreneurs. Such programmes can run at undergraduate and graduate levels and be targeted at students from across the sciences, engineering, business, social science and arts disciplines. None of the universities or colleges highlighted the existence of this type of programmes. Where enterprise support existed, it was fragmented with no real collaboration across higher education institutions in the region.

The following measures would promote regional innovation in the Galilee:

- Special regional innovation policy instrument should be created, for example in the form of a regional innovation fund. The Higher Education Innovation Fund (HEIF) model in the UK could serve as a source of inspiration (see Chapter 4). A strategy with emphasis on endogenous development of traditional industry that is engaged in R&D would better serve the region. Higher education institutions should be encouraged to draw upon business schools, humanities and social sciences in providing assistance to business.

- Considerable efforts should be made to develop general competencies among the population to help adjustments to rapid changes in the labour market and to facilitate lifelong learning. Systematic joint efforts should be made by the authorities, educational institutions and key stakeholders to raise the levels of education attainment, particularly among the Arab population. Authorities should provide adequate support for the existing Arab colleges and allow colleges of education to diversify their provision according to the needs of the local industry. Investing on Arab colleges would generate mid- to long-term benefits for the regional economy in the form of tax revenues and job creation. Technical and vocational education should be strengthened for the benefit of the regional industry and underrepresented groups.

- To improve productivity and innovation in traditional industry and services and to improve graduate retention, specific mobility programmes should be established to link the students, graduates, post-graduates and academic staff with the local business and industry in a more systematic way. Models for linking postgraduate students with the local industry include the Knowledge Transfer Partnership Scheme in the United Kingdom that has improved the competitiveness of the companies through introduction of some form of innovation or new technology and around 75% of postgraduate associates are offered jobs in the companies.

- The universities in Haifa should play a more active role in helping the Galilee to build a more robust economy based on knowledge and innovation. The universities and colleges should focus their concerted efforts on challenge-driven innovation on the key issues in the region, such as water, health and social challenges stemming from the multicultural population and use the region as a "laboratory" for research and knowledge transfer. Job creation should be seen as the focus of innovation activities in the Galilee. Technology Transfer Offices should be strengthened and organised at an arms length from the university in order to be managed as a quasi market service reporting to the university but independent from it. Incentives for higher education institutions should be strengthened to increase their capacity to act as technology transfer "agents" to bring non-local knowledge to the region and to create community partnerships.

- Colleges should be allowed to build their applied R&D and innovation capacities for the benefit of the regional development in the Galilee. Incentives for higher education institutions and their staff to engage in local and regional development should be developed. The government should seek to encourage greater collaboration between higher education

institutions through joint investments in R&D facilities and incentive programmes. The higher education institutions should also develop a practical engagement with business and a collaborative way of referring enquiries from businesses and industry with the help of virtual and face-to-face collaboration. Authorities should channel funds to enhance SME/business/college linkage and related applied research projects that would contribute to strengthen the Galilean innovation system. The RAAK procedure in Netherland is an example to consider.

- The higher education institutions should support entrepreneurship throughout the curriculum and build comprehensive support programmes encompassing entrepreneurship training, practical experience of creating new businesses for groups of students and incubation facilities together with seed funds for new graduate ventures. Finnish, German and US initiatives are examples that could be emulated.

Capacity building for regional development in the Galilee

There is a lack of strategic anchoring of regional engagement of higher education institutions in the Galilee and within the higher education system in Israel. Regional engagement is not embedded within the core tasks of the HEIs. Current higher education policies at the national and institutional level are not aligned with the goal of mobilising higher education for regional and city development.

Current regionally relevant activities by higher education institutions in the Galilee, including industry collaboration and widening access initiatives are more the result of bottom-up processes and not fully reflected in higher education policy or institutional set-up. They remain limited in scope and impact. There are gaps in important areas such as lifelong learning, support for traditional industry and public services, and responding to the needs of the Arab population.

There is a lack of integration of regional engagement within the core teaching/learning, research and service missions of the Galilee colleges and a co-ordination deficit within institutions and the higher education system. Action is often dependent upon the commitment of individual staff or student volunteers, and not reflected in the strategic development,

curriculum development or budget allocation of the higher education institution. Collaborative mechanisms among higher education institutions to build capacity and foster joint efforts for regional development remain limited. Modest resources are spread thinly and there is a lack of critical mass to generate projects which will have real impact at the local and regional level and also generate multiplier effects.

Furthermore, the system of information gathering about regional environment as well as success and failure of regional relevant activities by higher education institutions is limited in scope and quality. There is a lack of robust data particularly in the field of skills gaps, ethnic and socio-economic background of students, student progress, graduate employment, graduate destinations (outmigration), breadth and scope of work-based learning activities, business formation, the nature of innovation within firms, the barriers and problems and experiences of collaboration with higher education institutions which make it difficult to evaluate the outcomes of policies and institutional practices.

Current incentives for higher education institutions and their staff have an emphasis on academic excellence which is narrowly defined. Stronger incentives are needed to mobilise higher education institutions and their staff for local and regional development to provide regionally relevant education, R&D and service.

Incentive structures for mobilising research-intensive universities for regional and city development are limited in Israel. There is no explicit "third task" or regional development task assigned to them and regional engagement is left to the initiative of the individual institutions. The principal driver of research-intensive universities is scientific excellence and/or its applicability to business competitiveness wherever firms may be located. While the colleges are building the R&D capacity from a low base, they are constrained by their limited capacity in terms of time and money to move in this direction. Policy emphasises strong demarcation between research intensive universities and colleges which provide undergraduate education.

The promotion and tenure criteria for faculty at the colleges in the Galilee is centrally administered through the Council of Higher Education (CHE) in which faculty from the universities play a key role. The criteria for promotion emphasise research and publication and not a broader definition

which includes regional engagement. There is a need to widen the criteria for promotion and tenure to emphasise relevance and regional engagement.

The higher education programme review and approval process gives significantly more weight to national considerations than to the needs of the region. University faculty members play a dominant role in the approval of college academic programmes. There is a lack of support for integration of field experience, work-experience and community service within the curricula. The long delay in the process for approval of new academic programmes, which in some cases lasts for more than five years, inhibits the responsiveness of higher education institutions to changing regional needs. There is a need to ensure that higher education programme review and approval process is streamlined to allow for speed and greater responsiveness to regional needs.

The higher education funding policies do not give explicit consideration to providing incentives for regional engagement of colleges. The principal incentive for the colleges is negative: their exclusion from research funding. Student numbers are established centrally and there are no incentives to enrol students from within the region. Because the institutions depend to a degree on revenue from tuition fees (within limits set by the Planning and Budgeting Committee), they have incentives to recruit paying students from outside the region to generate additional revenue. There are no explicit incentives for institutions to reach out to and increase the enrolment of under-served population groups, especially the Arab and ultra-Orthodox Jewish populations who lag in participation rates. Funding mechanisms need to be created to provide incentives for regional engagement of higher education institutions.

Israel has no clearly identifiable regional policy. Efforts for the development of the Galilee have focused on attracting talent or businesses from outside of the region. The Galilee would benefit from a tailored place-based policy with emphasis on the development of the endogenous assets in the region: human capital and traditional industry.

The assets of the different regions in Israel are diverse and their potential for growth will depend on how public policy is adapted to specific challenges within these regions. While the development of the Galilee has been the official policy of the Israeli government for decades, efforts have often focused on attracting talent or businesses from outside of the region. Interventions at the regional level have been largely defined and

implemented in a top-down fashion from the centre. Regional and local levels remain weak, particularly in the Arab sector and there is an absence of underlying tradition of collaboration. There is no mechanism or platform for higher education institutions and regional stakeholders to discuss regional development.

The key question is how to improve the educational attainment levels and employment outcomes of the endogenous Galilee population, half of which are Arabs. This calls for sustained investments in education, schools and infrastructure, active widening access policies and providing diverse educational opportunities to Arab women and building up vocational tertiary education opportunities for Arab men. It also calls for diverse and flexible re-skilling and up-skilling opportunities of the population to help the population adjust to rapid changes in the labour market. Results from the investments in education will be visible only on a medium-long term perspective. A failure to focus on endogenous development of human capital will have serious impact on the sustainable national development, endangering Israel's international competitiveness and security.

Israel would benefit from policies aimed at boosting productivity, such as those targeted at innovation and entrepreneurship and improving education and vocational training. These areas have a strong regional dimension. This calls for tailored place-based policy for the Galilee that can make targeted efforts to improve the quality of public investments and services to the regions. Enhancing regional growth through context-specific regional policies would benefit national growth and regional cohesion which is important for the sustainable development of Israel.

Improving connectivity is a major challenge in the Galilee with most of the population living in small towns and villages. Intra-regional disparities in access to public transport and telecommunication services, and discrepancies in investments in infrastructure between different population groups remain significant and have a negative impact on educational and labour market outcomes.

Connectivity is a major challenge for the development of Israel and the Galilee. The geographical, topographical and ethnic-religious situation presents a number of challenges for providing access to transport infrastructure, communications and public services, especially in peripheral regions. Connections between urban centres and rural areas are crucial for greater development and widening access to labour force and education.

Further improvements in infrastructure are needed to connect peripheral regions and rural areas.

Regional disparities in access to telecommunications remain significant and pose a challenge for regional development in terms of widening access to education in remote areas, improving teleworking opportunities for place-bound Arab women and dissemination of innovation in small and mediums-sized enterprises. While no robust data was available about the inequalities in access to communication, they are likely to broadly correspond to disparities in GDP per capita. Improving access to telecommunications represents a potential source of growth and should be favoured.

The health conditions of the Galilee demonstrate a high correlation between the poor health outcomes and the low socio-economic status of the population. The new medical school provides an opportunity to address the health challenges in the region and build capacity for collaboration. It can also mark the beginnings of the first university in the Galilee.

Whereas public health profile in the centre of Israel is similar to that of other industrialised western countries, the epidemiology of the Galilee is closer to the health profile of developing countries. There is also underinvestment in health infrastructure and personnel in the Galilee. The new medical school can radically change the way medical education occurs in Israel and the Galilee and improve access to healthcare services in the region. Community-based approach to medicine and medical education can benefit the region and improve students' learning outcomes. It can shift the focus from specialisation, treatment of acute diseases and hospital-based care towards prevention, treatment of chronic disease and community-based medicine. This will require a change in clinical training based in acute care hospitals to training in community-based ambulatory care facilities. At the same time considering the current underinvestment in health infrastructure and personnel in the Galilee, a strong system of collaboration should be built between the hospitals and the new medical school. Joint research centres between hospitals and the medical school could be established in the areas that focus on the epidemiology of the region, including genetics, metabolic diseases and health promotion.

Innovation in the use of information technology (IT) in the delivery of health services should be a core mission of the new medical school. The new school and research institute provide an opportunity to link Israel's

leadership in the IT industry with more effective health care delivery – from new individualised computer-based medical records systems to the use of telemedicine to reach isolated populations. Rather than traditional university-based research in the biosciences that requires high-cost facilities, the school should focus on applied research that integrates and synthesises existing knowledge using information technology to achieve improved health outcomes for the region's population. Innovations in medical education and health care delivery are more likely to succeed if supported by deliberate public policies to counteract the inevitable resistance to change.

The following measures would build capacity for regional development in the Galilee:

- Authorities should widen the criteria for promotion and tenure to emphasise relevance and regional engagement. The criteria could include: *i)* research on issues relevant to the region, giving more emphasis to application, synthesis and integration than to discovery of new knowledge, *ii)* service to community while requiring evidence that contributions to community and region are documented and externally validated and *iii)* stronger relationships among research, teaching and service through integration of research relevant to the region in the curricula and student learning and integration of service to the community in curricula, research and student learning.
- Authorities should ensure that higher education programme review and approval process is streamlined to allow for speed and greater responsiveness to regional needs. The process should be adapted to emphasise regional engagement through increased representation of college faculty on the review committees of the Council of Higher Education (CHE) and efforts to seek the advice of regional leaders (employers, community leaders, regional economic development officials) in the CHE review process. Criteria emphasising regional engagement and responsiveness should be included in the review and approval process, for example: *i)* data documenting the specific gaps in access and opportunity for the population and important sub-groups (e.g. Arab population with attention to different needs of Arab men and women), *ii)* data documenting relevant regional labour market needs and potential future needs arising for regional economic development plans, *iii)* evidence of the engagement of regional stakeholders (employers, community representatives and representatives of under-served sub-populations) in programme planning and design and *iv)* emphasis on regional engagement (internships, community service, student research on regional issues) within the curricula and student experience.

- Authorities should develop higher education funding mechanisms to provide incentives for regional engagement of higher education institutions, for example through: *i)* formulae for block grant funding could include higher weights for enrolment of students from within the region, from special populations such as Arabs and ultra-Orthodox Jewish students or for enrolments in academic programs related to regional labour market needs, *ii)* policies governing tuition fees could provide for lower fees for in-region students and policies for financial aid to students can provide higher amounts for in-region students and special populations, *iii)* eligibility for special or "categorical" funding could be contingent on evidence of regional engagement and focus, *iv)* requirements that institutions collaborate in order to obtain funding and *v)* special funds could be established to provide matching of funding obtained by higher education institutions from contracts with regional employers for education and training services. Israel could establish a special regional investment fund (funded from public and private resources) to provide funding for building HEI capacity for regional engagement and provide incentive funds to institutions and individual faculty members for regional initiatives. These could emphasise increasing tertiary education access and opportunity for the region's population (especially target populations), engaging faculty members and students in teacher/learning and applied research projects related to regional priorities. Kentucky Regional Stewardship and various programmes provided by the Higher Education Funding Council in England (HEFCE) provide examples.

- The new medical school should address the unique regional health challenges in the Galilee. Its focus should be on community-based medical education and new forms of health care delivery as well as generating of innovations that link Israel's IT leadership with effective health care delivery (telemedicine and individualised computer-based medical records systems). Authorities could support partnerships 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. Authorities could provide 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) and incentive funding for recruiting and training the region's population for health careers. Authorities could incentivise collaboration to strengthen the capacity of the existing higher education institutions and research institutes in the Galilee by: *i)* encouraging new academic programmes in social work, psychology and the allied health professions to be offered

in collaboration with the new medical school programmes that provide opportunities for joint community-based clinical training, *ii)* providing opportunities for college students to transfer credits to the new medical school, *iii)* providing opportunities for college faculty to compete for funding for research to be conducted through the new institute, *iv)* providing opportunities for college faculty to have joint appointments with the new medical school and research institute and *v)* providing incentives in college faculty appointment and promotion policies that recognise and reward faculty engagement in scholarship on the region's health, social and economic issues.

- Israel should enhance capacity building in regions. Experience in the OECD countries shows that increased decision-making power at sub-national levels of government combined with co-ordination mechanisms can unleash the potential in the regions. As regional capacities are built through "learning by doing", increased responsibilities at the regional level are necessary to build skills and develop problem-solving approach. A regional strategy platform should be developed in the Galilee. The joint resources of the higher education institutions should be mobilised for the preparation and implementation of regional strategies. The capacity for regional engagement should be improved in the region among key agencies and higher education institutions through fora for communication where good practices can be fostered and through targeted training programmes with focus on practical problem solving. Evidence-based decision making should be strengthened in the region by focusing on a dashboard of key indicators that the key regional stakeholders can monitor over time. This can result in a shared local knowledge base which will galvanise the development of a strong local strategy for change.

- Connectivity between urban centres and rural areas should be improved and further improvements in infrastructure should be made to connect peripheral regions and rural areas. High speed internet connections should be developed to enhance access to education in remote communities and teleworking opportunities for place-bound population groups.

Chapter 1

National and regional context

This chapter presents the main socio-economic characteristics of Israel and the Galilee[1]. It identifies the key challenges of the Israeli society and their linkages to educational and labour market outcomes.

While Israel has developed a successful economy that has absorbed and integrated immigrants from 79 different countries, there is a growing social and economic divide between the different population groups and the centre and periphery. This gap is evidenced in the educational attainment levels and labour market participation rates, income disparities, dual economy with high-income ICT fields and low-income traditional industries, as well as the fundamental disparities between the Arab and Jewish populations. There have been unsuccessful policy actions to bridge the gaps.

The socio-economic challenges that Israel is facing are exacerbated in the Galilee where the population is almost 50% Arabs. The Galilee regional economy is dominated by traditional industries, there is a shortage of employment opportunities and the salary levels are low. A high proportion of the population has only twelve years or less of education. The region suffers from brain drain. These factors contribute to the disparity between Israel's northern periphery and the country's central hub of settlement.

1. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

1.1 The Israeli socio-economic context

Israel has enjoyed strong growth in economy and population in recent years. Over the 1998-2008 period GDP grew, on average, by almost 4%, compared with the OECD average of 3%. At the same time, GDP per capita growth has been below the OECD average due to rapid population growth.

The Israeli population grew from 0.8 million in 1948 to about 7.58 million by the end of 2009. Population has been shaped by Jewish immigration, most notably by the influx of highly skilled people from the former Soviet Union in the early 1990s. Population growth rate is significantly above the OECD average due to a high fertility rate: 2.9 children, compared with the OECD average of 1.6 in 2007. [1]

Approximately 75.5% of the population are Jewish including a rapidly growing ultra-Orthodox population (estimated 8%). The 1.54 million Arab population represents 20.4% of the total population. The majority are Muslim (16.8%) but there are also significant minorities of Christian (2%) and Druze (1.6%). There is also a small number of nomadic Bedouin people (about 2%). Arabs, ultra-Orthodox Jews and the general Jewish population live in separate areas and attend different schools. Population groups are systematically segregated also in many other areas of policy, for example defence which absorbs considerable human and financial resources (OECD, 2009a; 2010a).

The economic success of Israel has been based on the development of the high-technology sector, whereas other industry sectors have stagnated or declined contributing to regional disparities and a widening socio-economic divide within the Israeli society. The development of high-tech industries in the centre of Israel can be attributed to a large defence industry, a significant pool of researchers in the Jewish Diaspora and engineering and science skills brought by the wave of immigrants in the early 1990s (OECD, 2009a). The main high-tech fields include defence industries, computer component manufacturing, software engineering, medical technologies and pharmaceuticals. Despite the significant contribution of high-technology to productive capacity and employment growth in Israel over the last decade (see Table 1.1.), the sector employs only 5-6% of the population, most of whom are based in the centre of Israel.

Table 1.1. Production and employment 1995-2005

Sector	Production Growth Rate	Employment Growth Rate
High-technology	91.6%	25.1%
Traditional industries	-6.1%	-19.5%
All industry	26.8%	-7%

Source: National Economic Council, M. (2007): Socio-Economic Agenda, Israel 2008-2009, National Economic Council, Jerusalem, p.63

About one-third of total employment in Israel is in the public sector. In recent years, the sector has grown slower than the private sector due to government restrictions on hiring new staff. In the private sector, the number of employed workers in the manufacturing sector has been stable over the past 15 years, but its share of total employment fell from 20% in 1995 to 16% in 2008. The employment share of business services increased from 9% in 1995 to 14% in 2008. About 5% of the employment is in construction sector and in the accommodation services sector. Agriculture counts for 2% of employment (or 2.7% when foreign workers are accounted for). Construction and agriculture employ large numbers of both cross-border and foreign workers (OECD, 2010a).[2]

Recent labour market trends have weakened the employment position of Arab workers: Economic growth has been concentrated in the high-technology and information technology sector in which relatively few Arabs work. The traditional labour-intensive sectors such as textiles and food, construction and materials, and services have stagnated or declined. Furthermore, the increase in the number of foreign migrant workers since the beginning of the 1990s has contributed to the decline in the labour market participation rate of the Arab population (OECD, 2010a).[3]

The Israeli civilian labour force participation rate was 64% in 2008, considerably lower than the OECD average. Military conscription around age 19 postpones labour force participation among Israeli Jewish men for three years and women for two years. Female participation and employment has increased over the last 20 years from 47% to almost 60%, but the overall participation rate remains modest due to the low participation of ultra-Orthodox Jewish men and Arab women. The rate of participation by Arab women was 22% compared with 76% among Jewish women aged 18-65 (Prime Minister's office, 2009). Arab women often work part-time, while those with academic degrees find employment in teaching and low-paid local administrative positions (Shekhade, 2004; Yashiv and Kasir, 2009; and Yonay and Kraus, 2005).[4] However, over the 1990-2007 period, the overall

employment rate of Arab women was pushed up by the increase of the proportion of women with high levels of educational attainment, while the labour market participation for women with lower levels of education declined (Habib et al., 2010).

Employment rates in Israel are the lowest among those with the lowest levels of educational attainment and contribute to high poverty rates among Arabs and ultra-Orthodox Jews (see Box 1.1.). The national goal (National Economic Council, 2007) to raise the employment rate among the working age population to 71.7% by 2010 has failed as population groups with low employment rates – the Arab and ultra-Orthodox Jews and individuals with low levels of education – have not been integrated into the labour market.

In the Arab community the reasons for low employment rates range from low skills and educational attainment levels, regional disparities in infrastructural investment and underinvestment in Arab education, unequal access to social support, cultural influences which affect the family size and labour market participation of women, mistrust between communities, documented discrimination in the labour market and the limited effectiveness of policies to redress discriminatory practices (OECD 2009a; 2010a).

The low labour market participation among the ultra-Orthodox Jewish population stems more from choice than necessity. Unlike in other countries with ultra-Orthodox Jewish communities, for example Belgium, United Kingdom and the United States, in Israel the majority of adult ultra-Orthodox Jewish men remain outside of the labour force and are engage in fulltime religious study. Public policy supports this lifestyle by means of exemptions from military service, stipends for religious students and recently increased child allowances (OECD, 2009a; 2010a).

The Israeli labour market is characterised by a high degree of inequity in wage rates; wages are particularly low in the unskilled sectors with low levels of educational attainment. Income inequality, as measured by the Gini coefficient, increased from 0.25 in 1975 to 0.33 in 2003 (with strong growth since then until 2009, is likely to have increased further) (OECD, 2010). This has been partly caused by the rising wages in the fast growing high-technology sectors and gradual decline in the wages of unskilled workers. Arab women and ultra-Orthodox Jewish workers earn on average around 70% of the average wage, while for Arab men this is around 60%. [5]

Box 1.1. Poverty and non-employment in Israel

Israel suffers from high levels of poverty. The relative poverty as measured against 50% of equalised median household income is higher than in any OECD country and at 21.3% in 2005 is more than twice the OECD average of 11%. By 2008, the poverty rate had fallen to 19.9%. Poverty is concentrated on the fastest growing population groups and youngest age groups. Arabs who represent 20% of the population have a poverty rate of about 50%, while the ultra-Orthodox Jews or Haredim, estimated 8%, have even higher poverty rate at around 60%, compared with the 10% for the rest of the Jewish population. Poverty rates are highest for children (29%) and senior citizens (28%). The Arab and ultra-Orthodox Jewish population account for 46% of children starting primary schools.

In 2005, Israel had a higher incidence of child poverty than any other OECD country. Child poverty is increasing and doubled over the past ten years. Poverty rates for large families are at least 50%, and twice as high as for families with four children. Poverty is concentrated as Arab and ultra-Orthodox Jews families tend to have large families. Public spending on children in Arab localities is estimated to be at least one-third lower than for children in Jewish municipalities and the average number of years in education is about two years lower for Arabs than for the population as a whole. The percentage of Arab families below the poverty line is 51.4% compared to 15% among the Jewish population. The percentage of children below the poverty line is 62.5% compared to 23.8% among the non-Arab population. The average gross income of Arab households amounted to approximately NIS 7 590 which is only 57% of that in the Jewish households.

About four out of ten Israelis of working age (15-64) are not in employment, compared with an OECD average non-employment rate of about 33%. GDP per capita is about 20% below the OECD average. A high degree of non-employment contributes to low per capita income. This together with high income disparities results in high poverty rates. The differences in labour market participation among different population groups play a key role in explaining the poverty outcomes. Because Arab families and ultra-Orthodox Jewish families are frequently jobless or one-earner families in low paid employment, poverty rates are high.

Source: OECD (2009a), *OECD Economic Survey: Israel*, OECD, Paris; OECD (2010a), OECD Reviews of Labour Market and Social Policies: Israel, OECD, Paris.

1.2 The Israeli education system

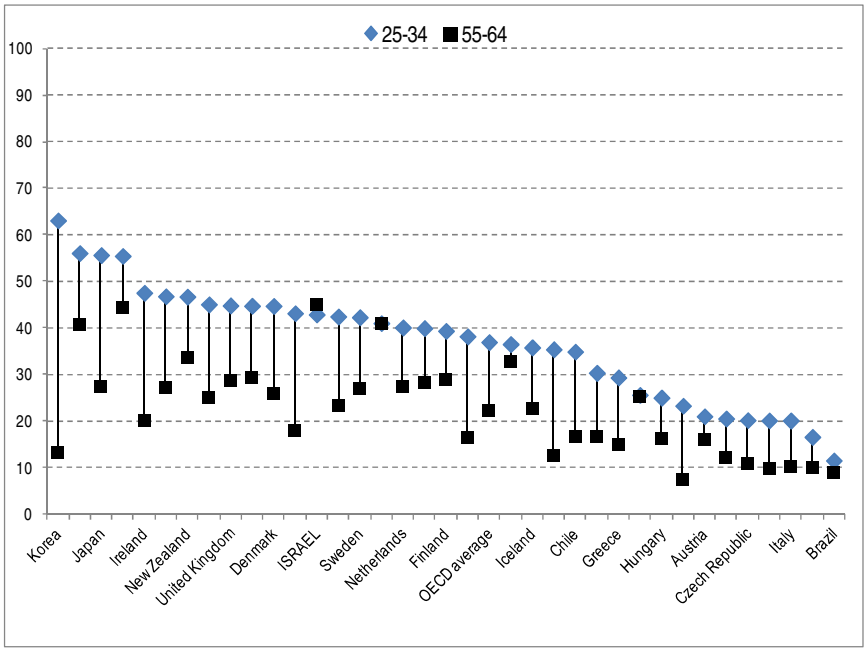
Educational attainment

The Israeli population has a high average level of educational attainment across all age groups, but there are considerable differences between population groups. About 43% of the 25-34-year olds and around 45% of the 54-64year olds have completed tertiary education compared with an OECD average of 37% and 22% (OECD, 2011), The proportion of people aged 45-54 who have completed tertiary education is higher than in any OECD country (see also Figure 1.1.). Between 2008 and 2009, Israel has decreased in the rankings, from 8th to 13th, in the percentage of 25-34 years-olds who have attained at least tertiary education. This is due to catching up of other OECD countries.[6] In addition, only about 20% of Arab population aged 15 and over has attained tertiary education, compared to 45% in the Jewish population and the proportion of Arabs with an academic qualification is about 40% of that of the Jewish population (Habib *et al*., 2010). Within the heterogeneous Jewish population, those of African-Asian origin have much lower attainment than those of American-European origin. Low levels of educational attainment are concentrated among the fastest-growing Arab and ultra-Orthodox Jewish population groups and generate joblessness and poverty.

Educational participation and attainment among the Arab population is rising, but even among the young cohorts the gap with the Jewish population remains substantial. Among the population of 15 and older the average number of years of schooling is 10.2 for Arabs and 13 for Jews. Nearly half of Jews have 13 or more years of schooling compared with fifth of Arabs. Dropout rates for Arab students in 9th and 11th grade were 8.1% in the mid-2000s compared with 3.9% for Jews (OECD, 2010). The percentage of Arabs with a post-secondary certificate is about one-third the proportion of Jews (CBS, 2008, OECD, 2009a).

A corrigendum has been issued for this page. See: http://www.oecd.org/dataoecd/11/50/49086081.pdf

Figure 1.1. Population with tertiary education (2009)



Note 1: Countries are ranked in descending order of the percentage of 25-34 year-olds who have attained at least tertiary education. The year of reference for the Russian Federation is 2002.

Source: OECD (20011), *Education at a Glance*, OECD, Paris.

Private returns on education in Israel are considerable. On average, the college-educated people constitute only one/eight of the unemployed. The average gross income of college-educated Israelis was NIS 12 672 in 2007, compared to a monthly income of NIS 7 374 for those with 9 to 12 years of education. However, for Arab population the returns on education remain modest, even at the PhD level. (OECD, 2010a)

Pre-primary, primary and secondary education

The Compulsory Education Law of 1949 made education free and obligatory for children aged 5-16 and since 2007 to the age of 18. Responsibility for the implementation of the law was divided between the national government and local education authorities. The State Education Law of 1953 formulated the principles and directives of education and established guidelines (a national curriculum) for its content with the language of instruction as either Arabic or Hebrew.

Today, Israel's education system is characterised by segregation of population groups at the pre-primary, primary and secondary levels. There are four main streams: the Hebrew-speaking schools that include state, state religious and ultra-Orthodox Jewish schools, the Arab-speaking stream and a small separate system for the Druze (see table 1.2.). All streams are supervised and fully funded by the state, apart from the ultra-Orthodox stream which is independent, outside the supervision of the state, but receives partial state funding. The share of private mainstream schools is relatively small.

Table 1.2. Students in primary education in 2010

Education stream	Percent
State	37.9
State religious	13.6
Ultra-Orthodox (Haredi)	20.3
Arab	28.0
Total	99.9

Source: CBS, 2009, Statistical Abstract of Israel 2008, CBS, Jerusalem.

Population growth has brought an increase in demand for all levels of education.[7] Policy has responded to the growing demands: since 1979, a series of policy changes has opened the secondary education (through grade 12) to a growing percentage of young people, including population groups which had previously been excluded from the system (Volansky, 2005).[8] Much of the increase in the number of primary and secondary students has been in the Arab and ultra-Orthodox Jewish streams. Today, the Arab and ultra-Orthodox Jewish population account for 46% of children starting primary schools. About one quarter of Hebrew-speaking children or one-fifth of the whole population start primary school in the ultra-Orthodox stream.

In international comparison, public spending on education is at a high level, however, spending per student is relatively low, considering the large number of young population in Israel. In terms of expenditure per student relative to GDP per capita, Israel is slightly below the OECD average of around 25%. Real expenditure per student is decreasing, by close to 9% between 1995 and 2007. Spending on educational institutions as a share of GDP, for all levels of education has decreased from 8.5% to 7.5%. (OECD, 2009a; 2010b)

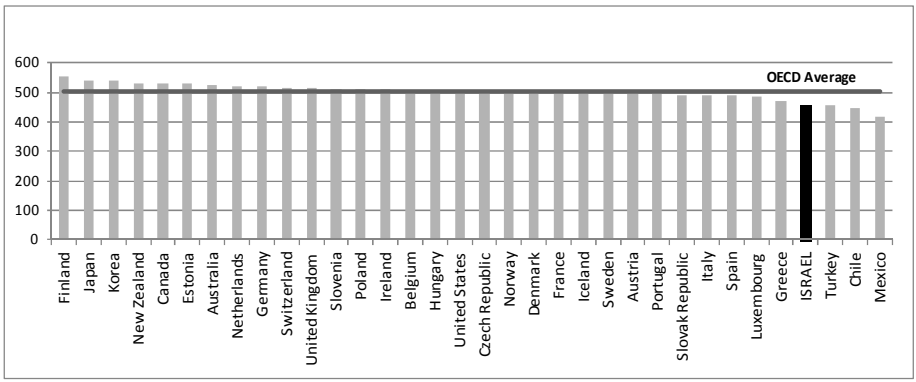
Public investment in education per child is lower for Arab children as evidenced in larger class sizes and fewer teaching hours. Compared with OECD countries, Israeli schools have large classes, but this is especially the

case for Arab schools (OECD, 2010a).[9] Furthermore, teaching hours in elementary Arab schools are about 75% of those in Jewish schools. Gal et al. (2010) estimate that on average for the years 2004-06 spending on education per child in Arab localities was about 38% lower than in Jewish municipalities. Budgetary spending per child (aged 0-17) in Arab localities is only half of Jewish communities' expenditure per child (Sikkuy, 2008). Authorities are aware of the discrepancies, and have started to increase investment. For example, over the 2007-11 period 8 000 new classrooms are scheduled to be built and subsidised, of which 40% are for the benefit of minority populations. However, sustained investment is needed to address longstanding shortcomings (OECD, 2010a).

Poor learning outcomes

The performance of Israeli students in international ability tests is poor. The scores for Israeli teenagers participating in the OECD's Programme for International Student Assessment (PISA) in terms of reading, science and mathematics and also in Trends in International Mathematics and Sciences (TIMMS), are about 90% of the OECD average; only Turkish, Chilean and Mexican students have lower scores (see Figure 1.2.). The poor international ranking in PISA holds across all streams of supervised education but Arab students in Israel have lowest scores of all at just above 75% of the OECD average in reading, mathematics and science.

Figure 1.2. Student performance: average PISA score for science in OECD countries 2009



Source: OECD (2010b), *PISA 2009*, OECD, Paris.

Authorities are aware of the shortcomings of the educational system. The New Horizon programme was initiated in 2007 to improve the quality

of education in primary and lower-secondary schools and was made compulsory in 2009 following an agreement between the education authorities and the Israeli Teachers Union. This programme aims to address the perceived low morale among teachers and the difficulty to attract motivated and talented individuals into the profession. The programme has brought along longer teaching hours but higher salaries: teachers' working time being increased from 30 to 36 hours per week.[10] To compensate, the pay scales are being raised substantially while some supplements to basic pay have been removed. Preceding the programme, the pay of teachers with 15 years experience in Israel was equivalent to 64% of GDP per capita in 2007 whereas for most OECD countries the equivalent figure was between 100 and 150% of GDP per capital (OECD, 2011). A similar programme was implemented in Scotland and possibly was a contributing factor to the subsequent increase in teacher training enrolment (OECD, 2007).

In addition to investing in the improved quality of teaching, the authorities should consider whether there is a need to strike a balance between standardisation and diversity in educational offerings, embracing a broader range of flexible study programmes.

Vocational education

Vocational education in Israel is underdeveloped. In the 1990s, the Israel education system moved to academically-oriented curricula. While the overall percentage of Israeli high school students eligible for the matriculation certificate has risen to approximately 50% (compared with 35% in 1990), the change in the curricular structure has left half of the age cohort behind without flexible educational options (Volansky, 2010).

Vocational training is partly catered for through separate tracks in regular upper secondary education. About one-third of students are in schools that run vocational variants of the Bagrut examination. These schools are often managed by non-profit organisations but are under the supervision and responsibility of local authorities. In addition, there are vocational schools under the authority of the Ministry of Industry, Trade and Labour that teach "traditional" trades, such as vehicle maintenance and construction for the equivalent of Grades 9 to 12. The sector is relatively small, with about 13 500 students in around 70 institutions, equivalent to only 3% of the total number of Grade 9 to 12 students. However, military conscription develops vocational skills in engineering and trades for the Jewish population.

Government spending on vocational training amounted to about 0.08% of GDP in Israel in 2007, well below the OECD average (0.14 of GDP). There has been a decline in spending since 2002: public expenditure on

vocational training of adults has been cut by three quarters. Legislative changes which occurred in 2002 and 2003 made eligibility for unemployment benefits stricter, particularly during vocational training. The result was a reduction in the scope of training for the unemployed, less participation in vocational training and shorter length of coursers (OECD, 2010a.)

Tertiary education: a dual system of universities and colleges

Israel has a dual system of tertiary education with research-intensive universities and colleges that offer mainly bachelor's degrees and to a lesser extent, masters' degrees. Policy maintains clear distinction between the university and college sectors, for example the state funding formulae differ. For both sectors student fees are regulated, uniform and fairly modest.

Tertiary education sector comprises seven relatively large traditional campus-based universities, one distance-learning university (Open University) 20 colleges, 27 teacher education colleges and 11 non-funded colleges. The first universities were established in the 1920s, and the last was set up in the 1970s. The second phase of expansion began with legislation permitting the establishment of private degree level colleges. In addition, foreign universities established campuses in the 1990s.

In 1993, the Council for Higher Education launched a master plan to develop the higher education system: regional colleges, polytechnical colleges, private institutes and teachers' colleges were transformed into independent higher education institutions through a considerable investment in human resources, infrastructure and facilities (Volansky, 2005). This change contributed to greater access to higher education in Israel, increasing the number of higher education institutions from 21 in 1990 to 66 in 2008.The colleges have absorbed the bulk of the increase in higher education students.

Entrance to higher education is complex, depending on a score calculated from the matriculation (*Bagrut*) certificate but also on a separate aptitude test (the Psychometric Test). There is some evidence of cultural bias in these tests and significant differences between Jewish and Arab students. About half of the age cohort fails to receive qualifications that would enable access to higher education.

Military conscription (three years for men and two years for women) intervenes in the transition from school to tertiary education or work. While it delays entry to the labour market, it also provides skills that have market value in the civilian life for the Jewish population. Arabs are exempt and ultra-Orthodox population are effectively exempt.

Due to the failure of secondary education to provide adequate skills and the military conscription which delays entry to tertiary education, there is a market for post-conscription education dominated by higher education institutions to prepare for tertiary education. In 2006, around 11 000 individuals – equivalent of 10% of the population of Grade 12 students – were enrolled in pre-university colleges or courses such courses, the vast majority were aged under 25 (OECD, 2009). The only open access higher education institution is the Open University.

Table 1.3. Percentage of students admitted to first-year academic study, eligible for matriculation, per age cohort* (1949-2008)

Year	Size of cohort	% eligible for matriculation certificate, per cohort	% enrolled in institutions of higher education, per cohort
1949	11 902	6.7	1.6
1960	25 032	14.2	11.6
1970	52 900	20	17.8
1980	65 500	21.3	21.3
1990	85 000	34.7	22.9
2000	106 300	42	36.2
2008	114 000	45.9	42.9

* Does not include students enrolled in the Open University.

Source: CBS (Central Bureau of Statistics) (2009), Statistical Abstract of Israel 2008, CBS, Jerusalem and CHE (Council for Higher Education) (2009), Planning and Data Division, Planning and Budgeting Committee, table 3.7 p.118, CHE, Jerusalem.

The percentage of bachelor's degree students who are Arab is low but slowly increasing. In 2006/07 this percentage was 11%, compared with only 7% in 1995/96. There has been a the sizeable increase in participation of Arab women in university studies: in the early 1990s Arab women were only about 40% of the Arab student population at bachelor's degree level in universities, in 2006/07 they had passed 60%, compared with 54% participation by women in the Jewish population. The changes in student demographics can be partly attributed to the opening of new colleges in the peripheral areas, which have increased the Arab population's access to higher education. In addition, there has been an increase in the number of Arab students studying for master's degrees in universities, in 2007/08 they amount to 6.4% of the total number of master's degree students in universities.

Table 1.4. The rate of first degree of Arab students between the years 1996-2006 by type of higher education institution (percentages)

Year	Total of Arab students	Universities	Colleges	Teacher education colleges
1996		7.0	3..5	15.6
2000	10.1	9.0	6.0	20.9
2004	10.7	9.8	5.0	27.7
2006	11.0	10.6	5.6	28.4

Source: CHE (Council for Higher Education) (2009), Planning and Data Division, Planning and Budgeting Committee, table 3.7 p.118, CHE, Jerusalem.

The rapid expansion of higher education system has had an impact on the quality of teaching, learning and research. Governmental funding for higher education has been cut about 20% in recent years. Support for research has likewise been significantly reduced. The consequence has been a brain drain as well as an ageing faculty. In the mid-1990s the ratio of senior faculty to students stood at 16:1. By 2006 it had reached 25:1.

Regulation and development of tertiary education

Regulation in tertiary education in Israel is conducted through the Council of Higher Education and its Planning and Budgeting Committee, Ministry of Education and MAHAT. Any post-secondary, degree-awarding institution has to apply to one of these three bodies in order to approve its programme or to fund it (see Box 1.2.). In international comparison the role of the Ministry of Education is relatively modest in Israel and in need of strengthening (OECD, 2009a). The Ministry of Finance, however, plays an important role in funding the system.

Box 1.2. Regulation in tertiary education in Israel

Tertiary education in Israel is regulated by the Council for Higher Education (CHE). The Council for Higher Education Act of 1958 established the CHE. Minister of Education chairs the CHE and the government authorises its membership, a majority of whom are tertiary education providers. CHE is responsible for licensing institutions, accrediting courses and administering the state funding of providers as well as long-term academic planning. The latter two functions are carried out by a subsidiary body, the Planning and Budgeting Committee (PBC). The PBC has the exclusive right to allocate the state budget for higher education among academic institutions, to promote financial efficiency by encouraging cooperation between institutions, to render an opinion to the CHE regarding the establishment of a new institution or new academic unit within an existing institution that would require substantial funding

Box 1.2. Regulation in tertiary education in Israel (continued)

Higher education providers cannot teach degree-level courses without the approval of the CHE, even if fully privately funded. In 2003 the CHE set up a system in which higher education institutions provide self-evaluation that are cross-checked by an independent committee. The Ministry of Education does not have a significant expertise or influence in tertiary education policy. Its authority is confined to certain aspects of tertiary education, mostly, in the funding of teachers colleges which have a combined enrolment of 36 000 students studying in, both, academic and non-academic programmes.

The third agent with authority in tertiary education is MAHAT, a government organisation affiliated with the Ministry of Industry, Commerce and Labour. MAHAT's mission is to develop the post-secondary training of engineers and technical personnel, awarding associate degrees in such areas as architecture, civil engineering, biotechnology, chemical engineering, agriculture engineering, mechanical engineering, digital media photography, sound engineering, visual studies, and communications. MAHAT administers 75 institutes, which in 2009 had a combined enrolment of 21 000. Eleven of these are located in the Northern District

The development of higher education in Israel is shaped by the Higher Education Act of 1958. The Act's primary aim is to cultivate the human capital and research necessary for serving the nation's needs. There is no explicit "third mission" or regional development task assigned to higher education institutions, but regional engagement is left to the initiative of the individual institutions. Government's decisions with regional impact in higher education include the approval of May 2005 to establish a new university in the Galilee, and of March 2009 to establish a medical school in Safed. The establishment of the medical school can provide a catalyst for the development of a university in the Galilee in the mid to long term.

The principal concerns in higher education range from the quality of education and low educational attainment levels of the disadvantaged population groups, to the need to modernise and improve the productivity of the traditional industries. A number of reports, task groups and committees in the National Economic Council linked with the Prime Minister's Office, the Science and Technology Committee of the Knesset, Ministry of Industry, Trade and Labour, Council of Higher Education etc. have proposed structural changes in higher education, enhancement of lifelong learning opportunities and widening access to higher education (see Box 1.3.).

Box 1.3. Higher education plans in Israel

The National Economic Council, affiliated with the Prime Minister's office, published a report in 2007, entitled Socio-Economic Agenda, Israel 2008-2010. Its principal recommendation concerning higher education is to give priority to research and development projects and to provide professional training opportunities to ultra-Orthodox Jews and Arabs so that these populations can acquire relevant skills for the job market (National Economic Council, 2007).

Another and closely linked aim for higher education is to develop the existing industrial base into a more modern workplace. A report submitted to Israel's Deputy Prime Minister in 2008 recommended that steps are taken to encourage technological innovation through a substantial investment in human capital in traditional industries. This would raise productivity, a target directly linked to further development in higher education (Makov Report, Ministry of Industry, Trade and Labor 2009). A similar conclusion was reached by the Science and Technology Committee of the Knesset which summarised several studies that had all addressed the problem of modernising the industrial base of the country's periphery, including the Galilee. Higher education was seen as playing a key role in the creation of employment opportunities and the improvement of skills in the labour force.

In 2008 the government received a report "Israel 2028 – A Vision and Socio-Economic Strategy in a Global World" prepared by a committee of prominent educators, economists, industrialists and social scientists. This report addressed the steps that are required to narrow the social stratification in Israel. According to the committee, the number of students in Israel will reach 610 000 in 2028, compared 250 000 in 2007 and the proportion of each age group participating in any type of post-secondary education will reach 75%. The committee recommended a post-secondary system that would consist of four interrelated tiers. The highest tier would include at least two elite universities belonging to the top 20 institutions in the world. In addition, system of research universities conferring the full range of academic degrees would operate. There would also be academic colleges, two-year community and vocational colleges. The system would facilitate an easy transition for students from one tier to another.

The report "Tertiary Education in Israel – A New Paradigm for Policy Making" was submitted to the Council for Higher Education by the Neaman Institute for Advanced Research in Science and Technology (Volansky and Limor, 2006) and argued that without a paradigm shift in the country's model of higher education, the gap between the country's "two societies" – those who had access to higher education and those who did not – would never be closed. This report recommended that the decision-making authority and accountability of existing colleges should be enhanced, mainly in areas pertaining to regional needs. The report also envisioned a new role in life-long learning for higher education institutions. Tertiary education in Israel would encompass post-secondary studies (associate degrees), academic studies (colleges and universities) and life-long learning.

In 2008, a substantive reform programme was proposed to increase state funding to universities and colleges combined with increased tuition fees, expand of government-backed student loans and introduce a range of other structural reforms, but the progress was hindered by the collapse of the reform package due to the protests from higher education students. The reform was based on recommendations by a governmental committee (the Shochat Committee) in 2007 (see Box 1.4.).

Box 1.4. Shochat committee recommendations

The six-year resourcing plan outlined by the Shochat Committee included permanent increases in recurrent spending on teaching and research as well as a period of increased spending in infrastructure. Around 60% of additional resource requirements would have been funded by higher state budget transfer and the remainder by increases in other revenues, most notably greater income from tuition fees.

The committee formulated a set of recommendations that were meant to improve the state of affairs. These included: i) returning the budget to its 2001 level, ii) raising student tuition by 50%, iii) expanding the support system for students from lower socio-economic backgrounds, iv) merging existing colleges and v) recruiting new faculty in order to enhance the quality of instruction and research. The committee also sought to demarcate the division of labour between universities as exclusive venues of research and colleges as institutions geared solely toward academic teaching and external quality control system. The committee made many recommendations on how the additional resources available to tertiary education providers should be spent and on other issues. The main themes relevant to tertiary education, as opposed to research, were as follows:

- Increasing distinction between universities and colleges. The report recommended limiting the number of new students going into the university sector and allowing the surplus to be absorbed by the colleges. It also stressed that colleges should focus on undergraduate teaching with only limited capacities for research and high level teaching. It recommended mergers among colleges and that some resources should go into encouraging those colleges to locate in remote areas.

- Lowering staff-student ratios but also cutting back on some types of courses, The report recommended hiring several hundred new staff to lower student-staff ratio and reducing the length of the post-graduate studies by, for example, removing requirements for a research-based second degree as an entry to doctoral programmes. It also recommended limiting the number of additional courses offered by state-funded providers in which tuition fees are unregulated and relatively high on the grounds that these courses are diverting resources excessively from academic teaching and research.

Box 1.4. Shochat committee recommendations (continued)

- Enhancing performance-related pay and benefits for staff. The report recommended various incentives for excellence in research and teaching in universities, a separate staff bonus system for other institutions and a special budget for encouraging poorly performing staff to take early retirement.

Source: Shochat, A. (2007) Report of the Committee for the Examination of the System of Higher Education in Israel, Government of Israel, Jerusalem. *www.che.org.il/download/files/shohat-report_e.pdf*, p 23-29 (Hebrew).

OECD (2009a) recommended that tertiary education reform should be brought back on track following the aborted 2008 Shochat measures. OECD stressed that the increased funding to tertiary education institutions should be linked with greater leeway in setting tuition fees by the providers, bold reforms to make staff pay more transparent and flexible and targeted measures to ensure that under-privileged groups will have improved access to tertiary education and that no student is denied access to higher education for financial reasons. In addition to these recommendations, there is a need to reduce the demarcation between the colleges and universities to improve the capacity of the colleges to respond to the regional needs and build their capacity in applied R&D. Continuing disparities in educational attainment and labour market outcomes also call for a structural change in education increasing vocational training opportunities, stronger efforts in upgrading the skills of the adult population and equitable investment in education between population groups.

1.3 Economy, employment and education in the Galilee

The Galilee is the northern-most part of Israel and, for the purposes of this review, is divided into two distinctly different sub-regions: the coastal Haifa sub-district and the Northern District. The Haifa District is further divided into two sub-districts: Haifa sub-district and Hadera sub-district. .

At the end of 2008, the Northern District had a population of 1.2 million which was approximately 17% of Israel's total population. The population is characterised by a high degree of ethnic diversity and considerable presence of Arabs who represent about 50% of the total population. The Arab population is characterised by diversity consisting of Muslims (majority), Bedouins, Druze and Christians. Most of the population in the Galilee lives in rural settlements.

The economy in the Northern District is characterised by low labour market participation rates, low income levels, persistence of traditional industries and negative migration balance. In 2005, the percentage of the population participating in the civilian labour force in the Northern District was 59.7%, compared with the national average of 67.1% (Paltiel, 2007). This gap was mainly due to the limited labour force participation of Arab women which explains the overall low participation of women in the Northern District (41% compared with the national average of 51%), (CBS 2008a).

The unemployment rate in the Northern District is consistently higher than the national average. In 2008, it was 7.7%, compared with the national average of 6.1%. The unemployment figures for women were 13.1% and 9.5%, respectively. In 2007 unemployment among Arab women was 22.7%. Non-employment in the Galilee has a direct impact on poverty levels: the percentage of children living below the poverty line was 45% in 2006, compared with the national average of 36%.

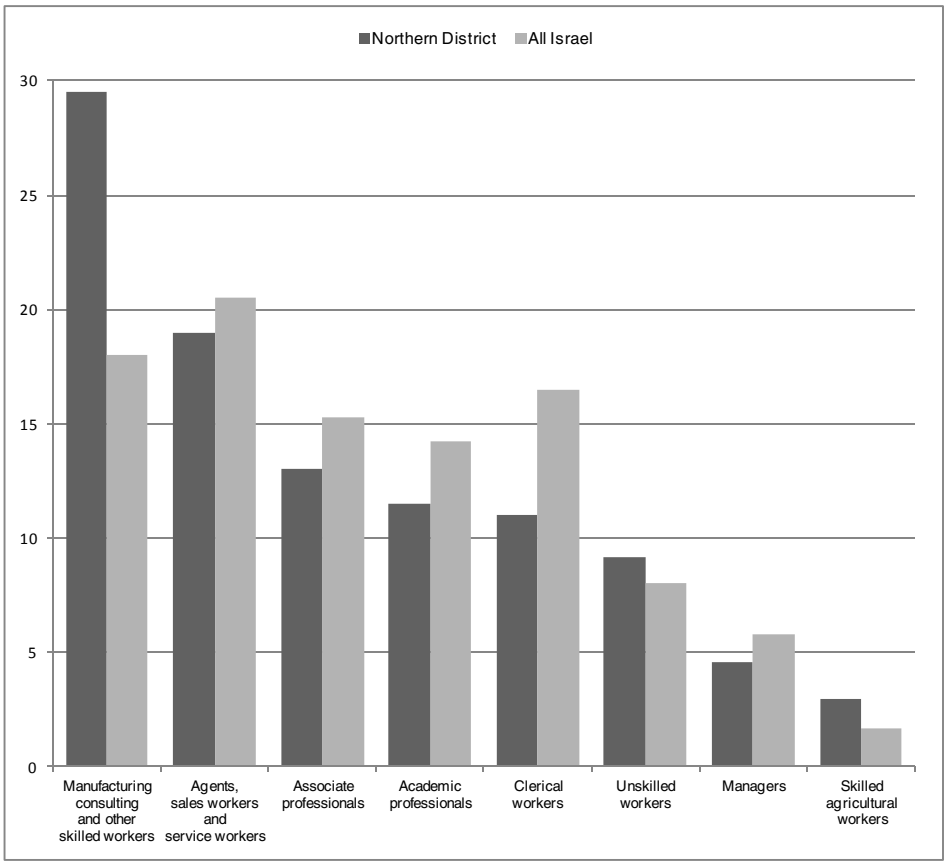
The labour market in the Galilee (excluding the Haifa sub-district) is dominated by traditional industries. In 2007, about 36% of the work force was employed in manufacturing (22.8%) and construction (10.4%), compared with the national average of 23% (see Table 1.5. and Figure 1.3.). Salary levels are relatively low: in 2005 the average monthly income in the Northern District was NIS 6 000 (NIS 6 887 for men and NIS 4 657 for women), compared with the national average of NIS 7 054 (8 575 for men and 5 419 for women) (see Figure 1.3. and 1.4.).

Table 1.5. Employment by industry in the Northern District and the national average (by percentage)

Type of Industry	Galilee	National average
Manufacturing	22.8	15.9
Education	13.7	12.9
Wholesale and retail	12.6	13.5
Construction	10.4	5.6
Health, welfare, and social work services	9.1	10.0
Business activities	7.9	14.1
Transport, storage, and communication	5.1	6.4
Public administration	4.1	4.5
Agriculture	3.5	1.6
Community, social, and personal services	3.5	4.7
Banking, insurance, and finance	1.4	3.6
Household services	0.9	1.8

Source: CBS (Central Bureau of Statistics) (2008b) Shnaton, CBS, Jerusalem, *www.cbs.gov.il/reader/shnatonhnew_site.htm* accessed July 2010.

Figure 1.3. Employed persons aged 18-64 by occupation as a percentage of employed persons



Source: Central Bureau of Statistics, Statistical Abstract for Israel 2009

The average income of salaried men employed in the Northern District is approximately 80% of the national average while women earn about 86% compared to the national average. Industrial workers earn about 93% of the national average while college or university-educated men earn approximately 88% and women about 95% of the national average (Paltiel, 2007). Income per capita in the Northern District is approximately 47% lower than in the Tel-Aviv metropolitan area (see Figures 1.4. and 1.5. and Placing the North in the Center, a Development Plan for the North, 2007).

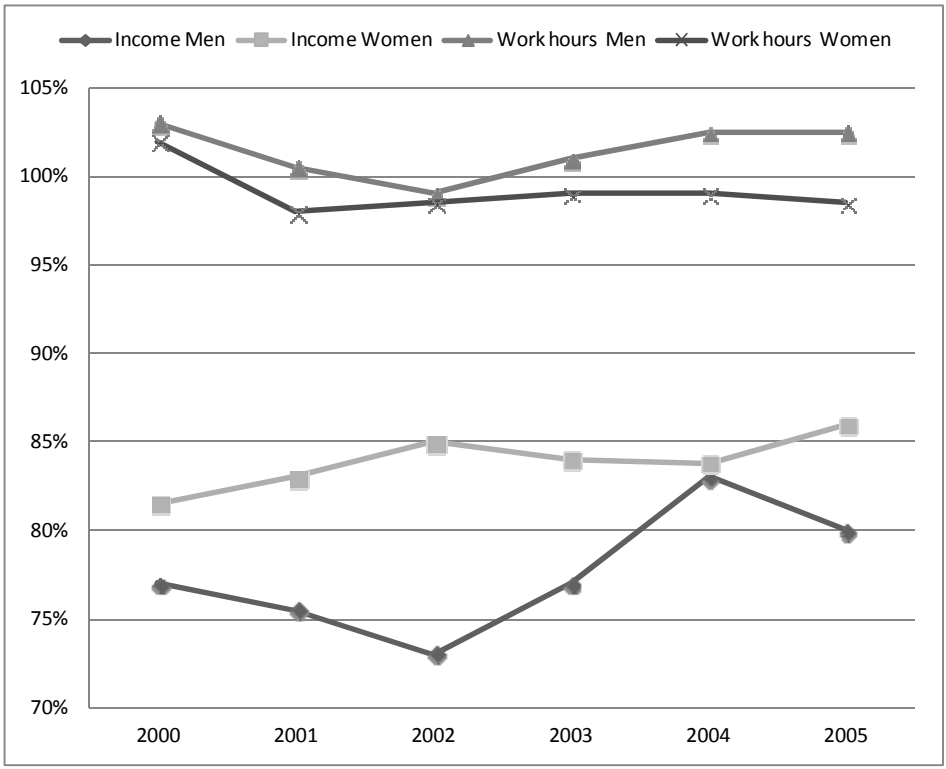
The region has a negative migration balance. Between 2006-07, 300 000 people migrated to the region while 329 000 left the region. Of these, Jewish

newcomers totalled 151 000 while the number of Jews leaving the Galilee reached 222 000. Most of the latter moved to the centre of Israel which offers better labour market opportunities and higher salaries. Higher education is a gateway for migrating to the centre of the country: according to some estimates, 46% of the students from the Galilee who pursued post-secondary studies in the centre did not return to the Northern District

The development of the Galilee has been supported by the official policy of the Israeli government, but the results remain modest. For example, in 1980s and 1990s, there were more than 40 policy plans prepared by three separate governmental offices in addition to the Jewish Agency and two other national authorities. Numerous other plans have been formulated by various interested parties (Katz, 1982; Yiftachel, 1992; CHE, 1993; Placing the North in the Center, 2007; Goldshmidt, 2008; Horovitz and Brodet, 2008; Makov Report, 2009).[11] A lack of co-ordination, together with significant fragmentation and conflicting approaches to planning and goals between the various agencies explains why so many of the plans were delayed or failed to be implemented (Yiftachel, 1992.)

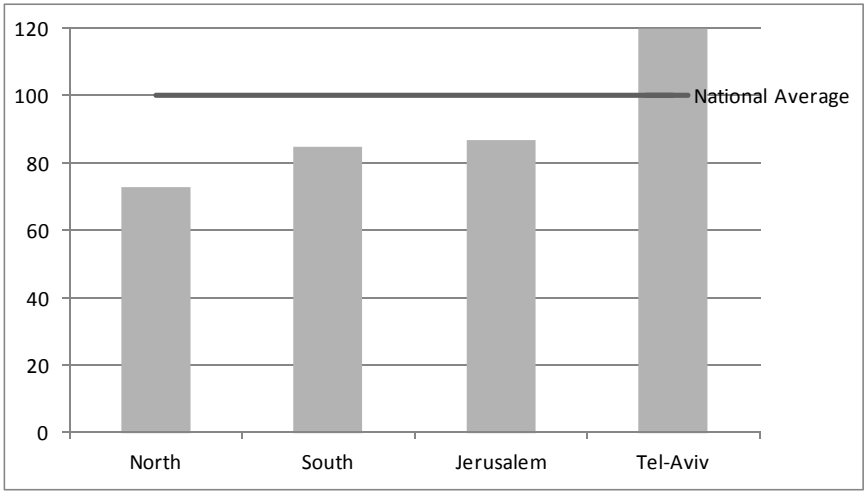
National Policy has encouraged migration from the centre to the Galilee (Kimmerling, 1983, Yiftachel 1992). National policy also encourages relocation of firms to the Galilee. Under the 2006 Law for the Encouragement of Capital Investment, the state provides investment incentives to attract foreign funded high-technology or research and development activities to poorer regions of the country, designated as National Priority Areas and including the Galilee. (OECD, 2010a).[12]

Figure 1.4. Proportion of weekly work hours and gross income of employees in the Northern District, all Israel = 1.00



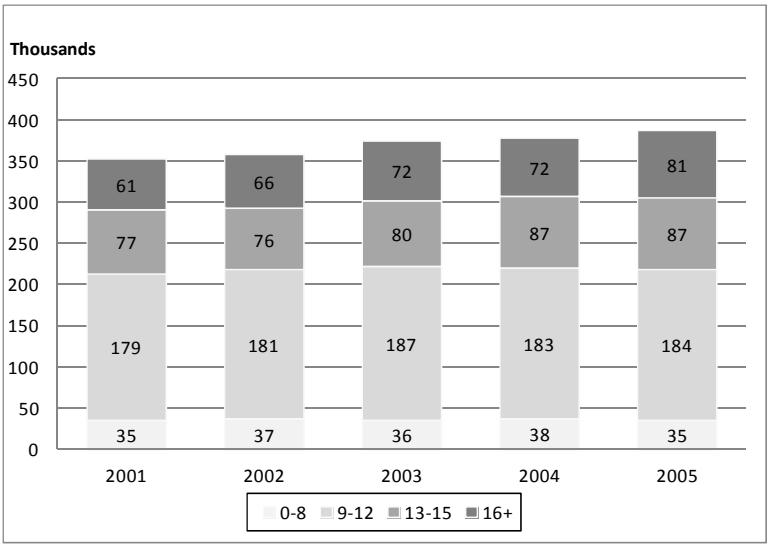
Source : CBS – Central Bureau of Statistics (2009), *Statistical Abstract of Israel 2008*, CBS, Jerusalem: Ari Paltiel (ed.): *The Northern District – A Statistical Report 2000-2005*, Jerusalem, p.36.

Figure 1.5. Disposable income per capita and district, 2006



Source : Hayud,, Z. (eds) (2007) Placing the North in the Center, a Development Plan for the North (2007), p. 15, Zafona LTD.

Figure 1.6. Civilian labour force in the Northern District, by years of education



Source : CBS (Central Bureau of Statistics) (2009), *Statistical Abstract of Israel 2008*, CBS, Jerusalem.; Ari Paltiel (ed), The Northern District - A Statistical Report 2000-2005, Jerusalem, p. 31.

Higher education in the Galilee

The Northern District is characterised by a low skilled population. In 2005, more than half the region's 388 000 employees between the ages of 18 and 64 had only 12 years or less of schooling (see figure 1.6.).

Due to the poor learning outcomes in primary and secondary education, half of the age cohort fails to achieve the qualifications required for the entry to higher education. In 2005, 52.8% of 12th grade pupils in the Galilee (Northern District) earned a matriculation certificate, compared with the national average of 55.1%. Due to limited accessibility of higher education, in 2004 only 39% school graduates from the Galilee enrolled in the first year of post-secondary studies in one of Israel's higher education institutions, compared with the national average of 43.9%. The number of first degree Galilean students for the year 2008 was 22 564 (see Table 1.6.).

There has been a gradual growth of higher education opportunities in the Galilee since 1990 and particularly after 1993 and the launch of the CHE master plan. Increasing percentage of students – 8.5% or 14 300 students – study in the nine colleges in the Northern District. New higher education institutions have also attracted talent from the rest of the country as the number of students from outside the Northern District studying there stood at 39.7% in 2008.[11]

Table 1.6. The percentage of undergraduates according to geographical districts

District/year	1990	1995	2000	2005	2008
Jerusalem	22.6	17.5	15.5	13	13.2
Northern District (Galilee)	**0.0**	**2.5**	**5.3**	**7.4**	**8.5**
Haifa	21.7	22	17.9	16.4	15.2
Centre	4.2	4.3	15.9	16.2	17.2
Tel-Aviv	42.8	42.7	31.5	31.9	30.7
Southern Distirct	8.7	10.9	13.9	15	15.2

Source: CHE (Council for Higher Education) (2009), Planning and Data Division, Planning and Budgeting Committee, CHE, Jerusalem.

Access to higher education in the Galilee has been widened with the establishment of the colleges. Five regional colleges that had been established during the 1960s and 1970s as non-academic institutions – one post-secondary polytechnic school, two teachers colleges, and an inner-city college in Nazareth – were upgraded to accredited academic institutions granting bachelors and masters degrees in a range of fields. Each of the academic colleges has a similar basic profile consisting of academic

programmes leading to a baccalaureate (first) degrees and, in several cases, to master's degrees, pre-academic programmes and continuing education /community service non-academic studies (see Table 1.7.). In addition, there are teacher education colleges that operate under the auspices of the Ministry of Education.

Table 1.7. Higher education in the Northern District and in Haifa District in 2008 (excluding teacher education colleges)

Higher education institution	Number of students (academic programmes only)	Number of programmes	Funded/non-funded
ORT Braude	2 332	12	Funded
Tel-Hai	2 428	13	Funded
Emek Yezreel	3 327	12	Funded
Kinneret	1 502	10	Funded
Safed	1 515	7	Funded
Western Galilee	1 954	6	Funded
Nazareth Academic Institution (formerly Mar Elias college)			Non-funded
Total in Northern District colleges	13 058	60	
Carmel	390	2[1]	Non-funded
Technion*	12 420		Funded
Haifa University*	18 347		Funded
Total in Haifa District higher education institutions	31 157		

*Research institutes (universities)

Source: CHE (Council for Higher Education) (2009), Planning and Data Division, Planning and Budgeting Committee, CHE, Jerusalem.

There are eleven institutions in the Galilee that offer post-secondary practical engineering programmes that are under the jurisdiction of the Ministry of Commerce and Industry (see Table 1.8.). Five of these are offered at regional colleges under the Council for Higher Education: Ort Braude, Tel Hai, Sakhnin, Western Galilee and Sefad Colleges.

Table 1.8. Practical engineers colleges in the Galilee under the authority of the Ministry of Commerce and Industry (MAHAT)

Name	City/town	No. of students in 2007
Ort Braude College	Karmiel	726
Tech College Tel-Hai	Tel-Hai	644
Sakhnin College	Sakhnin	630
Upper Nazareth	Upper Nazareth	572
Maalot Future College	Maalot	241
Jordan Valley	Jordan Valley	383
Western Galilee College	Akko	371
Afula – Northern College	Afula	307
Afula – Senkar	Afula	25
Erez	Shlomy	30
Sefad College	Sefad	52

Despite the progress made, the Galilee colleges – with the exception of the Arab colleges – continue to serve mainly Jewish students (see Chapter 2). Socio-economic gaps between the population groups and the disparities between the Galilee and the centre of Israel remain.

Conclusions

OECD (2010a) noted that there are "no quick fixes to the deep-rooted social chasm in Israel. Israel needs a continuous and concerted policy strategy". This policy should be based on the following building blocks:

- Ensure that investment in education is equitable for both Arab and Jewish populations in Israel. Policy should ensure that educational infrastructure on offer to all Arab and Jewish children including issues such as class sizes, educational facilities at all levels, basic standards in English, mathematics and sciences is of a similar standard.
- Invest more in the infrastructure in the peripheral regions of Israel where many Arabs live. Such investment should address public transport and telecommunication, childcare and education as well as social services. In the medium to long term, strengthen the higher education system in the Northern District to build the basis for a university.
- Develop a comprehensive strategy to address poverty and social exclusion among the Arab population.
- Strengthen vocational training and lifelong learning opportunities and improve geographical access to education.

Notes

1. High birth rates prevail among ultra-Orthodox Jewish and Arab populations. The number of young people in the Arab population is high: 49% are under the age of 19, compared with 33% in the non-Arab population. At the same time, however, the attitudes regarding employment and education of Arab women are changing. This change is reflected in the reduction of fertility rates among Arab Muslims from 5.5 children per woman in 1980 to 3.9 in 2007.

2. Jewish and Arab workers each account for just over one-third of the workforce in the construction sector, with cross-border workers and foreign workers together making up the other third. Among the unskilled agricultural workers, Jewish and Arab workers make up only 20% of the workforce, another 20% are Palestinian cross-border workers, while 60% are foreign workers.

3. Many foreign workers are willing to accept real hourly wages that are below the minimum wage which exerts downward pressure on the wages and reduce the employability of unskilled workers, which includes many Arab workers in the agriculture and construction sectors (Asali, 2006: Haidar, 2005; Shekhade 2004; and Yashiv and Kasir, 2009). The Labour laws set outs minimum employment working conditions but the law is not fully implemented, resulting in unskilled workers facing unfair competition.

4. Traditional values characterised by normative limitations and high birth-rates influences Arab women to stay at home. They also contribute to Arab women choosing occupations that facilitate part-time employment preferably in their location of residence. Arab women often end up in teaching (the case of almost 60% of employed Arab women with academic degrees) and in local administrative jobs which are poorly paid. Using the 2005 CBS Social Survey, King *et al.* (2009) note that about 75% of Arabs are positive about women working, but that in the presence of young children in the household, just over half of Arabs respond that mother should stay at home, while a further quarter of respondents favour part-time employment. Ultra-Orthodox Jews or Haredim are another population group with poor social-economic outcomes. This is because

they consist of relatively large families, and while about half of the Haredi women are at work, only one quarter of the male Haredim engages in paid employment in the formal sector. Male employment rates are low because men generally devote their time on studying Torah. Furthermore, Haredim generally are exempt from military service because of the religious studies, so there are strong incentives not to stop studying until the age of conscription is exceeded. Family incomes consists of spousal earnings, stipends by religious schools (around NIS 1 400 per month, of which about half is paid by the state), income support by the Ministry of Religious Affairs (NIS 1 200 per month), child allowances and transfers from the Diaspora.

5. Compared with Jewish men, Arab men are more likely to work in construction, agriculture, commerce and traditional manufacturing (Habib *et al*., 2010). Arab workers, particularly Arab men, are less likely to be employed in their chosen occupations, sometimes accepting jobs for which they are over-qualified because they cannot find employment at the appropriate level. (Abu-Bader and Gottlieb, 2008; Yakoobi *et al*, 2009; OECD, 2010).

6. Five OECD countries (Luxembourg, United Kingdom, Australia, Denmark and France) increased their number of graduates and students in this age cohort between 2008 and 2009.

7. Since the 1980s there has been an increase in the pre-primary education enrolment from the age of three because of state subsidies for early childhood education within Israel's disadvantaged populations. In 2006, 37% of Israeli 2-year-olds, 75% of the 3-year-olds, 86% of the 4-year-olds, and 95% of the 5-year-olds were enrolled in preschool programmes. The total number of pre-primary education enrolments stood at 400 000. Israel's primary school system consists of 800 000 students in 2 200 schools. At the end of their primary education, students move on to the secondary education system, which is divided into junior and senior high schools. In 2007, enrolment in the secondary education comprised 610 000 students in 1 588 schools, from grade 7-12.

8. Before 1979, a selective system was in place primary and secondary education: children who had completed their primary education were divided into three groups. Those on a track to academically-oriented studies were placed in "grammar schools." Those on a track to vocational training were assigned to "technology schools." In addition, there were those who directly entered the workforce without high school studies.

9. For primary and lower secondary classes in Hebrew schools have 24 and 29 students respectively, whereas it is 29 and 33 students respectively in Arab schools. The OECD average for primary and lower-secondary classes is 22 and 24 students respectively.

10. The New Horizon programme involves increase in teaching time including five hours of small-group teaching in primary schools and four hours in lower-secondary schools, critical for allowing more attention on the individual student and his/her educational needs.

11. To qualify for the tax breaks, the company has to satisfy a certain critical in terms of the number of jobs the investment will create and the international competitiveness of its output. The investment incentives includes grants (covering between 10% and 24% of the cost of investment in land development, investment in building and machinery and equipment), employment grant programme and grants for employing highly qualified new immigrants and returning residents. OECD (2009a) stressed that it is too early to say to what extent this policy has been effective in improving employment opportunities in Israel's periphery. Additional direct pubic infrastructure investment is required to redress the infrastructure inequities that have developed over past five decades.

12. Krentzler (2009) examined the impact of the geographical location of institutions of higher education on the residential patterns of the college-educated population in Israel and concluded that the newly-founded colleges generate migration from the country's centre to the periphery, including to the Northern District.

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Chapter 2

Human capital development

Human capital development is the single most important factor for economic growth of countries and regions. The ongoing erosion of human capital in Israel and the Galilee poses a challenge for sustainable development. If significant changes are not made in the human capital development system, by 2020 a significant number of new workers will enter the labour force without relevant skills which limits their contribution to economic development. This chapter summarises the challenges facing the Galilee regarding human capital, the roles that colleges and universities are currently playing in addressing these challenges and alternatives for strengthening the engagement of higher education institutions in the region's future competitiveness.[1]

The key message is that the ability to fuel local growth by cultivating relevant skills is the best guarantee that the region will thrive in future. Israel will need to raise the level of educational attainment across different population groups in the Galilee. In order to help adjustments to changes in the labour market it will need to enhance the flexibility of the population through skills diversification, vocational training and enhanced access to Life Long Learning opportunities. Strong efforts should be made to improve educational and labour market outcomes of Arabs who represent half of the Galilee population. Furthermore, improvements need to be made to the labour market relevance and geographical accessibility of tertiary education in the Galilee.

1 . The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

The Galilee is characterised by a low skills/low wage economy. The Galilee population, half of which are Arabs, has a significantly lower level of educational attainment than the Central District (more than 70% of BERD is in the Central District). One third of the population – Haifa sub-districts excluded – live below the poverty line. The unemployment rate is higher than the national average and average wages lower for both the self employed and salaried employed. The regional economy is dominated by traditional sectors such as agriculture, construction and basic manufacturing, which are under growing pressure in the global knowledge-based economy. A central challenge for the Galilee is to significantly improve the employment and education outcomes of the Arab population, who belong to the fastest growing population groups in Israel.[1] Failure to do this will pose a serious challenge for the sustainable development of Israel.

The high degree of diversity of ethnicity and religion across the Galilee and the separation of ethnic and religious groups in different neighbourhoods and towns has implications for higher education in the region. The Haifa sub-district is 70% Jewish compared to only 43% in the Northern District. The Northern District includes 38% of Israel's and 52% of the region's Arab Muslim population and 59% of Israel's and 74% of the region's Arab Christian population (CBS, 2009). There is also great diversity within the Jewish population. Several of the Jewish settlements were developed to accommodate new immigrants many of whom came from the former Soviet Union, North Africa and the Middle East who continue to face language and cultural barriers in assimilation.

There are more than 400 local municipalities located in the Galilee 80% of which are Jewish municipalities, mainly small rural localities, including communal settlements (*kibbutzim*) and agricultural settlements (*moshavim*). Arab and Jewish populations generally live in separate communities, for example, the populations of the towns of Afula, Karmi'el, Kiryat Shmona and Safed are largely Jewish while the populations of towns of Nazareth, Shefa 'Amr, Shaghur and Sakhnin are Arab (in each case predominantly Muslim but with some Arab Christians).

Migration dynamics have implications for the role of higher education institutions. Of the people who migrated in the Northern District almost half migrated within the district (48%) (CHE, 2009). This fact reflects the reality that the Arab population is less mobile than the Jewish population and, when Arabs migrate, they tend to move within the region. For example of those who left the district in the period from 2006 to 2008,

69.5% were Jews. Of those who entered the district, 71.3% were Jews. Therefore in order to have an impact on improving the quality of human resources in the region, the higher education institutions must reach the large and growing Arab population that remains in the region while continuing to play a role in attracting and retaining the predominantly Jewish population from the centre.

Historically, the higher education institutions served an important role in "development" towns as Israel sought to expand the population and develop the economy of the periphery. Today higher education continues to be seen as means to attract young people from the centre to the periphery in the hope that they will settle and remain in the area following graduation. However in reality educated young people, who are unable to find jobs in the region, are migrating to the centre (Goren, 2009).

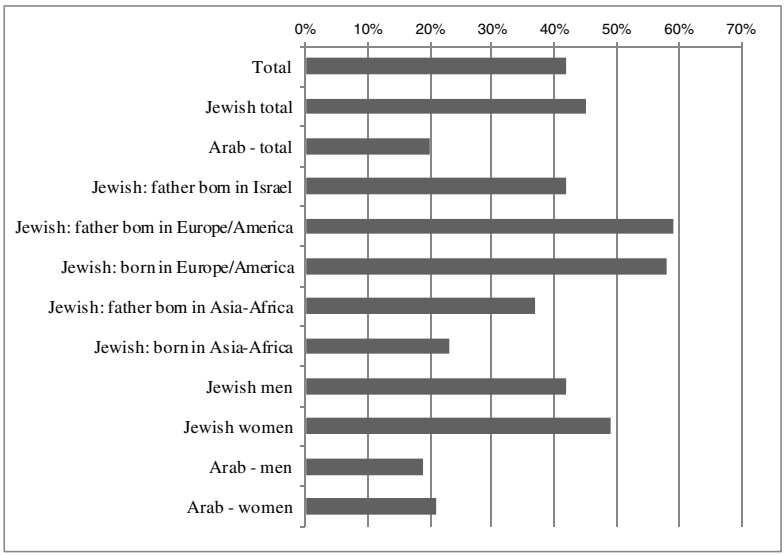
In the context of low skills, ethnic and religious diversity, and brain drain, this chapter examines the following three dimensions to assess the effectiveness and coherence of human capital formation policies in the Galilee:

- Widening access: do the existing tertiary education providers offer adequate learning and training opportunities to the diverse populations in the region?
- Demand for skills: are the existing tertiary education institutions and programmes adequately aligned with the skill needs of the local economy?
- What lessons can be learnt from international experience?

2.1 Educational attainment and enrolment in higher education

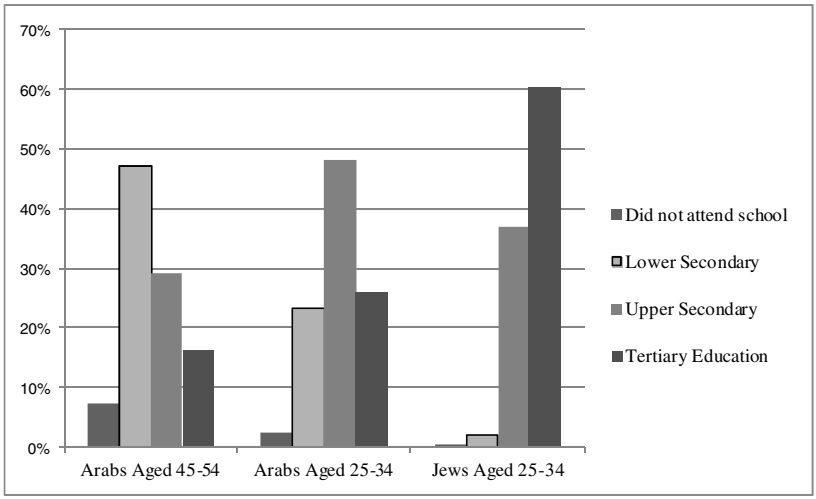
Although precise data regarding the educational attainment of the region's population were not available, it is possible to extrapolate from national data to get a picture of the challenges facing the Galilee. For Israel as a whole, only about 20% of the Arab population age 15 and over has attained tertiary education compared to about 45% for the Jewish population (Figure 2.1). The younger age group of Arabs is increasingly better educated, but the gap between the Arab and Jewish population aged 25-34 remains stark (Figure 2.2). If strong measures are not taken to revise this trend and with the global shift towards a more knowledge-based economies, in 10-15 years Galilee's labour force will see an influx of young workers who lack the appropriate skills that are needed in the economy.

Figure 2.1. Ethnic and gender differences in percentage of population age 15 and over with a tertiary education



Source: Central Bureau of Statistics, Statistical Abstract of Israel 2008, derived from *OECD Economic Surveys: Israel* (2009), p. 83, Table 3.6B.

Figure 2.2. Education attainment in the Arab population, 2007



Source: Central Bureau of Statistics, Statistical Abstract of Israel 2008, derived from *OECD Economic Surveys: Israel* (2009), p. 84.

To increase the educational attainment of the region's population and to ensure sustainable development in the region, Galilee must ensure a higher percentage of the Arab population, who represent about half of the population in Galilee, complete secondary education with the knowledge and skills needed for tertiary education and a knowledge-based economy. While educational outcomes of the Arab population are improving, they still lag behind those of the Jewish population even in the younger cohorts. No precise data were available regarding the participation of various population groups in tertiary education for Galilee, but the extent of the challenge is evident from national data (see Tables 2.1. and 2.2. in the Annex).

In the Northern District, from 2010 to 2014, the number of students enrolled in Hebrew language secondary education is projected to decrease slightly from 51 642 to 50 904 at an annual rate of 0.04%. At the same time, nationwide, Arab education is projected to increase by 3.9%. This means a significant increase in secondary school enrolments of Arab students in the periphery – the Galilee and the Negev – and an increase in those who could enrol in tertiary education (Central Bureau of Statistics, 2009).

In recent years, progress has been made in increasing higher education access and enrolments in the Galilee through the expansion and establishment of colleges. Authorities emphasise the efforts made to increase the number of students in the colleges in the periphery: the percentage of undergraduates in the state of Israel studying in institutions in the Northern and Southern Regions increased from 8.7% in 1990 to 22.7% in 2006 (Table 2.1). This increase was at the expense of the three metropolitan regions of Jerusalem, Tel-Aviv and Haifa, whose share in the student population went down from 87.2% in 1990 to 60.7% in 2006. "Five out of the six universities that have undergraduates are in the three metropolitan regions, and their reduced share in the student population is the result of the slowdown in the growth of universities and the diversion of undergraduates to colleges." (CHE and PBC, 2007.)

Table 2.1. Share of bachelor's degree students by district of study, 1990-2006

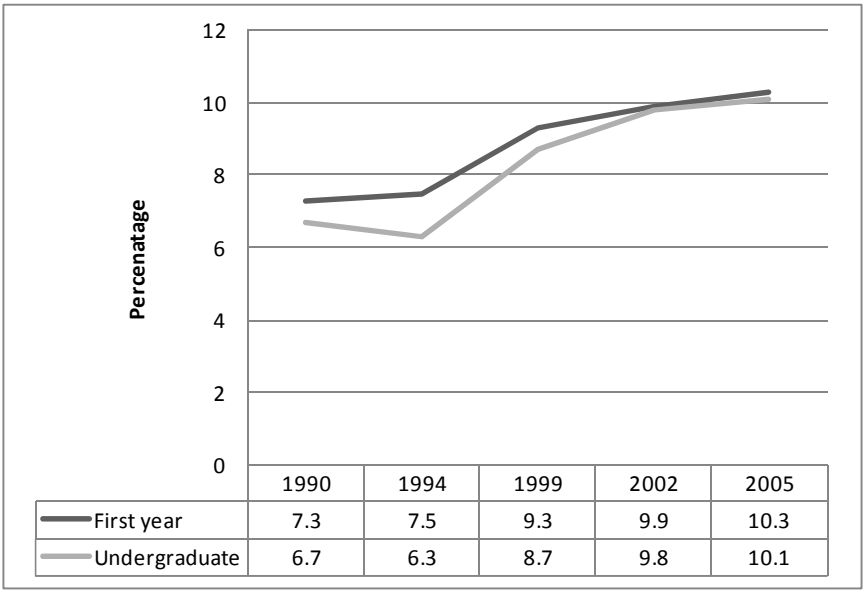
The region	1990	2000	2006
Jerusalem	22.7	15.5	12.9
The North	0.0	5.3	7.7
Haifa	21.7	17.9	15.8
The Centre	4.1	15.9	16.6
Tel Aviv	42.8	31.5	32.0
The South	8.7	13.9	15.0

Source: Council for Higher Education and Planning and Budget Committee (2007), *Higher Education in Israel*, CHE, Jerusalem. p. 24

While progress has been made in increasing the participation of Arab population, higher education attainment rates among Arabs remain low. Whereas in 1991 only 10.7% among Arab secondary school graduates completed two years of study in academic institutions, their percentage went up to 18.8% in 2002. At the beginning of the 1990s there were about 5 000 Arab students in all institutions of higher education. Until 2005 this number more than tripled itself, compared with 171% of growth in the general student population. Growth of participation in higher education was greatest among Arab women. In 2009/10 there were 17 612 Arab students studying for a bachelor's degree, 2 036 for a master's degree and 350 for a doctoral degree. The expansion of Arab participation is due, in part, to the opening of colleges in the peripheral areas.

Despite this progress, the percentage of Bachelor's degree students (including universities and colleges) who are Arab is very low, only 11% in 2006/07, compared to approximately 20% of their share in the relevant (20-24 year old) population. In universities the share of Arab students among the undergraduate student population was 10.1% in 2005 as compared with only 6.7% in 1990 (Figure 2.1). Between 1997 and 2005 the percentage of Arab students in the colleges grew from 3.5% to 5.6% and in teacher training colleges from 15.6% to 30.4%. After a long period of stagnation there has been an increase in the share of Arab students studying for a master's degree in the universities from around 3.6% throughout the 1990s to 5.1% in 2004. In 2008/09 about 6.4% of the total number of master's degree students in universities were Arabs. This increase is due to the increased participation of Arab population in undergraduate studies. At the same time, 8 500 Israeli Arab students are reported to study abroad, notably in Jordan.

Figure 2.3. Percent of undergraduate Arab students in universities



Source: Council for Higher Education and Planning and Budget Committee (2007), p. 15.

Students in the Galilee HEIs

The Galilee higher education institutions tend to serve students from the region for pre-academic, non-degree and practical engineering programmes, but vary in the extent to which they focus on the region. With the exceptions of the Technion, the University of Haifa and the Tel Hai Academic College, the higher education institutions draw most of their students from the Galilee. The Technion, as a globally competitive technical university draws highly qualified students from throughout Israel and other countries, but also has a number of targeted initiatives at the secondary and pre-academic level for students in the Galilee, including Arab students (see Box 2.2.). The Tel Hai Academic College, which describes its role as a "national college located in the region," has developed to a scale and a level of prestige that it now recruits substantially from the centre to the extent that 60% of its undergraduate academic students come from outside the Galilee. Other colleges draw more than 80% of their students from the Galilee, but all strive with varying degrees of success to attract students from the centre.[2]

The colleges in the Galilee express their commitment to serving the ethnic diversity of the region. Some also emphasise their commitment to

serve the region's populations which are currently underrepresented in education, especially Druze and Arabs, both Muslim and Christian. However, with the exception of Arab colleges, the enrolments remain largely Jewish. While the Arab colleges – the Academic Arab College for Education in Haifa, Sakhnin Academic College for Teacher Education and the Nazareth-Galilee Academic Institution (NGAI) – serve primarily Arab students, their capacity remains low due to the limitations in their missions and resources. For example the Sakhnin College is confined to teacher education with limited ability to respond to the regional needs and the Nazareth Academic Institution (NAI) is not a budgeted institution.

Other colleges express a commitment, to a varying degree, to reaching out to the Arab and Druze populations and to multi-cultural education. For example the Gordon College has since the 1970s reached out to and established a culture that is supportive of Druze students, especially women (Druze women are not allowed to attend classes with Druze men and they must marry within their own communities). Kinneret Academic College asserts on its website that it is "one of the most multi-cultural colleges in Israel with students coming from a rich array of backgrounds: urban and country, secular and religious, Jewish and Arab." Max Stern Academic College of Emek Yezreel has a core mission to narrow social gaps in Israel by providing undergraduate education to first-generation students from Jewish and Arab families and being a model of diversity and pluralism. Western Galilee College focuses on having a religiously diverse student body: a "mosaic, serving both Jewish and non-Jewish students, with a commitment to the community and region."

Despite these efforts, the enrolments of the Galilee colleges remain largely Jewish (from 65% to 70% at Gordon and Western Galilee to a high of more than 90% at ORT Braude) in a region where almost 50% of the population is non-Jewish. Also the college staff remain predominantly Jewish.

Unrepresentative samples of the ethnic profile 0of the student population in the Galilee higher education institutions and in pre-academic studies highlight a significant disparity in access to higher education between population groups (see Table A.2.1. and A.2.2. in the Annex). While the data is limited – all colleges are not included and there is no information on the gender profile – it underscores the failure to ensure equitable access to higher education. The lack of robust date reflects also an absence of strong policy focus by the authorities and higher education institutions. The institutions should collect, report and publish the ethnic and gender data on student population and the institutions and authorities should analyse and use this data to develop a

more equal access to higher education, influencing the policy and practices.

The low enrolment rates of the non-Jewish population in the Galilee colleges, ranging from less than 10% to a maximum of about 30%, and the low proportion of Arab students in pre-academic classes (4.4% in 2006), reflect not only the supply of relevant places, but also the demand which is influenced by a number of variables, such as socio-economic status, level of parents' education, preparation at the primary and secondary education level, geographical accessibility, language skills and perceived and real rates of return to education.

Barriers and disincentives to higher education and employment among the Arab population

The Galilee Arab population faces barriers and disincentives to higher education. These include underinvestment in infrastructure, geographical distance and a lack of accessible public transportation, expectations of traditional society and lack of day care for children which particularly affects women, and low prospects for better labour market outcomes as well as discrimination in the labour market. At the same time, however, a large number of Arab students are reported to study abroad.

Discrepancies in public investment in infrastructure in Arab and Jewish communities are barriers to employment and educational opportunities for the Arab population. The lack of accessible public transportation is a significant barrier, especially to those who live in rural villages in the Galilee, to participating in the labour market as well as attending colleges and universities. Furthermore, this is a important cause of the significant Arab school dropout rates (Abu-Bader and Gottlieb, 2008). Plans to extend the service to Arab communities are an issue of continuing controversy (Azoulay, 2010). Geographic barriers are particularly relevant to Arab populations in villages and Arab women who are more "place-bound" because of family and cultural considerations (OECD, 2010a).

Arab women participation in higher education is lower than their Jewish equivalents because of the expectations of traditional society, lack of day care for children and other social and cultural barriers. The Druze, a population that is religiously and ethnically distinct from the Arab population, adheres to a strict code of conduct to assure non-assimilation. This code restricts mobility and access to the labour market and educational opportunities (especially for women) outside the immediate community (CHE, 2009). However, because Druze men serve in the

Israeli Defence Force, they are afforded access to other benefits not available to the Arab population.

Inadequate preparation at schools and underinvestment in Arab schools in particular constitutes a barrier to higher education (OECD, 2009; 2010a). At the national level, 50% of all high school students in Israel either do not matriculate or matriculate with a certificate that does not allow them to continue to higher education. In addition, there is no well developed vocational training system in place (National Economic Council, 2007).

Low prospects of better employment and higher earnings (rates-of-return) from education have significant effects on a person's motivation to pursue further education. For Israel as a whole, there are significantly less non-Jewish workers employed in academic and administrative positions than Jewish workers. Even Arabs holding academic degrees have difficulty in obtaining suitable employment. As the National Economic Council notes, "... holders of academic degrees who are not Jewish are frequently employed in jobs which do not suit their skills and therefore do not make the most of the return on their education." (Ministry of Industry, Trade and Labor, Planning, Research and Economics Administration, 2005; Al-Haj, 2003) The National Council cites a study on this subject which found that the odds that an Arab academic will be employed in the appropriate occupation for his education level are five times lower than the odds of a Jewish academic with identical characteristics (Ministry of Industry, Trade and Labor, Planning, Research and Economies Administration, 2005).

Discrimination against Arabs in the labour market is also a barrier. The National Economic Council (2007) cites evidence of lower salaries of Arabs compared to Jews in professions such as engineering and architecture, lawyers, economists, accountants, psychologists. The Council also cites the rejection of suitable Arab candidates as evidenced in the low odds of Arabs related to Jews being employed in occupations that match their skills and in lower investment in Arab communities stemming from years in which "..the Law to Encourage Investment provided a clear preference to establishing industrial factories in Jewish communities."(National Economic Council, 2007).

High language demands and barriers in campus culture limit the participation of Arab students: a high level of competence in Hebrew is required for study. Furthermore Jewish values define the dominant culture of most of the higher education institutions in the Galilee (Government of Israel, 2009). From the experience of the United States and other countries with significant under-represented minority populations, issues

related to culture of the higher education institutions, for example the extent to which the campus environment, student services, instruction are sensitive to unique cultures can have a significant impact on minority student participation and retention (U.S.-Israel Science and Technology Commission and Foundation, 2008; Hurtado et al., 1998).[3] Multi-cultural initiatives of several higher education institutions in the Galilee (e.g. the Gordon College Multi-cultural Centre) are consistent with good practice. The development of the Nazareth Academic Institution (NAI) in the heart of the majority Arab city of Nazareth is an especially important development (see Box 2.1.).

Barriers in connectivity, limited prospects for employment and documented evidence of historic discrimination against the Arab population in access to higher education and the labour market influence demand for further education among this population (OECD 2009; 2010a). Given the large Arab population in the Galilee, these are critical issues that must be addressed in an examination of the role of colleges and universities in the future of this region.

2.2 Measures to improve access to higher education

Authorities are aware of the discrepancies, and have started to increase funding for measures that improve accessibility of higher education for Arabs, for example: *i)* the appointment within higher education institutions of academic advisors for Arab students; *ii)* the employment of personnel in the admissions departments who speak Arabic as a mother tongue; *iii)* the preparation and maintenance of special preparatory courses in subjects such as Hebrew, English, mathematics and learning skills; *iv)* the establishment of special tuition scholarships for students who are willing to act as tutors to Arab students; and *v)* the establishment of a competitive national fellowship programme for outstanding Arab students.

While it is too early to evaluate the success of these initiatives, sustained investment is needed to reach out to the Arab community to address longstanding shortcomings. Necessary responses include increasing geographical accessibility to higher education, improving preparation for higher education through long-term investment to schools and closer linkages between schools and higher education institutions and improving campus culture and academic and social support measures to improve retention and success in higher education.

Improving geographical accessibility of education

Many of the higher education institutions in the Galilee, with notable exceptions of Sakhnin College and the newly established Nazareth Academic Institution (NAI), are geographically separated from predominantly Arab communities. Considering the current underrepresentation of Arab population in tertiary education, steps should be taken to provide adequate support to NAI, which is the first comprehensive Arab higher education institution in Israel (see Box 2.1.). Support should also be provided to the Arab colleges of education to help them to diversify their teaching portfolios. Investing on Arab colleges would improve education attainment levels and generate mid- to long-term benefits for the regional economy in tax revenues and job creation.

Box 2.1. Nazareth Academic Institution (Mar Elias College)

The Nazareth Academic Institution (NAI), located in Nazareth, started as Mar Elias College, a licensed branch campus of the University of Indianapolis (USA) and was located in the village of Ibillin at the premises of Mar Elias Educational Institutions, which operate an elementary school and a high school. Since the launch of the college in October 2003, enrolment has grown by over 230% with students pursuing bachelor's degrees in communications, computer science and chemistry. The college has a core mission of drawing together students from all backgrounds and religions.

In Spring 2009 the Israeli Government and the Council of Higher Education (CHE) gave full accreditation to the Nazareth Academic Institution. A year later the CHE authorised the institution to relocate to Nazareth and to open with bachelors programmes in chemistry and communication studies. Budget funding did not however follow these decisions. In October 2010 the first 120 students will start their studies in a limited selection of courses in chemistry, communications, occupational therapy and computer science.

Nazareth Academic Institutions aims to become an engine for economic and social development for the Galilee and expand its existing teaching portfolio. Key needs of the Arab community in Israel were recently identified in a market survey that helped the institution to identify its focus areas: environmental science, entrepreneurship and business management, theology and Holy Land studies, speech therapy, biotechnology and nutrition science. One third of the students' programme is compulsory peace studies. Teaching staff consists of Christian, Jewish and Muslim members. Study programmes integrate practice, education and theory.

Box 2.1. Nazareth Academic Institution (Mar Elias College) (continued)

Unlike the six academic colleges in the Galilee, the support from the Council of Higher Education to Mar Elias/NGAI is limited to small subsidy of only USD 500 per student per year. Tuition fees are high and students are charged USD 2 500. For 2010, the college budget is USD 1.8 million: 50% of the budget is covered by the board of trustees (mainly from the Illinois state and Austria), 25% tuition fees; the rest by the local Arab community. In 2010 Mar Elias will receive USD 250 000 from the board of trustees. Local community has supported the college: In Ibillin the buildings have been given for free to the college; in Nazareth the facilities are from the local government. Donations are being sought from Jewish community, Nazareth community and multinational corporations, such as Microsoft.

The Sakhnin Academic College for Teacher Education faces different challenges. While it is eligible to train teachers, it cannot open new departments of study that would serve the actual needs of the region and offer better employment opportunities to the Arab population. As a result, the college's options are severely limited: It is only allowed to continue to train teachers who will have difficulty in finding work, thus contributing to an already high unemployment rate. The number of unemployed Arab teachers in the north is about 4 000[4].

There is a need to design tertiary education based on the particular local needs. The authorities should support the provision of colleges on the basis of the current and projected demand in order to provide the growth (or reduction) of services in locations where it is required. A region-wide assessment of current and planned capacity should be conducted against anticipated student numbers, identifying needs in terms of staff and infrastructure and taking into account related transport and student housing provision. In some cases, there is a need to enhance infrastructure-sharing arrangements between different education providers. When developing the network of higher education institutions, care should be taken to ensure that adequate IT infrastructure is in place for high speed, low cost connectivity.

Smaller colleges may suffer from increased costs associated with the small scale college operations, relatively low student numbers and a high proportion of students from disadvantaged socio-economic background. Therefore they need to develop strong collaborative links with each other in order to improve their education, service and applied research capacity. Additional funding should be allocated to develop collaborative, local

solutions to regional provision through partnerships with local stakeholders. Recognising the need to increase geographic accessibility, some colleges have proposed extension centres located in Arab villages, but authorities have rejected these initiatives. Authorities should consider providing support for specific higher education extension learning centres served by several different colleges and possibly universities and the Open University, in villages with low tertiary education participation rates.

The Open University education in Israel is well developed and provides the only open access opportunity to higher education in the country. However there are considerable gaps in terms of regional delivery and the Galilee and particularly its Arab population appears to be underserved by the Open University provision. This may be attributed to several reasons, for example the lack of provision in subjects relevant to the Arab population, limited collaboration between the Galilee colleges and the Open University or limited efforts by the Open University to actively reach out to the Galilee. In view of the fact that the Open University not only provides open access education, but also improves learning environments by refurbishing schools to make them suitable for blended learning opportunities, it would be recommendable to consider how to engage the Open University in multi-stakeholder collaboration.

Improving preparation to and retention in HE

Due to inadequate preparation for tertiary education, significant differences remain between Jewish and Arab students in the percentage of students completing 12th grade and in the percentage of students receiving matriculation certificates based on scores on the matriculation and psychometric examinations (see Chapter 1). Authorities have launched educational reform of primary and secondary education to overcome quality and equity gaps and to improve the preparation of teachers. It is necessary to accelerate this reform and to ensure that investment in education is equitable.

Higher education institutions in the Galilee play important role in supporting school reform. Initiatives in place include: *i)* focusing on teacher preparation, including professional development of school principals and teachers; *ii)* increasing enrolment in pre-academic programmes for under-represented population groups, such as Arabs, including programmes to improve proficiency in Hebrew; and *iii)* targeting student community service for the underserved communities and schools (see Box 2.2.).

Box 2.2. HEIs widening access to and improving retention in HE

The Galilee colleges of teacher education are directly involved in improvements in the school systems through preparation of teachers and professional development. The **Arab College** and **Sakhnin College** aim to provide professional development of teachers for Arab schools.

The **Technion** promotes science, technology and mathematics learning through its centre for pre-university education including a science and technology youth unit, unit for pre-academic studies and unit for fostering excellence. The youth unit provides several programmes and services that are available in the Galilee region, including science days and lectures, enrichment courses, visits to the Technion and summer workshops. The unit on fostering excellence conducts a summer campus, promotes mathematics education in the schools and conducts a Pre-Atidim programme. There are special programmes for example to orthodox Jews and outstanding Arab youth from northern Israel (NAM). The main objective of the NAM project is to promote higher education in engineering and sciences and to allow the integration of the Arab sector into Israeli industry. The NAM project began in 2006/7 with 55 students from Arab villages accepted into the programme, 17% were Christian, 35% Muslim; 55% males and 24% females. From this NAM programme, 53 students graduated and were accepted at universities, including 41 at the Technion, 7 at University of Haifa and 7 at Hebrew University. The programme has grown to 56 in 2007/08, 242 in 2008/09, 332 in 2009/10, and is projected to enrol 422 in 2010/11.

The **Tel Hai Academic College** has a number of initiatives to raise aspirations and improve learning outcomes at schools: The Unit for Social Involvement of Students engages college students in improving the "readiness for academic studies" of secondary school students. These initiatives include a programme for students from the Arab sector from schools in the Northern District; The Department of Environmental Sciences conducts an academic course that includes practical work in pre-schools with children and teachers on projects such as erecting special recycling stations, constructing sculptures from waste, setting up an organic garden and environmental beautification of the area surrounding the pre-school; The Centre for Special Education in the Department of Education requires students to take a practical academic course involving field studies in schools serving students with physical disabilities, mental retardation and autism, teenagers with behavioural problems and children-at-risk; The Faculty of Science conducts lectures to students in the Atidim Pre-Academic Programme.

Box 2.2. HEIs widening access to and improving retention in HE (continued)

Extensive college engagement in raising aspirations occurs through student community service and volunteer programmes, especially the Perach programme. The project involves students from all Israeli universities and colleges with children from disadvantaged socio-economic background in undertaking cultural and educational activities. Perach student mentors work in all sectors of Israeli society – Jewish, Arab, secular and religious. They serve four hours a week over the course of the academic year (October to June) tutoring students mainly in grades two through six from disadvantaged backgrounds (including students with disabilities). Regional co-ordinators oversee the work of the volunteers. In the north there are eight Perach programmes, involving approximately 1 000 college and university students.

Remedial courses are another type of response to the challenges posed by inadequate preparation by students for tertiary education. Some colleges, for example Gordon College, ORT Braude and the Tel Hai Academic College, have adopted comprehensive institution-wide responses to address social, financial and learning difficulties of their students.

Despite many commendable programmes and projects in the Galilee, there appears to be no systematic region-wide approach to widening access throughout all population groups and improve retention rates in higher education. The authorities need to address these challenges in the periphery in a comprehensive way and mobilise appropriate levels of financial resources to support public education at all levels and for all population groups. Measureable targets should be set for higher education institutions regarding the enrolment and graduation rates of the minority groups. There is also a need to step up the outreach efforts of the higher education institutions and share good practices among themselves in a systematic manner.

International example in widening access and improving retention: El Paso, Texas

There are international examples of widening access initiatives that Israel could use, involving strong regional level collaboration across institutions and education sectors. For example, El Paso in Texas has a high concentration of low-income people, many with very low educational attainment. Over 80% of population are self-identified as Hispanic, an ethnic minority group in the United States. The higher

education institutions in El Paso have achieved notable success in widening access to higher education and in educational attainment through long terms multi-stakeholder collaboration. Underlying individual institutional efforts is the College Readiness Consortium, which connects efforts in all primary and secondary education institutions (school districts) in the region to college level programmes to increase access and attainment (see Box 2.3.).

Box 2.3. El Paso Collective widening access and improving retention

The El Paso Collaborative for Academic Excellence is a long-term multi-stakeholder public-private effort, initiated and based at the University of Texas at El Paso, to improve educational attainment and retention from the first year in school through the college or university degree programme. The collaborative includes membership from the business community, all levels of educational institutions (from primary through University), the public sector and a non-profit organisation concerned with improving educational achievement.

The goal of the collaborative, launched in 1991, was to make systematic changes in educational policy and curriculum in all of the twelve El Paso County School Districts that would produce measurable results in performance in key areas of the curriculum and to reduce the achievement gap across ethnic and socioeconomic groups. The approach has been measurably successful, particularly in improving the performance of Hispanic students, a group with the largest proportion of low-income students and for whom English is usually a second language. Test results for Hispanic students in the critical 11th grade, (a year before college entry) show improvement in performance from the 33rd percentile in 1993 to the 72nd percentile in 2008.

There has been an increased enrolment in science, technology, engineering and mathematics programmes by Hispanic students over the period of Collaborative activities and a graduation rate of 76.7%, which is the highest among the large urban school districts in the State of Texas. Given that Hispanic students make up 89% of the student population in the El Paso school district, improvement in their educational achievement has had a significant effect on the overall performance of the school districts.

Box 2.3. El Paso Collective widening access and improving retention (continued)

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

The University of Texas at El Paso (UTEP) has undertaken its own programmes to widen access and improve student performance and completion rates. The relationship between the broadened community programmes to improve college readiness and the ability of the university to respond are interrelated because over 70% of the UTEP students come from within the region. UTEP has increased its enrolment by approximately 40% since the late 1990s and the vast majority of the increase has been with Hispanic students, who have increased from below 40% of the student population to over 75%. Degree award has risen from approximately 2 000 in the late 1990s to 3 500 in 2008. Approximately 10% of UTEP's students are Mexican citizens who cross the border every day to attend classes at the University. UTEP has also taken specific steps to make college affordable and accessible to students who usually combine work and study. It has undertaken programmes to change course scheduling, enable students to borrow money to purchase books needed for courses during the semester, and pay for their education as they acquire the funds to do so. These programmes are particularly important given the low-income levels of the college age population and their households, their lack of familial experience with higher education, their need to work while learning and their propensity to avoid borrowing to invest in higher education.

Source: OECD (2010b), *Higher Education in Regional and City Development. Paso del Norte, Mexico and United States*, OECD, Paris.

2.3 Social and economic context for human resource challenges

In order to achieve balanced and sustainable growth, Israel needs to dismantle the dual economy by narrowing the gap between advanced technology sectors which employ a minority of workers (5-6%) and the traditional sectors in which the overwhelming majority of workers are employed. Traditional industries are lagging the advanced technology sectors in production and employment growth rates (see Table 2.2). Rapid growth in isolated sectors cannot be sustained for a long time.

Table 2.2. Production and employment 1995-2005

Sector	Production growth rate	Employment growth rate
High technology	91.6%	25.1%
Traditional industries	-6.1%	-19.5%
All industry	26.8%	-7%

Source: National Economic Council (2007): *Socio-Economic Agenda, Israel 2008-2009*, National Economic Council, Jerusalem, p.63.

Authorities are aware of the disparities and the difficulties in achieving high growth rates and low unemployment rates, when growth is based exclusively on the knowledge-intensive sectors and the bulk of the economy suffers from low productivity and a lack of growth. According to *Israel 2028: Vision and Strategy for Economy and Society in a Global World*, the productivity of traditional sectors needs to be increased. In terms of human resources this calls for: i) promoting and strengthening the entire education system, as well as scientific research; and ii) increasing labour force participation rates of society's vulnerable segments, including Arab and ultra-Orthodox Jewish populations (U.S. – Israel Science and Technology Commission and Foundation, 2008).

In the Galilee, the traditional sectors are the core of the regional economy. The percentage of employed persons in the traditional sectors of manufacturing and construction is significantly higher in the Northern District than in the Haifa or Central Districts (see Table 2.3.). However, there are intraregional differences as the pattern of employment is not consistent across all sub-districts: construction tends to be more concentrated in Jezreel (Yizre'el) and Akko sub-districts, while the sub-district of Kinneret has a comparatively low level of employment in traditional industries and a higher concentration of employment in wholesale and retail trade and in tourist related industries. Furthermore,

there is also a considerable public sector employment in public administration, education, health and social services.

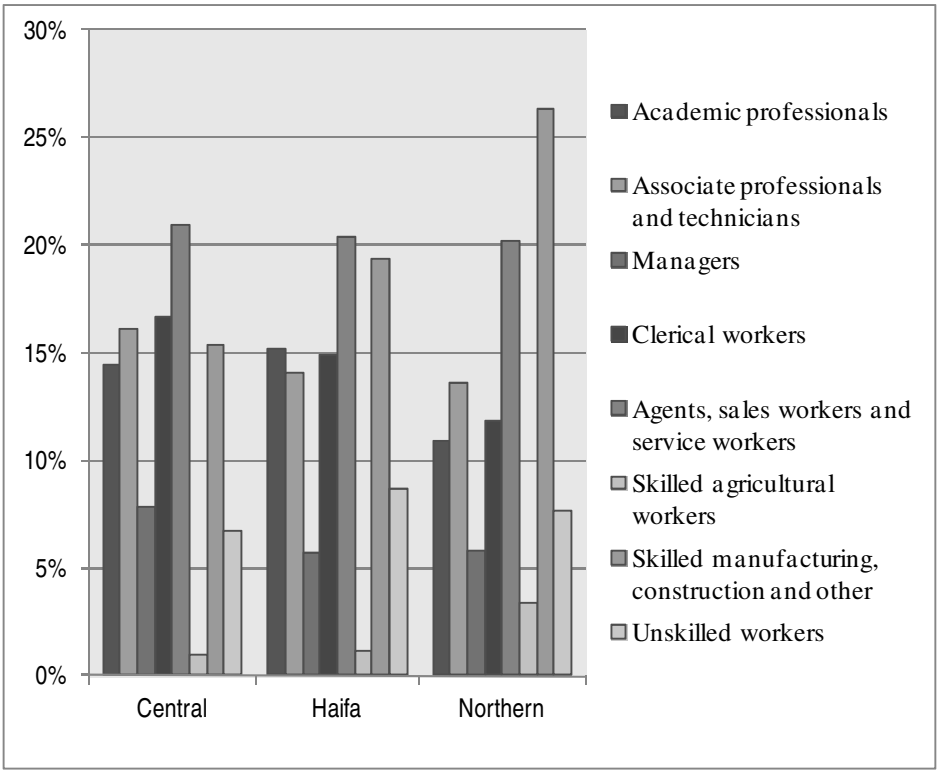
Table 2.3. Employed persons by industry, district and sub district of residence, 2008

	Northern District	Safed	Kinneret	Jezreel (Yizre'el)	Akko	Haifa district	Central District
Thousands	414.8	41.4	40.7	148.9	174.2	219.6	754.5
Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture	4.1	5.4	5.7	3.6	3.1	0.5	1.2
Manufacturing (mining and industry)	23.1	21.1	17.4	23.3	25.5	17.5	14.5
Construction (building and civil engineering projects)	9.3	2.6	4.8	11.0	10.1	4.3	4.7
Wholesale and retail trade, and repairs	13.0	8.6	17.6	13.4	12.8	12.2	15.0
Accommodation services and restaurants	4.7	8.5	7.7	3.2	4.5	3.6	3.8
Transport, storage and communications	4.8	4.7	5.6	5.3	4.4	7.1	6.8
Banking, insurance and other financial institutions	1.1	1.1	. .	. .	1.2	2.2	4.8
Business activities	7.4	7.4	4.0	8.1	7.8	14.4	16.3
Public administration	4.7	4.2	7.8	4.5	4.4	4.5	4.4
Education	13.8	18.7	12.9	12.8	13.0	13.1	11.3
Health, welfare and social work services	8.8	10.5	9.0	8.8	8.7	12.1	10.4
Community, social, personal and other services	3.7	4.4	4.4	3.5	3.5	4.7	4.2
Services for households by domestic personnel	0.7	2.3	. .		. .	2.4	1.8
Electricity and water supply	0.8	. .	. .	0.8	0.6	1.4	0.8

Source: Central Bureau of Statistics, Statistical Abstract of Israel, 2009 No. 60, Table 12.14.

The occupational structure of the Northern District differs markedly from the other two districts (see Figure 2.4): a higher percentage of persons are employed as skilled manufacturing, construction and other skilled occupations in the Northern District (26%) compared to the Haifa District (19%) and Central District (15%). A lower percentage are employed in academic professions in the Northern District (11%) compared to the Haifa District (15%) and Central District (14%).

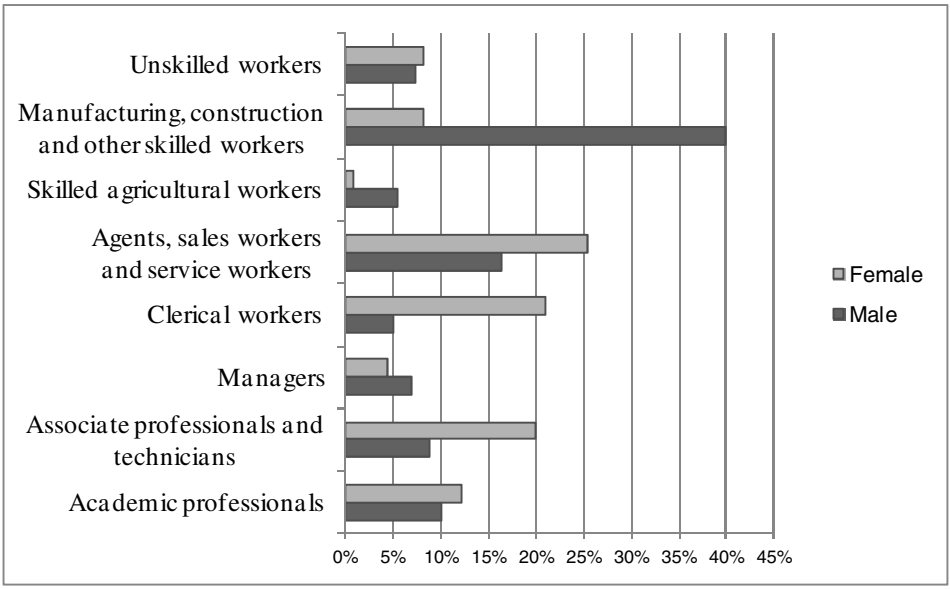
Figure 2.4. Employed persons by occupation and district, 2008



Source: Central Bureau of Statistics, Statistical Abstract for Israel, 2009.

Due to low labour market participation of Arab women, only 43.0% of employed people in the Northern District are women, compared to 46.4% in Haifa and 44.5% in the Central District. Men and women are employed in substantially different occupations: men are employed predominantly as skilled workers in manufacturing, construction and similar industries, while women are employed as agents, sales and service workers, and associate professionals and technicians (see Figure 2.5.).

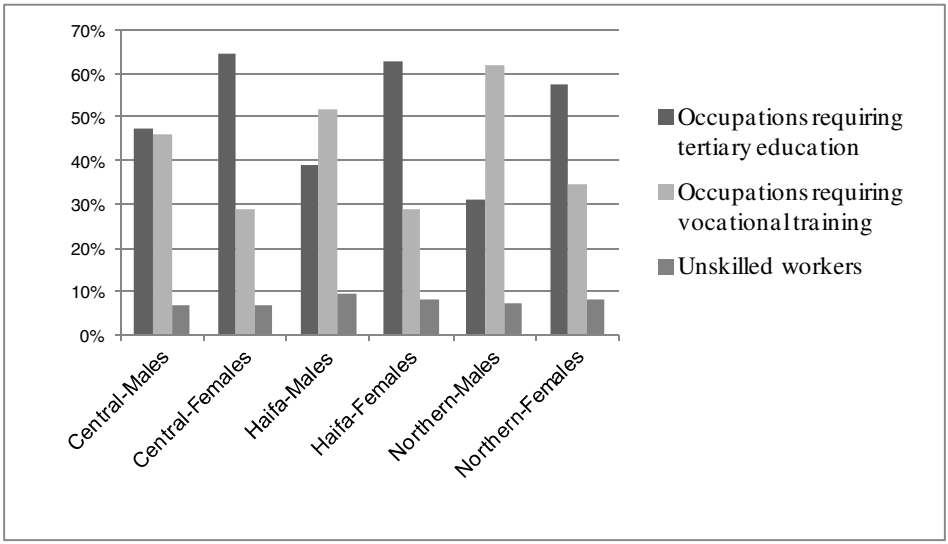
Figure2.5. Employed persons by occupation and sex in the Northern District in 2008



Source: Central Bureau of Statistics, Statistical Abstract for Israel, 2009.

A smaller percentage of those employed in the Northern District (42%) are in occupations that require tertiary education types A or B compared to the Haifa District (50%) and Central District (56%) and there are considerable differences by gender in employment by occupation between the Northern District and other districts (see Figure 2.6.). Only 31% of males in the Northern District are employed in occupations requiring tertiary level education, compared to 39% in the Haifa District and 47% in the Central District. Therefore, the largest percentage of males in the Northern District (62%) require vocational/technical training at a level less than tertiary education, compared to 52% in the Haifa District, and 46% in the Central District. In contrast, 57% of the females in the Northern District are employed in occupations requiring a tertiary education, compared to 63% in the Haifa District and 64% in the Central District.[5]

Figure 2.6. Employed persons by type of education, gender and district in 2008



Source: Central Bureau of Statistics, Statistical Abstract for Israel, 2009.

The Arab population has a higher percentage of employment in construction and other industries characterised by manual labour compared to the Jewish population. These fields are subject to greater fluctuations and therefore result in the Arab population having a higher unemployment rate. About 40% of non-Jewish professional employees are in industry and construction in 2002, compared to a low rate for Jews. There has been increased labour market competition from recent migrants in the economic sectors where Arabs have traditionally been employed (National Economic Council, 2007).

2.4 Mismatch between higher education demand and supply

Due to the large share of Arab population in the north, a major challenge for the Galilee is to increase the labour market participation rate of Arabs which is considerably lower when compared with the rate of participation among Jews. Specifically, the participation rate of Arab women is very low and stagnant: only 17.8% in 2005, when in 1995 the rate was 18.3% (National Economic Council, 2007). Furthermore, a majority of the Arab female employees (approximately 53%) work part-time, a phenomenon which partially explains the gap between the average

wages of Arab women and Jewish women (National Economic Council, 2007).

A key question for this review is the extent to which the academic programmes offered by the higher education institutions in the Galilee are aligned with employment in the region. Employment by industry and occupation in the Galilee differs from other regions of Israel with higher levels of employment in traditional industries and lower levels of employment in occupations that commonly require education at the tertiary level. Even more significantly, employment patterns are different for Jews and Arabs, and within the Arab population, for men and women. These differences stem not only from employment preferences or cultural considerations of each population group, but also from discrimination against Arabs in the labour market (U.S.-Israel Science and Technology commission and Foundation, 2008). They also stem from the lack of tertiary education opportunities relevant to available employment opportunities.

Currently, the education provided by the colleges does not appear to be well aligned with the demand for skills. Four key issues contribute to the mismatch between higher education supply and demand. These are:

- Narrow education and employment opportunities for Arab women.
- Lack of vocational-technical programmes relevant to the employment of Arab men.
- Lack of integration of regional engagement within the core teaching/learning and research missions of the higher education institutions.
- Lack of focus of higher education institutions on students' employment and entrepreneurship outcomes.

Narrow education and employment opportunities for Arab women

Arab women are enrolled primarily in teacher training programmes despite the high level of unemployment among Arab teachers. A recent news report indicated that there are 8 000 unemployed Arab teachers in Israel, 60% of whom are in the Galilee (Haaretz, 2009). Two-thirds of these teachers are women. The majority of employed Arab women work in part-time jobs. They have difficulty finding employment in fields other than education and also face cultural, traditional and geographic constraints with the result that they acquire employment at lower occupation levels. As a result there is a high level of employment of Arab women in clerical occupations.

While Arab women continue to face serious challenges in the labour market resulting from geographic constraints, culture and tradition (family obligations and reluctance to work far from home and village) and the reality of discrimination in employment, considerable improvements have been made in improving employment outcomes of educated Arab women (OECD, 2009). At the same time, a significant number of Arab women with low levels of education have lost their jobs in the agriculture and textile industries due to the entry of immigrant workers into the Galilee labour market.

Although robust data on enrolment of students by ethnicity and gender were limited, comparatively a small number of Arab women attending the academic colleges in the Galilee are enrolled in academic programmes other than teacher preparation. Making a wider range of academic programmes open to Arab women is the intent of the Nazareth Academic Institution (NAI). The employment outcomes of the NAI's predecessor Mar Elias have been promising: according to the information received from the institution, about 70% of female graduates (all Arabs) are employed, mostly in positions requiring higher education qualifications (see Box 2.1.).

Current underinvestment in Arab education represents not only a considerable challenge, but also an untapped resource for the Israeli society. Opening wider educational opportunities for Arab women will ultimately impact on their labour market outcomes and generate positive results for the Israeli society. In addition to providing adequate support to the Nazareth Academic Institution and the Arab colleges of education which should be allowed to diversify their teaching portfolio, the authorities should ensure wider use of ICTs, distance learning and teleworking opportunities in order to enhance women's participation in education and labour force.

Lack of vocational-technical programmes relevant to the employment of Arab men

Arab men are employed predominantly in traditional industries and in occupations that tend to require vocational training rather than tertiary-level education. Compared to Arab women, less Arab men complete 12 years of schooling and earn matriculation certificates. No data were available on programme enrolment by ethnicity and gender, but only a small proportion of the Arab enrolment in higher education institutions is of men and most of that enrolment is in practical engineering rather than the bachelor level programmes of the higher education institutions.

Currently, Israeli education system has an overemphasis on academic preparation for higher education and limited focus on developing the vocational skills needed by industry. While Israeli Defence Force is a source of vocational skills for the Jewish population, this channel is not available to the Arabs. There is a need for increased availability of education and training programmes at the level of certificate or associate degree (tertiary level B) targeted at Arab men, who provide the core human resources for the region's traditional industries. Increasing the level of training of this population is a key means for reversing the decline in productivity of this sector of the economy which is a high national priority. There is a need to revive and strengthen industry internship as part of vocational and technology education. Furthermore there is a need to ensure that necessary pathways are in place for students to climb up the educational ladder.

Box 2.4. The Galilee Centre for Industrial Training

Stef Wertheimer, industrialist and founder of Iscar Ltd. has worked for decades to strengthen vocational training in the Galilee. His schools, now with four centres in Lavon, Druze, Jelayno and Navy, have been running for several decades providing skills for non high tech industries. They emphasise a combination of practical and theoretical studies and training in soft skills to facilitate social mobility. Technical schools are based on a multi-stakeholder collaboration: the municipalities donate an empty building for the training purposes; Wertheimer funds modern equipment and the daily operational budget is covered by the government, Wertheimer, municipalities and in some cases industry or Israeli Defence Force. Schools generate small business spinouts for example in hard metal manufacturing and manufacturing for the naval industry.

Wertheimer has also funded a new vocational training centre in the Galilee called The Galilee Centre for Industrial Training. In co-operation with the state of Baden-Wurttemberg in Germany, the Centre will offer a one-year training programme culminating in a certificate from the Landesakademie fur Fortbildung und Personalentwicklung an Schulen. The study programme will include six months at the Galilee Centre followed by six months at the Landesakademie. Initially, 20 students per year will participate in the programme.

Source: CHE (Council for Higher Education) (2009), "The Galilee, Israel: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/2/16/44345452.pdf.*

Technical schools have a stronger emphasis on industry links and entrepreneurship and have capacity to generate incremental, demand-led innovations. There is a need to expand the scale of the Wertheimer model to have an impact on the region's population. Establishing such programmes within a network of "community colleges" with a core vocational training mission would be an alternative.

2.5 Lack of focus on regional needs and employment outcomes

Work-based learning

The Galilee is a net exporter of educated workforce. Improving work-based learning opportunities and knowledge transfer programmes based on links between higher education institutions and industry could help talent retention in the region. Some steps have been made to this direction. For example the Best to Industries Programme at the Computer Sciences Department of the Tel Hai Academic College provides an example of systematic collaboration with the local high-tech industry that improves students' learning outcomes, strengthens the links between higher education and industry and helps attract and build high-tech industry to the northern-most part of the country. This type of initiatives should be expanded to other higher education institutions and disciplines. An important channel of knowledge exchange is the internship system employed by several colleges in the Galilee (see Box 2.5.).

Box 2.5. Work-based learning in the Galilee colleges

In **ORT Braude,** all third year engineering students participate in some form of internship in industry. Such internships provide an entry point into the workforce as some students continue working for the industry partner after the internship. Internships also take place in college business school, for example in the **Western Galilee College** and **Nazareth Academic Institution** also aims to combine practical and theoretical education.

The Computer Sciences Department in the **Tel Hai Academic College** carries out the programme "The Best to Industry" in co-operation with high-tech companies, factories in the region and the Ministry of Industry and Trade. The students participate in the project work in regional industries (from the end of their second year) for 500-1 000 hours. Most of them also implement an extensive project at a high academic level, with personal instruction from members of the academic staff.

Box 2.5. Work-based learning in the Galilee colleges (continued)

The participating students are eligible for an ILS 25 000 scholarship which is funded by the Ministry of Industry, Trade and Labour (MOITAL) and the company or the factory in which they are employed. In addition to the scholarship, the participating students also gain experience in the development of software systems or a product, learning the theoretical aspects of the system alongside the practical tools, and obtaining an understanding and level of knowledge that cannot be obtained from in class work. The programme creates a reservoir of capable students who are eligible for employment at the high-tech companies that exist in or relocating to the Galilee.

Despite some notable exceptions, the higher education provision in the colleges remains supply-driven rather than demand-based, although steps have been taken in some colleges to engage employees in the curriculum design. In many cases, faculty members appear to be inclined to follow traditional lecture modes of instruction while providing limited time for interaction with students or field experiences. Only a small proportion of students in a limited number of disciplines have access to work-based learning and internships. There appears to be limited efforts to integrate practical experience or voluntary service in the curricula. *Ad hoc* systems may be in place, but systematic programmes linking for example graduates in the regional industry were not in evidence. Furthermore while higher education institutions expressed concern about the lack of employment opportunities for graduates within the region, many did not have robust institution-wide systems in place to monitor the labour market outcomes of their graduates or did not know where they had found employment. Considerable number of students engages in voluntary work. With the exception of the Tel Hai College, this is non-credit bearing and considered outside of the curricula.

Israel has a strong tradition of providing scholarships for students to engage in community service. However, from the student perspective there are competing demands of community service obligations, jobs to pay for college and time needed for academic study. Students may receive scholarships funded by the PBC, based on their socio-economic status, scholarships by the institutions, as well as other scholarships awarded for participating in community service such as Perach Student Tutorial Project. Despite the positive aspects of these programmes, multiple well-intentioned but unco-ordinated programmes do not add up to a comprehensive approach to helping students pay for college. Furthermore,

working an excessive number of hours during an academic year can also have the unintended consequence of undermining student academic performance (King, 2002). As the authorities consider alternatives for the financing of higher education, they should make incentives for community service a more integral element of student support policy taking into consideration students' socio-economic status. In particular, the policy should recognise that many students have to work to pay for college even after a portion of their tuition fees have been paid through scholarships. Community service and work undertaken by students during the academic year should not exceed a reasonable number of hours per week.

There appears to be a lack of integration of regional engagement within the core teaching/learning, research and service missions of the higher education institutions in the Galilee. Policies that affect the higher education institutions in the Galilee, especially the colleges, do not offer sufficient support for higher education institutions to play a regional role. Furthermore, while the Galilee colleges have made efforts to link their academic programmes and services to the needs of the region (see Box 2.6.), the lengthy programme approval process is a major barrier to expeditious response to regional priorities. Alignment of policy with regional engagement mission will be discussed in more detail in Chapter 4.

Box 2.6. Examples of academic programmes responding to regional needs

Gordon College prepares Druze teachers and is engaged with the schools in providing professional development of teachers and principals in implementation of the New Horizons school reform being implemented by the Ministry of Education. In addition, the college provides college-level opportunities for special needs adults who by Israeli law are entitled to state-supported education till the age of 21. The college also has a centre for giftedness and excellence which prepares students to teach these special needs students and provides services to the region's teachers and schools in this field.

Nazareth Academic Institution aims to provide study programmes that respond to social, cultural and economic needs of the Israeli Arab community. Key needs of the Arab community in Israel were recently identified in a market survey that helped the institution to identify its focus areas: occupation therapy, computer science, environmental science, entrepreneurship and business management, theology and Holy Land studies, speech therapy, biotechnology and nutrition science. Study programmes integrate practice, education and theory.

Box 2.6. Examples of academic programmes responding to regional needs (continued)

ORT Braude plays an important role in the region as the provider of engineers and technicians and maintains relationships with regional employers. The college seeks advice of employers for the design of its courses. Through internships with local employers, students gain both practical experience and increased chances for employment. Because an industry supervisor and a faculty member mentor each student the internships also provide a means for interaction between the college's faculty and employers on the design and relevance of curricula. ORT Braude also offers a practical engineering programme (sponsored by the Ministry of Commerce and Industry) in which a high percentage are Arab students.

Sakhnin College's primary mission is to prepare Arab teachers. In addition, the college also offers practical engineering programmes (under the authority of the Ministry of Commerce and Industry) in foremen, practical civil engineering, technician, and practical biotechnology. In 2009, the college initiated adult literacy programmes for the Arab population in their middle ages.

Tel Hai Academic College integrates academic programmes with community service. In contrast to other HEIs in which community service and engagement takes place outside the framework of the academic curriculum and the work of the regular faculty, the Tel Hai faculty have developed courses that integrate community work and learning by designing community-based research that advances scholarship in innovative ways. At Tel Hai College, the departments of education, psychology, social work, environmental studies and nutrition all take active roles in engaging students in the field. The College's Centre for Community Responsibility encourages and strengthens these connections, providing resources to support this work. Furthermore the college has developed innovative programme Best to the Industry in collaboration with industry to provide work-based learning opportunities for ICT students, one example is the programme on viticulture which supports the local wine industry. The Tel Hai Academic College stands out among the HEIs in Galilee for its deliberate efforts to integrate regional engagement with its core mission.

Western Galilee College is implementing a new programme that respond to needs of the region: bachelor's degree in conservation of sites and monuments. The programme combines both academic and practical field experience to increase the opportunities for employment. In response to needs of regional employers, the college has proposed to develop a new school of management with departments of management and economics. With support of the Cherie Blair Foundation for Women, the college is sponsoring, beginning in the 2009-10 academic year, 20 Jewish and Arab women from the Western Galilee region to study for an interdisciplinary bachelor's degree in economics and business administration.

Co-ordinated planning, led by the authorities within different sub-regions, is necessary to have regular interactions between the higher education leaders to enable more effective planning and to coordinate the development of programmes that are aligned with regional industry and labour market needs.

Lifelong learning, continuing professional development and training

Due to rapidly changing skill requirements in working life, lifelong learning, skills upgrading and re-skilling are becoming increasingly important. Upgrading the skills of the adult population is likely to have a more direct effect on the region's economic performance since adult learners are generally less mobile than younger students due to family commitments. 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 (OECD 2007; Santiago *et al*., 2008).

Government spending on vocational training amounted to about 0.08% of GDP in Israel in 2007, well below the OECD average (0.14 of GDP). There has been a decline in spending since 2002: public expenditure on vocational training of adults has been cut by three quarters. Legislative changes in 2002 and 2003 made eligibility for unemployment benefits stricter, particularly for people taking vocational training, The result was a reduction in the scope of training for the unemployed – less participation in vocational training and shorter length of courses (OECD, 2010a).

Currently, the Galilee higher education institutions are more oriented to meeting the needs of traditional students than those of the working age adults. While the higher education institutions have some programmes in place for adult learners, there was limited hard data available to understand the needs of this population or the efficacy of higher education in meeting them. Continuing professional development and training programmes are provided in some institutions through the continuing education or external studies departments (see Box 2.7.). It is unknown, however, whether the availability of courses and programmes is sufficient to meet the needs and demands of adult learners. Other approaches that have demonstrated effectiveness with adults, such as work-based programmes and on-line courses targeted to adults were not so readily available. Furthermore, as earlier noted, the Galilee, and particularly its Arab population appears to be underserved by the Open University.

Box 2.7. Continuing professional development in selected HEIs

Gordon College offers certificate programmes for medical doctors, dentists and lawyers who want to pursue a teaching career. The college provides programmes for teachers to prepare for changes in the math and science curriculum. The Gordon College conference centre organises meetings and conferences in fields such as gifted education, green education, that provide opportunities for teacher professional development.

ORT Braude College serves as a forum for regional industries on new developments in engineering and technology. The college's internship programmes provide an ongoing means for the industry-based mentors to engage with college faculty for professional development. The college also plays a broader role in the community through social activities, availability of courses and use of college facilities, activities for high school pupils and events for the development of the Galilee.

Sakhnin College's primary mission is to prepare Arab teachers. This presents a serious challenge because of the high level of unemployment of Arab teachers. In light of this problem, the college is pursuing targeted initiatives to improve the qualifications of unemployed teachers emphasising: empowerment, behaviours in job interviews, writing of resumes and job seeking.

Technion offers a wide range of continuing professional development opportunities with an estimated 1 000 participants from the Galilee each year. These include master's degree programmes in business administration and engineering fields, a bachelor's degree in geo-information and certificate programmes in fields such as real estate studies, interior design and computer studies. The Technion medical school, through its clinical department, collaborates with hospitals throughout the region and provides continuing education programmes in family medicine and dentistry. Technion also responds to requests from industry to tailor professional development programmes for employees.

Western Galilee College's external studies department offers programmes in alternative medicine, art and design. With the Akko municipality, the college offers courses tailor-made for business, and a special therapy-oriented programme jointly with the Criminology Department. The College has a centre to encourage young adults to return to higher education.

The rapidly changing global labour market poses challenges to the development of the work force, at all levels of educational attainment. In Gifu Prefecture in Japan, universities, industry and government have established a consortium that allows employees from all branches of industry to pursue their studies and cope with the changing labour market

demands. Classes are attended after employees finish their shifts at work. A wide range of subjects are available and a variety of methods are used, including hands-on learning, lectures and language laboratories. (Softopia Japan 2010). The European Union decided that the average level of participation in life-long learning should reach a minimum of 12.5% of the adult working-age population by the year 2010 (EC 2010). In contrast to these and similar developments throughout the world over the last decade, the Israeli system of higher education has been lagging behind in implementing a policy of co-operation between higher education, industry, the individual employee and government.

Limited pathways for students among institutions

There is limited student mobility among higher education institutions in the Galilee. Reported reasons were the competition among institutions for a limited pool of students and the lack of a credit transfer system. Higher education policies emphasise the important objectives of differentiating the missions of institutions and discouraging unnecessary programme duplication. As a complement to these policies, there is a need to have policies that provide pathways for students to move between and among institutions to take advantage of academic programmes that may not be available at their college of initial enrolment.

The Galilee provides an opportunity for Israel to enhance institutional collaboration so that the combined capacity of the colleges can contribute to more cost-effective delivery of academic programmes in the region. The authorities could pilot a credit transfer system that would make it possible for students at the colleges in the Galilee to transfer to another college to take advantage of an academic programme without the loss of academic standing or progress. In its requirements for approving a new academic programme, the authorities could include a requirement that an institution provide pathways for students at other colleges in the region to transfer to the programme and to transfer credits for course work already completed. Priority could be given to academic programmes in fields in demand within the region such as the health professions or tourism and hospitality. Changes in finance policy would be important to make such a transfer policy work. For example, both the sending and receiving institutions should not be penalised in the funding formulae of the Planning and Budgeting Committee (PBC) because of the loss or gain in enrolment resulting from student transfers. The authorities could also provide funding to support joint academic programme planning between the faculties of two or more colleges to facilitate student credit transfer.

Conclusions and recommendations

Israel and the higher education institutions in the Galilee have made significant progress in raising educational attainment levels. However, while the mission statements of most of the institutions focus on serving the Galilee, most of the colleges aggressively recruit students from the centre and beyond. The Tel Hai Academic College states explicitly that it is a national institution "located" within the region.

A strong contrast remains between the composition of higher education institution enrolments in the Galilee and the composition of the region's population. In a region where almost 50% of the population is composed of non-Jews, which are among the fastest growing population groups in Israel, most of the higher education institutions – with the exception of the Arab institutions – have enrolments that are from 65% to over 90% Jewish. In a region where men constitute 53% of the population, the enrolments of institutions (with the exception of ORT Braude) are predominantly (65% or more) composed of women.

There is also a mismatch between programme provision and regional economy. Employment by industry and occupation in the Galilee differs from other regions of Israel with higher levels of employment in traditional industries and lower levels of employment in occupations that commonly require education at the tertiary level. Even more significantly, employment patterns are different for Jews and Arabs, and within the Arab population, for men and women. These differences stem not from discrimination against Arabs in the labour market as well as the lack of tertiary education opportunities relevant to available employment opportunities. Unemployment, non-employment and under-employment, as well as lower earnings may alienate the Arab population. It will also result in a situation where the regional economy cannot take full advantage of the productive potential of the Arab population.

Geographic barriers have an impact on access to higher education, especially for Arab populations in villages and for Arab women who are place-bound because family and cultural considerations. Many of the higher education institutions in the Galilee – with notable exceptions of Sakhnin College and the newly developing Nazareth Academic Institution – are geographically separated from predominantly Arab communities.

There is a lack of education and training programmes at the level of certificate or associate degree (tertiary level B) particularly targeted at Arab men, who provide the core human resources for the region's labour force. Current Arab colleges are constrained by limited resources or missions which confine them to teacher education.

Most of the Galilee higher education institutions are committed to regional engagement, but the extent to which this mission is integrated in teaching and learning and R&D activities varies among and within the institutions and in most cases is driven by individual academics or departments rather than the institutions. In several cases, regional engagement appears to be a "train on its own track." There are limited efforts to integrate practical experience or community service within the curricula and faculty members are inclined to follow traditional lecture modes of instruction while providing limited time for interaction with students or field experiences. Student community service obligations often compete for the students' time which is required for academic study or jobs to pay for college.

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

- Authorities, higher education institutions and other educational institutions and stakeholders of the economy and society should work together to establish a Regional Human Capital Development System to define region-wide goals, policies and priorities to improve the educational attainment rates and to bridge the gaps between the population gaps. As part of this system, institution-specific clear measurable targets should be set for enrolment, graduation and employment outcomes of the students, with quotas for underrepresented groups.
- Authorities and higher education institutions should continue to expand efforts to increase the enrolment of Arab students as well as the efforts to improve their completion rates. These efforts should build upon successful models of effective academic and social support services for students, increasing financial assistance to low income students, including both institutional and government aid.
- Authorities and higher education institutions should facilitate better matching between higher education supply and demand. They should make stronger efforts to improve education and employment opportunities for Arab women; to provide vocational-technical programmes relevant to the employment of Arab men; and to integrate regional engagement within the core teaching/learning and research missions of the higher education institutions. Efforts should be made to increase Arab faculty in the higher education institutions respecting the goals of the Civil Service Law.
- Authorities should encourage pathways for students between and among institutions to be provided in the Galilee through a pilot

student credit transfer system and changes in finance policy to encourage institutional collaboration in promoting student mobility.

- Authorities and higher education institutions should work together to improve the data on labour market needs and trends and student access and progress. Higher education institutions should systematically monitor student progress, as well as students' labour market outcomes and graduate destinations. The most effective region-wide graduate labour market systems are based on comprehensive labour market intelligence, on-line publication of the data in a single place to improve students' ability to make rational choices about their studies and to help graduates and employers to come together and increases students chances of moving into employment; and using the data strategically to identify regional priorities and at an institutional level, to respond to the data in terms of course provision and the provision of employer-specific skills.

- Authorities and higher education institutions should take steps to significantly expand higher education opportunities for working age adults. These steps should create clear and transparent pathways to advanced education for adults, including the ability to attend multiple institutions, obtain short-term education and training that can later be applied to degrees, and re-skilling and up-skilling courses and programmes designed around the particular needs of adults who combine work and study.

- Higher education institutions should focus on the employability and entrepreneurial skills of graduates; providing them with the skills and competences needed in a globalised knowledge economy. Work- and problem-based learning methods and programmes to build entrepreneurship skills would improve retention rates and graduation rates in the region. Similarly, stronger efforts in language learning could help the region in its internationalisation efforts.

- Authorities should conduct a region-wide assessment of current and planned capacity against required and anticipated student numbers and identify gaps in staff and infrastructure. Co-ordinated negotiation and planning processes should be led by the authorities within the subregions. Support should be provided for extension learning centres that draw on a range of providers, including several colleges, possibly Open University and other universities, in villages with low tertiary education participation rates. When developing the network of education providers, care should be taken to ensure that the population continues to have access to adequate lifelong learning

services. Adequate IT infrastructure should be put in place to ensure high speed, low cost connectivity.

Notes

1. The per capita personal income of a region is increasingly correlated with the proportion of the population with a tertiary-level education. for example, in the United States, for example, the correlation between per capital personal income and the proportion of the population with an associate degree or higher has increased from 0.65 in 1980 to 0.83 in 2005, according to the National Center for Higher Education Management Systems.

2. For example ORT Braude was originally founded in the Zionist tradition with a major goal and expectation to attracting Jewish students from the centre who would study and then settle in the Galilee. However, in recent years the college has not been successful in this goal and, therefore, its primary focus is on drawing students from the Galilee.

3. Hurtado *et al.* define campus climate through four interconnected dimensions: *i)* institution's historical legacy of inclusion or exclusion of various ethnic/racial groups, *ii)* its structural diversity in terms of numerical representation of various racial/ethnic groups, *iii)* the psychological climate of perceptions and attitudes between and among groups, and *iv)* the behavioural climate dimension, characterised by intergroup relations on campus.

4 Telephone interview with the head of Teachers Manpower Division in the Ministry of Education, 9 December 2009.

5. Not all occupations require tertiary education-type A or B. For analysis purposes, the occupations are divided according to: *i)* occupations that commonly require a higher education degree at the tertiary-type A or B level (academic professionals, associate professionals and technicians, managers and clerical workers); *ii)* occupations that require vocational/technical training (agents, sales workers and service workers, skilled agricultural workers, and manufacturing, construction, and other skilled workers) and *iii)* unskilled workers.

Annex 2.A1. The ethic profile of the student population in the Galilee

Table 2.A1.1. The ethnic profile of the student population for academic studies in the Galilee (from an unrepresentative sample of higher education)

Higher education institutions	Degree	Jews	Muslims	Christians	Druze	Others	Total
Emek Hayarden	first	212 (84.48)	16 (6.4)	3 (1.2)	3 (1.2)	16 (6.4)	250
Emek Yezreel	first +second	2 573 (75.52)	521 (15.29)	190 (5.57)	21 (0.61)	102 (2.99)	3407
Haifa University	first	7 112 (70.85)	1 407 (14.01)	635 (6.32)	556 (5.53)	328 (3.26)	9710
	second	4 298 (80.94)	543 (10.22)	273 (5.14)	129 (2.42)	67 (1.26)	5243
	third	842 (86.62)	65 (6.68)	37 (3.80)	17 (1.74)	11 (1.13)	961
	teaching certificate	34 (24.63)	60 (43.47)	25 (18.11)	19 (13.76)	0	138
Islam and Sharia studies college	first	0	1 059	0	0	0	1059
Oranim	first	1 530 (74.16)	343 (16.62)	104 (5.04)	54 (2.61)	32 (1.55)	2063
	second	208 (59.09)	105 (29.82)	25 (7.10)	14 (3.97)	0	352
Ort Braude	first	2 088 (80)	127 (4.86)	101 (3.86)	125 (4.78)	169 (6.47)	2610
Sakhnin college	first	0	902 (90.29)	86 (8.6)	11 (1.1)		999
Technion	first	6 841 (8.46)	745 (8.54)	435 (4.98)	163 (1.86)	534 (6.12)	8184
	second	2 248 (86.09)	106 (4.05)	91 (3.48)	30 (1.14)	136 (5.20)	2475
	third	791 (91.55)	12 (1.38)	17 (1.96)	0	44 (5.09)	820
	teaching certificate	7 (63.63)	4 (36.36)	0	0	0	11
Tel Hai	first +second	2 361 (85.11)	168 (6.05)	73 (2.63)	121 (4.36)	51 (1.83)	2774
Safed	first	114 (44.01)	81 (31.27)	19 (7.33)	45 (17.37)	0	259
	Total	31 259 (73.66)	6 264 (14.76)	2 114 (4.98)	1 308 (3.08)	1 490 (3.51)	42435

Source: Central Bureau of Statistics (2009), Statistical Abstract for Israel 2009

Note: Percentages are in parentheses.

Table 2.A1.2. The ethnic profile of the student population for pre-academic studies in the Galilee (from an unrepresentative sample of higher education institutions)

Pre-academic studies (preparatory courses)	Jews	Muslims	Christians	Druze	Others	Total
Emek Yezreel College	391 (80.95)	18 (3.72)	7 (1.44)		67 (13.87)	483
Gordon Teachers College	33					33
Haifa University	312 (63.97)	50 (10.89)	13 (2.83)	41 (8.93)	43 (9.36)	459
Ort Braude College	364 (81.61)	14 (3.13)	3 (.67)	19 (4.26)	46 (10.31)	446
Safed College	96 (75.59)	17 (13.38)	3 (2.36)	11 (8.66)		127
Technion	338 (65.50)	90 (17.44)	17 (3.29)	17 (3.29)	54 (10.46)	516
Tel Hai College	238 (87.5)	7 (2.57)		14 (5.14)	13 (4.77)	272
Western Galilee College	498 (91.20)	9 (1.64)		8 (1.46)	31 (5.67)	546
Total	2 270 (78.76)	205 (7.13)	43 (1.49)	110 (3.81)	254 (8.81)	2882

Source: Central Bureau of Statistics (2009), Statistical Abstract for Israel 2009,

Percentages are in parentheses.

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Chapter 3

Contribution of higher education to regional innovation

The regional dimension of innovation is crucial to promote long-term economic growth and competitiveness. This chapter will examine the effectiveness of Israeli innovation policies and practices in the Galilee and the role of research and knowledge transfer conducted by the universities and colleges.[1] *The chapter will consider the efforts made by the authorities as well as the higher education institutions in the region. It will examine the current knowledge transfer mechanisms and highlight good practice from other regions around the world. Finally, the chapter will conclude with specific recommendations to improve the regional innovation in the Galilee.*

The key message is that while Israel has developed a broad array of programmes supporting RDI, they are less suited for the Galilee's low skill/low wage economy. Stronger efforts are needed to improve the productivity and innovation in traditional industry and services to create new businesses and better jobs that will benefit all population groups. This could be achieved through encouraging the colleges to build their R&D and innovation capacity, strengthening human capital development and vocational education, building up entrepreneurial skills among students and enhancing links between higher education institutions and industry.

1. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

In the Galilee, innovation-related policies and the role of higher education institutions in innovation are dependent on Israeli national policies. The national policy frameworks for innovation largely operate on an aspatial basis and have a high-tech focus. R&D assets and innovation activities are concentrated in the centre of Israel whereas the periphery – the Galilee and the Negev – is characterised by low skill/low wage economy. The major challenge for Israel in terms of innovation is to break away from the dual economy with significant income gaps and uneven development. Building up an effective regional innovation system and investing in human capital development would help the Galilee to break out of the path dependency.

With its manufacturing base, strong R&D capacity in the research universities in Haifa and its diverse range of colleges and multicultural and multiethnic population, the Galilee offers potential for the development of a more efficient innovation system. The largest city Haifa has the scale of resources and institutions which can form the basis of an innovation system which could also reach out to the Galilee. The core cities of Acre, Carmiel, Kiryat Shmona, Nazareth, Sakhnin, Safed and Tibereas could provide an opportunity for nodes of local innovation systems or clusters. However, to date the regional innovation system remains under-developed.

Establishing new higher education institutions has been one of the main mechanisms by which Israeli policy makers have influenced regional development. New colleges have been expected to improve the skill levels among the local and regional population. With appropriate incentives, the Galilee colleges could also improve the ability of the local business sector to develop new products and processes. Undergraduates and graduates are a primary source of innovation in the organisations they join (*e.g.* Martin and Trudeau, 1998). It is therefore crucial to consider the significance of labour market processes for the technological and organisational dynamism of the Galilee sub-regions and in the northern districts as a whole. Innovation generation also depends on local R&D investment and the capabilities to valorise it, to enhance new enterprise formation and job creation.

In this context, this chapter examines the following three dimensions to assess the effectiveness and coherence of innovation and R&D policies and practices within the Galilee and its sub-regions:

- Is the innovation system well connected and responsive to the diverse industrial structure across the region?

- Do the existing higher education providers support the regional innovation system in an optimal way? Are there gaps in delivery where performance could be improved?
- What lessons can be learnt from international experience?

3.1 RDI policy and funding framework in Israel

Israel is one of the top performers in developing pro-innovation policies and generating innovations, particularly in the ICT sector. It is the leading country in the intensity of business R&D compared to GDP and the third largest supplier of NASDAQ listed companies after the United States and Canada. Israel has a highly developed venture capital market with more than 80 funds that have raised close to USD 10 billion during 1993-2000 (Getz and Segal, 2008): a world record in terms of venture capital backed investment as a percentage of GDP.[1] Israel also ranks high in terms of entrepreneurship outcomes and the angel business investment rate (see Box 3.1.).

However, the national innovation system is characterised by sectoral and geographical imbalances. In contrast to the OECD average of 20%, approximately 80% of Israeli R&D spending is concentrated on the ICT fields. These fields represent 15% of Israeli GDP but only 5% of employment. At the same time 4% of government support to R&D is directed to traditional industry (2004 figures). While the Israeli ICT companies invest around 10% to 18% of their turnover in R&D, the corresponding figures for traditional industries are 0.1% to 3%. Less than 30% of business expenditure in R&D takes place in the periphery, the Galilee and the Negev.

Box 3.1. Israeli framework conditions for R&D and innovation

Israel is among the world leaders in civilian R&D in terms of investment. In 2008, the total investment in R&D was ILS 35.2 billion or4.8% of GDP compared to 2.3% for an average of OECD countries. By comparison, other small countries with a GDP comparable to that of Israel that have attained high economic development levels had lower rates of R&D investment: Ireland (1.43%), Denmark (2.72%) and Finland (3.73%).

Most of Israel's civilian R&D (80.8%) is undertaken by the business sector, with 11.9% concentrated within the higher education system. Investment in civilian R&D grew between 1995 and 2008 at an average annual rate of 12.2%.

Box 3.1. Israeli framework conditions for R&D and innovation (continued)

During that period, the national R&D investment grew both in absolute terms and as a percentage of total GDP in every year except 2003. Most of Israel's R&D (80.8%) is funded privately; only 4.4% of the national R&D investment comes from government sources. By comparison, 64% of R&D is funded by the private sector in OECD countries, on average, and 78% in Japan and 74% in Finland, countries with highly developed innovation-driven economies. .

As of 2005, approximately 47 000 people worked in R&D (exclusive of HEI staff) corresponding to 6.5 per 1 000 population, comparable to Sweden, Finland and Japan. By comparison, the OECD countries have an average of 3 researchers per 1 000 inhabitants. The Israel Defence Forces (IDF) have traditionally been a supplier of highly skilled engineers to the R&D labour force, e.g. in electro-optics, radio-frequency engineering, computer science, information technology, cryptography, applied mathematics, industrial management, human resources, system integration and project management.

Rates of patenting are indicative of favourable framework conditions for research and innovation. In 2008, the US Patent and Trademark Office issued 1 496 patents to Israeli inventors, corresponding to 208 patents per million inhabitants. By comparison, OECD countries patent at a rate of 43 per million inhabitants per year (this does not include patents issued in Europe and Japan to Israeli inventors). Rates of scientific publication are similarly indicative of framework conditions for research and innovation. According to a 2003 report by the Institute of Scientific Information (ISI), Israel is ranked third (after Switzerland and Sweden) with 1 334 publications published per million inhabitants.

Under Israeli law, the intellectual property rights in any invention are held by the inventor's employer. That is, inventions by an employee are treated as "works made for hire." Thus, HEI staff must commercialise their inventions through the HEI technology transfer organisation. Each HEI has its own policy and formula regarding profit sharing. In a typical arrangement, revenues from the commercialisation of a university-developed technology are divided in three equal parts to the inventor, the inventor's research laboratory and to the institution.

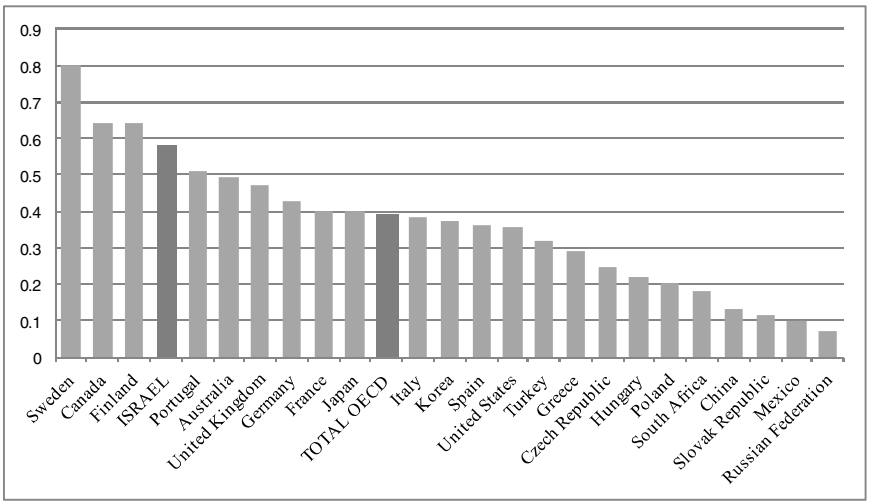
Israel has a thriving venture (risk) capital community. According to the Global Competitiveness Report, Israel is ranked second worldwide (after the United States) for availability of venture capital. In 2008, Israeli high-tech companies raised USD 2.08 billion in venture investments according to the Israel Venture Association.

Source: Council for Higher Education (2009), "The Galilee, Israel: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/2/16/44345452.pdf;* OECD (2009a), Main Science and Technology Indicators, OECD, Paris.

RDI funding

Higher Education R&D (HERD) in Israel represents less than 15% of gross expenditure on R&D (GERD), but is more important than Public Research Organisation R&D. Since the peak in 2003, the proportion has declined. In 2008, in terms of the expenditure on higher education R&D (HERD) as a percentage of GDP, Israel ranked the fourth in comparison with the OECD countries: its expenditure on higher education R&D as a percentage of its GDP reached 0.58% as compared to OECD average of 0.39%. Business and industry funded 7.3% of the Israeli higher education R&D in 2007 compared to the OECD average of 6.5% (see Figures 3.1. and 3.2.).

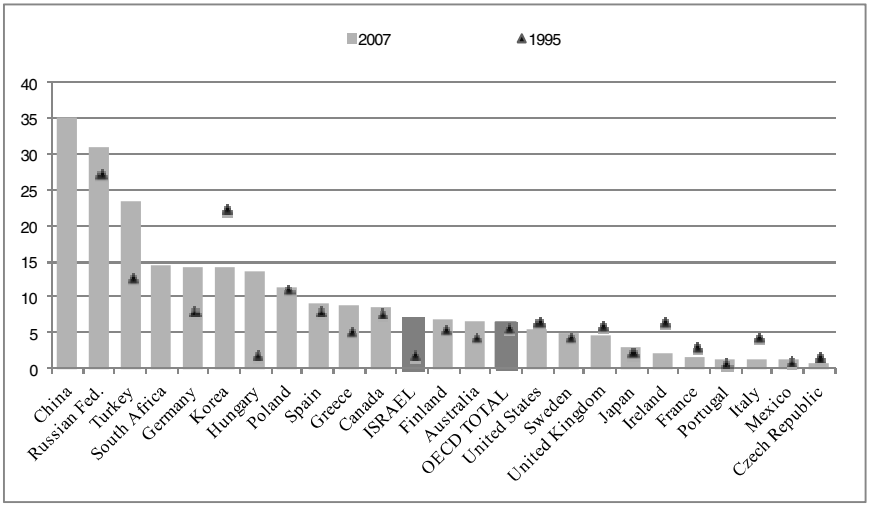
Figure 3.1. HERD as a percentage of GDP in selected countries, 2008[1]



1. Or nearest available year.

Source: OECD (2009a), *Main Science and Technology Indicators*, OECD, Paris.

Figure 3.2 Percentage of HERD financed by industry in selected countries, 1995 and 2007[1]



Note 1: Or nearest available year.

Source: OECD (2009a), Main Science and Technology Indicators, OECD, Paris.

The governmental body responsible for identifying the needs and justifying resource provision for R&D is the Ministry of Science and Technology. The total spending by ministries on science and engineering R&D declined from EUR 29 million in 2003 to EUR 17 million in 2007. The overall budget of the Ministry of Science and Technology was cut nearly by half during this time. Similarly, university research budgets, which are based on the total budget per student, declined by 9% between 1996 and 2005, while many government ministry budgets for R&D (excluding agriculture) have been cut by over 50% during the past ten years.

In order to consolidate academic research and also to reduce the brain drain, attract talent, improve colleges and overall quality and outcomes of education, the 2007 Shochat report recommended the increase of public funding of about EUR 150 million split across five years. The recommendation has been approved, but no decision has been taken for implementation. In 2009 however, the government allocated an additional EUR 46 million to academic R&D (for the government backed Bio-Technology Fund). In spring 2010 the Council for Higher Education announced its plan for higher education reform including considerable investments in research and centres of excellence.

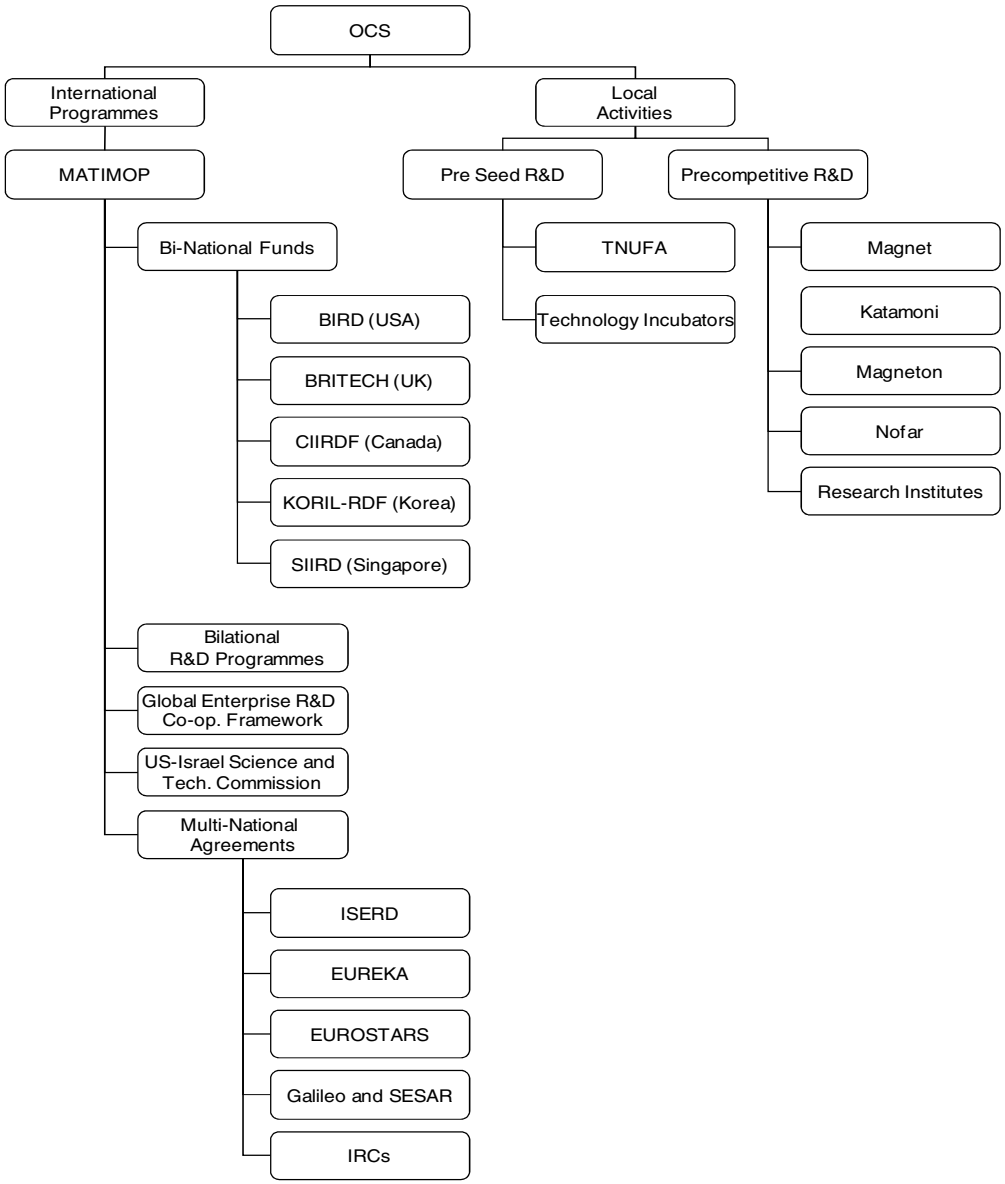
Despite Israel's strong innovation capacity and first mover advantage in advanced R&D in ICTs, there are reasons for concern:

- Public support to academic R&D is insufficient and funds need to be funnelled towards research linked with the long term priorities of the Israeli economy, including water, energy and health.
- The strong emphasis on high-tech fields (15% of Israeli GDP but only 5% of employment), especially ICTs, has favoured the emergence of a dual economy with significant income gaps and uneven development in Israel. There is evidence of brain drain and signs that Israel is losing ground as more and more countries are now focusing on advanced R&D.
- Heavy reliance on market mechanisms has resulted in short-termism. The venture capital industry is focused on profit-making rather than long-term national R&D policy making. Furthermore because of the financial crisis, the funding of venture capital firms and Israeli start-ups and exit markets was projected to contract significantly in 2009 (merger and acquisition activities). The government has now started to step in, but a number of strategic sectors are in urgent need of policy attention.

MOITAL programmes

The main source of competitive funding for firms and academia is the Ministry of Industry, Trade and Labor (MOITAL) and its Office of Chief Scientist (OCS) which have created a wide array of programmes to support innovation, technology transfer, commercialisation and international partnership (see Figure 3.3.). About 60% of total government R&D is managed by the MOITAL (2007 figures) while less than 10% goes through the Ministry of Science. For example, the industrial competitive R&D programmes have an annual budget of USD 230 million (EUR 187 million). Other MOITAL funds are channelled through three main tools: The R&D Fund, the MAGNET programme and the Technology Incubator programme (see Box 3.2.).

Figure 3.3. Office of the Chief Scientist's RDI programmes



Source: Ministry of Industry, Trade and Labour (2010), *www.moital.il*.

Box 3.2. Main MOITAL programmes to support RDI in Israel

The R&D Fund is the largest framework for providing finance for innovation and also one of the main component of the Office of Chief Scientist's (OCS) new policy. The annual budget of USD 250 million is spent on about 800 projects undertaken by 500 companies. It is open to all Israeli registered firms wishing to engage in technology research and development. Proposals are evaluated by experts and approved by the Research Committee. With a few exceptions, the recipients of funds under this framework are obliged to pay royalties to the Tnufa fund if their project succeeds. The form of support is a grant that can reach anywhere between 20% to 50% of the total cost of the R&D project. Grants are structured as a conditional loan: they are subject to 3%-5% of sales. In case of non-commercialisation no repayment is required. In 2006, the fund derived USD 132 million for project royalties and reinvested it in the fund. Part of this fund is used to promote particular R&D areas and utilised for infrastructure purposes. An example is the new biotech fund.

The MAGNET programme sponsors consortia that engage in pre-competitive R&D. There are also other routes of academic industrial cooperation, but they do not receive significant support, except for the unknown level of cooperation between the defence establishment and universities. The MAGNET programme encourages pre-competitive R&D in collaboration between industry and academic sector and usually gets a budget in the range of EUR 37 million.

The Technology Incubator Programme was introduced in the 1990s in response to a wave of immigration from the former Soviet Union. It usually receives about EUR 37 million for funding the public part in establishing new companies in privatised incubators. Technological incubators provide a framework for nascent companies to develop their new ideas and form new business ventures in order to attract private investors. Grants are up to 85% of the approved budgets. There are 24 Technological Incubators in Israel, 15 of them in peripheral areas, with approximately 200 R&D projects being carried out at any given moment. The R&D grant provides 85% of the approved R&D expenditures, with the remainder to be invested by the incubator itself. The grants are soft loans to be repaid in case of commercial success.

Source: Council for Higher Education (2009), "The Galilee, Israel: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, *www.oecd.org/dataoecd/2/16/44345452.pdf.*

The RDI programmes managed by the Ministry of Ministry of Industry, Trade and Labor (MOITAL) have many merits. They cover the different phases of the innovation process: precompetitive R&D, basic and applied

research (NOFAR programme),[2] technology transfer from academia to industry (MAGNETON programme),[3] commercialisation (Technology Incubator programme). A number of these programmes aim at enhancing university/industry relationships and co-operation between higher education institutions and business. The share of public money varies according to the estimated risks of the endeavour. For example, in the case of MAGNET, academy partners are granted 66%, 80% or 90% according to the chosen route (there are four routes: Consortium, Association, MAGNETON, NOFAR) with the balance born by industrial companies.

However, since 70% of business R&D is invested in the centre of Israel, many of the programmes supported by the Ministry of Industry, Trade and Labor (MOITAL) have limited impact on the economy in the periphery. Nonetheless, the Technion, the Proteomics centre, the Israeli Institute for R&D in food technology and Russel Berrie Nanotechnology Institute have received substantial support from MOITAL. The Ministry of Science and Technology has also initiated the establishment of new knowledge centres, some of in the Galilee for example the MIGAL Galilee Technology Centre.

Of relevance to the Galilee are also the tax breaks and grants provided under the law for the Encouragement of Capital Investment (1959). These focus on attracting foreign-funded high-technology or R&D activities to poorer regions based on a map of "National Priority Areas". The generosity of tax concessions and grants depends on the location of facilities, the degree of foreign ownership and the size of investments. The greatest support is provided to Priority A regions of the Galilee, the Jordan Valley, the Negev and Jerusalem (OECD, 2009b). For example, international companies that set up R&D centres in the Galilee will be eligible for government support, on condition that at least 20% of their employees are Arab university graduates. In the 2009-10 budget NIS 900 million (about USD 225 million) was allocated to R&D specifically for the Arab sector (OECD, ECO 2009). Under the matching funds, private companies can receive up to 50% matching funds at favourable terms, but in practice the impact of this programme is reduced due to underfunding (by 95%). Under the tax incentive programme, new business in National Priority Areas pays no corporate tax for up to ten years. According to the evaluation by the Knesset Research and Information Centre, initiatives funded by subsidised capital are less likely to survive than those financed on market terms. Investment in human capital may be more effective over the long term (CHE, 2009).

3.2 The regional picture in the Galilee

The development of the periphery – the Galilee and Negev – is connected to the growth and development plans of the national government. Initially the Israeli borderland served as an expansion of activity connected to settlements, pioneers and cultivating the land. Kibbutzim and Moshavim[4] played an important role in the cultivation and protection of the land. The remoteness of the Galilee, the lack of traffic routes and the poor quality of the infrastructure contributed to the relative slow development of the region.

Following the creation of new cities to attract immigrants and middle income families in the 1970s and 1980s, factories were set up in these urban areas that were dependent on special development funds from the government. The factory work required little training, was labour intensive and paid low salaries. In the Galilee, factories were established for packaging fruits, weaving cloths, sewing and assembling machines. They contributed to the income of urban residents but widened the gaps with central cities.

Today the agricultural settlements in the Galilee are subject to a deceleration in population growth. The Galilee has 25% of the population of Israel (and 17% excluding the Haifa sub-district), but a negative migration balance. Young Jewish population from the development towns relocate to big cities in the Central District where commerce and electronic/high-tech companies are concentrated. Evidence of the deceleration process is also manifest in development plans that emphasise tourism and dependency models between the Galilee and the central areas and coastal region.

Sub-regional innovation strategies

The fragmentation of the regional innovation system of the north is an important challenge for the sustainable development of Israel. At sub-regional level, there are a number of fragmented initiatives. One of the most important developments is the gathering of all municipalities in the Eastern Galilee to work together for the development of the region. The strategy is to focus on a few activities such as life sciences (see Box 3.3.). For this purpose an Innovation and Pre-Seed Fund has been developed and structured cooperation among companies launched. Furthermore disciplinary clusters are being developed in co-operation with the Ministry of Industry, Trade and Labour (MOITAL). The Galilee Development Authority with the presidents of the Galilee colleges are examining ways to implement the idea of the Eastern Galilee Academic-Industrial Students' Centre. A proposal to support the CIII Centre (Centre for Implementing Innovation in Industry) is also under discussion with investors.

Box 3.3. The Regional Innovation Strategy of the Eastern Galilee Region, Israel

The Galilee Regional innovation Strategy called GAL-EDGE (Galilee Economic Diversification and Growth of Enterprises) is a tangible result of a project started in the beginning of 2006 as an initiative of the Galilee Development Authority, MIGAL (Galilee Technology Centre) and MATI (Centre for Promotion Entrepreneurship). It is part of a European Union Regional Innovation System (RIS) project with partners from Germany (Steinbeis Europa Zentrum and Anhalt University) and Estonia (the Institute of Baltic Studies IBS)[1]. The aim is to develop a Plan for Innovation and Entrepreneurship in the Eastern Galilee.

The action plan, agreed under GAL-EDGE aims to: i) build the infrastructure and ideas in the Eastern-Galilee in order to introduce innovation in all sectors and entities, ii) develop a holistic approach to the economic development and R&D enhancement in the Eastern Galilee, iii) provide support for the traditional industry in implementing innovation in their factories, facilitating collaborative partnerships and activities with Europe and the United States, iv) initiate focused development of a high level Academic Research Centre in the Eastern Galilee and v) establish means and ways to involve women more in economic development activities.

The GAL-EDGE group has developed several platforms for regional economic development: the Centre for Implementing Innovation in Industry in the Eastern Galilee (CIII), the Galilee Innovation Fund (GIF), Empower Women in Eastern Galilee (EWG).

1. IBS is an independent non-profit R&D centre that assists in the public policy development in the Baltic Sea region by providing socio-economic analysis.

Source: EU 6th Framework Programme for Research and Technological Development, *http://cordis.europa.eu/fp6*, accessed July 2010

The Galilee: a peripheral old industrial region

The Galilee economy is dominated by traditional sectors such as agriculture, construction and basic manufacturing, which are all under growing pressures in the global knowledge-based economy. High-tech industries have penetrated the Galilee, albeit at a slower pace than in the central region. While the high-tech industries represent only 15% of the Israeli economy, in the Galilee this figure is even lower. Today, the Galilee is slowly developing a blend of low and high tech industries in plastic, machinery, agro-food, chemicals, ICT, optics, life sciences and pharmaceuticals.

The key challenges in peripheral industrial regions are a lack of dynamic clusters, a low level of R&D and innovation due to the predominance of small and medium-sized enterprises (SMEs) in traditional sectors and/or branch plants with limited absorptive capacity and a weak endowment with innovation support institutions. Old industrial regions also have a predominance of mature industries and externally controlled firms. Various forms of "lock-ins" such as excessively strong business and policy networks and narrow orientation of knowledge providers may also hamper regional development. The focus in this type of regions is on incremental and process innovation (Tödtling and Trippl, 2005; see Annex 1.1.).

Different types of regions call for differentiated innovation policy approaches. In peripheral regions, the key challenge is to strengthen and upgrade the regional economy by implementing measures which foster "catching up learning". In particular, policy measures should target small and medium-sized enterprises (SMEs) and their innovation weaknesses as well as improving innovation attitudes. In addition to attracting innovative companies from outside and attempts to embed them in the region, there is also a need to support new firm formation and enhance the innovation capacities of the existing companies. Establishing mobility schemes, for example innovation assistants for SMEs and improving medium level skill provision are also necessary.

In old industrial regions, it is also important to foster the renewal of old sectors and innovation activities in the related industries and to upgrade the knowledge base. Policy should focus on industrial and technological diversification and on the reorganisation of existing firms, networks and institutions as well as formation of new enterprises. Foreign direct investment can bring complementary knowledge into old and new clusters. Higher education institutions should focus on supporting business activities in new industrial and technological fields and build up providers of new skills.

For the Galilee and its sub-regions, strategy that has an emphasis on traditional industry which is engaged in R&D could be a more appropriate way forward. There is a need to encouraging technological, marketing and organisational innovation in traditional industry and the service sector, for example through wider adoption of ICT. A rebalancing of priorities would convey a clear message to the Technion, the University of Haifa and the academic colleges about the needs of the region for skilled human resources and for R&D. In order to formulate and implement policy intervention and initiatives, policy makers should have robust data about the specificities of the regional innovation system in the Galilee and the factors undermining its development potential.

3.3 HEIs responding to regional needs and demands

A central concern of this review is establishing the extent to which higher education institutions respond to the needs of their surrounding region, what mechanisms are in place to facilitate this and to what extent national policies and programmes support this work. The academic R&D assets are concentrated in the Technion and the University of Haifa, where engineering and basic research are being pursued. Their focus is global and national, rather than local impacts. The universities have developed mechanisms for engaging with business and industry through research and technology transfer by having dedicated offices for technology transfer and intellectual property but there are few spillovers to the Galilee and limited links with the Galilee business and industry. A number of science parks and incubators have been established in the region providing a basis for new economic developments but in most cases, links with the higher education institutions are limited.

Regionally oriented R&D is undertaken in colleges, but remains at a modest level due to the lack of critical mass and national regulations that limit the colleges' ability to build capacity in knowledge transfer and industry collaboration. Some colleges have taken steps to build their capacity in this domain, for example the Tel Hai Academic College and ORT Braude. Enterprise support services for students remains at a low level. Colleges see their role as regional change agents but deliver this role mainly through community service.

R&D and technology transfer in universities

Located in Haifa, the Technion is the oldest university in Israel. It has been instrumental in training most of the hi-tech engineers in the country. More than 80% of the chief executive officers of Israel's hi-tech industries listed on the American Stock Exchange are Technion graduates. The Technion comprises 18 academic units covering a broad spectrum of scientific and technological fields which are divided into faculties and departments.[5] It has played a key role in laying the country's infrastructure and establishing its crucial defence and value added industries. During the 2007/08 academic year, the Technion student population was 12 400, of which 70% were registered for a bachelor's degree, 22% for a master's degree and 8% for a doctoral degree.

The University of Haifa has a focus on social and political sciences which make it the regional hub of non-technical higher education. About 16 500 undergraduate and graduate students study in the university a wide variety of topics in social sciences, humanities, law and education. The

University is also home to the Hecht Museum of Archeology and Art, several research centres and institutes, including the Evolution Institute, Center for the Study of the Information Society, Center for the Study of National Security, Tourism Research Center and hosts an IBM research centre on its campus.

Research output

The Technion and the University of Haifa differ in size and in terms of knowledge production. While in the Technion, the research output, as measured by the SCImago Institutions Rankings, is similar to the leading research universities in Israel, the performance of the University of Haifa is more modest due to its focus on non-science fields. Both universities have a scientific impact significantly inferior to that of the Weizman Institute of Science. The Technion and the University of Haifa are both active in national and international co-operation in research (See Table 3.1.).

Table 3.1. Selected Israeli and Galilean universities in the SCImago Institutions Rankings

Rank	University	Output	CxD (Citation per document)	International collaboration	Journal average importance	Field normalised citation score
108	U Tel-Aviv	13 692	6.76	36.96	1.04	1.19
173	Technion	10 691	6.07	38.85	1.01	1.34
174	Hebrew U	10 641	8.51	45.88	1.07	1.35
302	U of Negev	7 261	4.87	39.68	1.01	1.04
353	Weizman	6 179	12.87	51.48	1.09	1.80
623	Bar-Ilan	3 590	5.27	44.65	1.04	1.04
806	U of Haifa	2 667	4.23	38.55	1.02	1.06

Note: Universities are ranked according to their publication output (column 3). CxD is an indicator showing the average scientific impact of an institution's publication output in terms of citations per document. Column 5 shows the institution's output ratio that has been produced in collaboration with foreign institutions. Column 6 shows the journal average importance where an institution output is published. Column 7 reveals the ratio between the average scientific impact of an institution and the world average impact of publications of the same time frame and subject area.

Source: SCImago Research Group (2009), "SCImago Institutions Rankings: World Report", Granada, Spain, *www.scimagoir.com/pdf/sir_2009_world_report.pdf.*

Research at the Technion

The research conducted in the Technion is aimed at generating global, rather than local impacts. However, a number of research activities take advantage of the sites and locations in the Galilee to develop their products. Many faculty members are also involved in consulting for industry, mostly in the northern part of Israel. Regionally relevant research is often taking place within the framework of autonomous research units (see Box 3.4.).

Box 3.4. R&D at the Technion

The Technion spends USD 50 millions in R&D every year, compared to USD 700 million in Stanford and USD 1.2 billion in Massachusetts Institute of Technology. The Technion focuses on niche areas and has a high capacity to change direction when needed. The university sees R&D as a means of diversifying funding and taking advantage of its 600 researchers. Commercialisation of research is a crucial activity. Results are substantial but limited: in 2008 the Technion Research and Development Foundation was directly involved in initiating six new companies in areas such as medical equipment, environment embryonic stem cells, alternative energy and imaging system. In addition, licensing agreements were signed by the faculty. The privatisation of the commercialisation process is not without risks. Israel has many serial entrepreneurs but the success rate of Israeli entrepreneurs is limited.

The Transportation Research Institute of the Technion gains its funding mainly from government ministries and is targeted at solving problems of national significance, such as road safety, traffic control, infrastructure, transportation planning systems, energy and the environment. Part of its work is focussed work on specific needs of the north (e.g. road accidents in bypassed towns; route choice modelling or bituminous mixture for pavements). Several Technion Institutes such as the Israeli Institute of metals, the EMC (Electron Microscopy Centre), the Smoler Family Proteomics Centre, the Experimental Surgery Lab and the Animal Units in the Faculty of Medicine are providing technological services and access to development facilities to research users and customers in the region.

The Galilee and its special conditions would provide universities and colleges an opportunity to engage in challenge-driven innovation. This could focus on key issues, such as water or health and social issues stemming from the multicultural population in the region, and could use the region as a "laboratory" for research and knowledge transfer. So far this opportunity remains underutilised.

Medical School

In order to expand the R&D capabilities in the region, an Academic Science Institute ("a new Weizman institute") will be built near Safed with a medical school and a scientific research centre. This scientific capability aims to provide the Galilee with the much needed advanced technology and help retain and attract talent to the region by offering scientists competitive salaries, funding and infrastructure for research and also widening opportunities for the younger generation. The medical school will have potential to improve human capital and innovation outcomes in the region. However, it will be important that the medical school, which is located in the middle of a Jewish community, will help improve health outcomes of the diverse populations in the Galilee using the region as a laboratory for its teaching, research and service (see Chapter 4 for recommendations).

Technology transfer offices

The largest technology transfer offices in Israel are aggregated under a single portal called the Israel Technology Transfer Organisation (ITTN) (www.ittn.org.il/.) The Israel Technology Transfer Organisation (ITTN) serves as an umbrella organisation of Israeli technology transfer companies. It works to lobby government entities, promote collaboration with counterparts in the world and improve accessibility of the public to new research results and inventions. Partners of the organisation in the Galilee and the northern districts include the Rappaport Research Institute (biomedicine, health care) of the Technion Israel Institute of Technology (IIT), the Carmel Haifa University Economic Corp (agricultural science, bioinformatics, bio-pharma), the Gavish Galilee bio-applications at MIGAL (life science, therapeutics, environmental science) and the T3 (Technion Technology Transfer Office).

In the Northern District, the two universities and some colleges have their own technology transfer offices (TTOs). Neither the universities nor their TTOs have a regional mission. On the contrary, there is an incentive to locate new companies in the centre of the country due to the positive perception factor. For example, the T3 of the Technion has been both active and pro-active in commercialisation. It would benefit from strengthening and being organised at an arms length from the university in order to be managed as a quasi market service reporting to the university but independent from it (see Box 3.5.).

Box 3.5. T3 at the Technion

At the Technion, the T3 technology transfer office employs a team of MBA-trained commercialisation officers who comb research results and attend research seminars to identify commercialisation opportunities. Through its website, the T3 invites industry inquiries for consulting. It also develops technology transfer strategies for faculty innovations with MBA students. The T3 assists in business development (AMITechnion) and helps recruit talent.

With a small staff of three to five people, T3 delivers an impressive agenda. It is involved *i*) in the analysis of new inventions and concepts developed at Technion, *ii*) in licensing technologies developed at the Technion, *iii*) incorporating spin-offs companies based in the Technion, *iv*) participating in the board of Directors of affiliated companies and *v*) negotiating and approving of the Intellectual Property and business aspects of agreements with industry.

In 2009, T3 handled approximately 100 provisional patent filings, twice as many as in 2004/05. T3 maintains an interactive website for researchers, organises events where technologies are regularly presented to preselected audience and invites entrepreneurs to the Technion campus. The T3 staff reviews every research application by the Technion faculty and, if it has a high degree commercial potential, contacts the researcher. There is no obligation for the researcher to get in touch with the T3. T3 has no in-house patent lawyer but uses outside patent services.

The contribution of colleges to the R&D

The number of academic colleges and colleges of education has increased rapidly in recent years. While the colleges in the region often see the development of the Galilee as a key part of their mission, they often have a focus on education and social sciences and are building their research and links with the business and industry from a low base. However, the Tel Hai Academic College and ORT Braude have already established themselves as quasi-unique providers of engineers and technicians of the interior of the region and increasingly also partners for the regional industries (see Box 3.6.).

Box 3.6. R&D in the Tel Hai Academic College and ORT Braude

Tel Hai Academic College, originally founded as a recreation centre for Kibbutz members, was incorporated in 1995 as an independent academic college, granting its own academic degrees, initially BA and BSc degrees and since 2008/09 Masters degrees in humanities, social sciences, sciences and technology. The college has forged strong links with the Upper Galilee Centre for Knowledge (MIGAL), a privately owned research and development centre located in an industrial park in Kiryat Shmoneh. MIGAL offers support services relevant to the region's agricultural base and provides the high tech industry with professional opportunities in the region. It comprises 15 different research groups in agro-sciences, ecology, therapeutics and analytical chemistry and undertakes research activities in highly advanced laboratories. The scientific staff of 140 all live in the region, with more than 30 of them holding PhD degrees. Because most of MIGAL's scientists also work or study at the Tel Hai Academic College, the centre is able to compete for academic research grants and start-up companies in Kiryat Shmoneh. Tel Hai is also home to the International Community Stress Prevention Centre (CSPC) which promotes stress alleviation and crisis management at organisational, individual, community and national levels worldwide (see Chapter 4).

ORT Braude, based in the Jewish city of Carmiel, is the only engineering college in the Galilee. It serves as an academic technological and scientific centre for the whole Galilee: 97% of students come from the north of Israel. ORT Braude undertakes some R&D and has established an R&D company that holds all the intellectual property rights. The college's strategy is to accept intellectual property if it can be accompanied by publications. ORT Braude's R&D has resulted in "products" such as robots and video-products. It has also been involved with innovation in the field of dentistry equipment. It has applied for public funds in collaboration with a company involved in this sector.

Science Parks and incubators in the Galilee

A number of science parks have been established in Galilee, but their links to the Galilee colleges remain at a low level, with the notable exception of the Tel Hai Academic College and ORT Braude. The science parks have been funded by public initiatives but also through private investment (see Box 3.7.). In Carmiel for example, the park is fully owned by the Carmiel Economic Company Limited, an offshoot of the city of Carmiel. Like the entire Galilee, the city of Carmiel benefits from the National Priority Areas Zone A regulations; small R&D centres or large enterprises locating in the Zone A are entitled to employment grants – subject to certain conditions – calculated as a percentage of employee salary cost for each new employee for a period of four years. A number of high

tech labs such as Elbit are located in the Carmiel park. The city has also attracted colleges that are now networked with companies in the park.

One step further to attract R&D investment is through the development of incubation infrastructure. In Israel the distribution of incubators' projects is focussed on medical devices (41% of total number of projects), biotechnology (18%), software (12%), communications (10%), environment (8%) and electronics (6%). Approximately 200 projects in various stages of R&D are being hosted by the technological incubators at any given time. By the end of 2006, more than 1 000 projects had matured and left the incubators. Since 1991, the Ministry of Industry, Trade and Labour (MOITAL), Office of Chief Scientist (OCS) has invested about USD 30 million a year to support 24 technology incubators all over Israel and hundreds of projects operating within them. The business sector began to understand the hidden potential of these investments only in the late 1990s. In 2006 the private investment was four times greater that invested by the OCS (US-Israel Science and Technology Foundation, 2008).

In the Galilee several incubators have been created in, or close to the parks such as Misgav (Carmiel) or linked with higher education institutions such T3 in the Technion or Metav in the Tel Hai Academic College. Other incubators include NGT in Nazareth, Yokneam in Naïot, Yoznok Haemek in the Jezreel Valley and Kinarot in the Jordan Valley. These technological incubators are government supported organisations that give fledging entrepreneurs an opportunity to develop their innovative technological ideas and set up new commercial businesses.

Box 3.7. Science Parks in the Galilee

The Tefen Industrial Park: the first industrial park in the Galilee was established in 1985 by the industrialist Stef Wertheimer in the Western Galilee. The success of the Tefen Industrial Park led to the development of three other industrial parks at Tel Hai, Dalton and Lavon. A five-minute drive from the exclusive residential centre of Kfar Vradim, the Tefen Industrial Park is at the heart of a centre of industrial development that includes the multinational industrial company Iscar. Located in a 30-acre (12 ha) landscaped park, the Industrial Park houses industrial export companies, four museums, a sculpture garden, a visitors centre and a school. The Tefen Industrial Park lies at the heart of the Tefen Industrial Zone, where a host of export industries employ more than 3 000 employees. The 20 industrial companies resident in the industrial park represent a range of industries and include companies with worldwide markets such as Kolsint and Stepac L.A and the key development centre for the global market leader SanDisk (flash memory). SanDisk works in cooperation with ORT Braude, whereby fourth year students gain practical experience at the company and students are directly recruited.

Box 3.7. Science Parks in the Galilee (continued)

The Tel Hai Industrial Park was established in 1992 near the town of Kiryat Shmona. The Park is located alongside the Tel Hai Academic College in one of the highest priority industrial development areas for government support. The park has attracted advanced industry seeking the benefits and lower-costs of outlying regions. Residents in the park are ten innovative companies employing some 500 workers. The industrial park has succeeded in attracting sophisticated manufacturing and software companies from the centre of the country. The lower costs and higher worker productivity in the region have enabled for example the global defence electronics company Elbit to relocate the bulk of its manufacturing operations of its communications equipment for the security services to the industrial park. BMC Software, one of the largest software companies in the world, has established one of two development centres in Israel at Tel Hai employing over 120 employees. Other fast-growth companies include the bio-tech companies Etrog and Tagra. BMC Software has worked closely for a number of years with the Tel Hai Academic College influencing the programming studies at the college, providing students with work experience and directly recruiting students into their workforce. Similar efforts have been made by Etrog in the training and recruitment of students of biotechnology studies.

The Dalton Industrial Park was opened in 2006 on the Dalton plateau in the Lower Galilee. Plans provide for the construction of eight industrial buildings in a park area of some 25 acres (10 ha) and include the development of educational and cultural programmes. To date, three industrial buildings have been completed. The Dalton Industrial Park houses four companies employing close to 100 employees. Companies include the cutting tools manufacturer MasteRound, Galeatea, a manufacturer of equipment for the diamond industry, and two start up companies developing equipment for the purification of water and metals.

The Lavon Industrial Park was established in 1998 just south of Tefen, overlooking the city of Carmiel. The park is the implementation of an integrative model that locates a quality residential community alongside a park of advanced industry and an educational centre, all within a short distance of each other. The "Zur Lavon" educational centre, located in the park, provides a varied programme of training courses for industry. Much in demand is the industrial entrepreneurship course for Arab and Jewish populations, a collaborative initiative between the Industrial Parks and the Executive Education Centre of the Tel Aviv University. In 2006 the Zur Lavon Industrial High School opened alongside the Lavon Industrial Park. The school provides a framework of small group and individual tutoring within which pupils graduating grades 9 and 10 can study for technological industrial qualifications, academic qualifications and receive professional work experience. The high-quality residential area and industrial centre serve to attract young professionals and their families from Israel's central urban areas to the Galilee.

Enterprising support

The Galilee suffers from brain drain, which suggests that finding ways to increase entrepreneurship could be an effective strategy for job creation. While Israel is ranked high on entrepreneurship (ahead of most OECD countries according to the IMD World Competitiveness yearbook), data conceal wide disparities between the different parts of the country. In the periphery and notably in the Galilee, business creation is at a relatively low level. The region is less penetrated by the high tech culture that is thriving on the coast and in the centre of the country. Human capital development is at a modest level: while the Galilee has nearly 17% of the population of Israel, it educated only 8% of undergraduates in the country.

The Galilee colleges are in early stages of promoting entrepreneurship among their students and staff. For example, the Tel Hai Academic College and ORT Braude have an emphasis on teaching engineering and sciences rather than management and entrepreneurship. Among Arab population, the management capacity is low and acts as a constraint for both public and private sector development. The Nazareth Academic Institution (NGAI, former Mar Elias College) aims to become a multi-ethnic engine for economic and social development for the Galilee and also focus on management training, but is currently a non-budget institution with a limited teaching portfolio. Technical schools generate small business spinouts for example in hard metal manufacturing, manufacturing for naval industry.

The colleges provide students with little practical experience of new venture formation. There is also limited evidence of mainstreaming entrepreneurial experience in curriculum. Where entrepreneurship teaching exists it is largely conventionally taught, rather than embedded in the curricula (see Box 3.8.). International experience shows that the best support for graduate entrepreneurship often comes from teaching programmes where students work in teams to form real companies mentored by entrepreneurs. Such programmes can run at undergraduate and graduate levels and be targeted at students from across the sciences, engineering, business and arts disciplines. None of the universities or colleges highlighted the existence of this type of programmes.

Box 3.8. Enterprising support in the Galilee colleges

The Tel Hai Academic College has a main focus on the Triangle Development Model in order to leverage synergies between the college, MIGAL R&D centre and Meytav (the incubator) and to create a focal point at the new campus for excellence and innovation. Entrepreneurship teaching is indirect and not yet formalised. Some steps have been taken to boost graduate entrepreneurship: the department of economic and management sponsored in 2009 a conference on regional entrepreneurship in co-operation with the centre of entrepreneurship promotion in Galilee (MATI). The MATI centres, usually located in larger cities, act as a one-stop-shop for start up entrepreneurs by providing a package of services including subsidized counseling, training and loans with reduced interest rates for the benefit of the new business owner.

ORT Braude has a focus on engineering disciplines and promotion of practical skills through interactions with industry and active teaching and learning. The college offers a conventionally taught entrepreneurship programme as an elective, but this demandingprogramme has not attracted students that often combine work and study. ORT Braude should consider embedding entrepreneurial skills in the curriculum.

The Western Galilee College in Akko has taken steps to establish a school of management. At the time of the OECD review, it was unclear to what extent the focus of the management school would be on business entrepreneurship. This new school could provide an excellent opportunity to build a broad focus on entrepreneurship.

The Nazareth Academic Institution (NAI, former Mar Elias College) aims to become an engine for economic and social development for the Galilee. Based on a market research on the needs of the Arab community in Israel, the institution identified management and entrepreneurship as one of its focus areas. Management capacity among the Arab population is low: only 1-2% of managerial positions are occupied by Arabs, who constitute 20% of the population in Israel. 95% of Arab entrepreneurs start activities without any formal management skills. Bankruptcies are at a high level. Furthermore, many Arab municipalities lack tools to manage and create a conducive environment for business development (see also Chapter 2).

International examples in enterprise support: Finland, Germany and US

Despite projects, study programmes and initiatives, enterprising support and entrepreneurship education are in an early phase of development reflected in the limited breadth and refinement of activities and a small proportion of students benefiting from them. Higher education institutions would benefit from more articulated entrepreneurship programmes,

embedding entrepreneurial skills in the curricula and closer collaboration with each other. There is evidence of students' interest in staying in the region and self employment opportunities. Entrepreneurship courses were however perceived either to be too demanding or non-existent. The Team Academy in Finland (see Box 3.9.) is an example that could be emulated throughout the academic colleges. This example is particularly suitable to the Galilee colleges as it combines entrepreneurship training, service to the local SME community and new innovative learning methods.

Box 3.9. The Team Academy in Finland

Established in 1993, the Team Academy is a special unit for entrepreneurship and leadership at the Jyväskylä University of Applied Sciences in Central Finland. It aims to *i)* increase student and graduate enterprise formation; *ii)* enhance enterprising attitude; and *iii)* help small and medium-sized enterprises (SMEs) and other companies to access university expertise in marketing, management and entrepreneurship. At the same time it acts as a "learning laboratory", where new learning methods and models for business life are developed (*e.g.* effective teams, learning organisations and modern marketing). Team Academy offers a special three and a half year educational stream. Each student takes intensive training in leadership and marketing as a member of a team through real life project work. The Team Academy is open to business students, but based on its experiences, a set of courses promoting entrepreneurship have been developed to all students, under the title "the path for nascent entrepreneur".

During the last ten years, the Team Academy has served the needs of the business life through 1 750 projects. It has provided entrepreneurial education for more than 500 BBA graduates and given birth to 17 companies in addition to the cooperatives that operate during the study time. About 25% of the Team Academy graduates are active entrepreneurs especially in the service sector and consultancy. The Team Academy has received a number of national awards for its innovative learning methods and its proven track record in the enhancement of entrepreneurship.

Another example of university entrepreneurship programme is the McGuire Center for Entrepreneurship at University of Arizona which has a 25-year track record of entrepreneurship education. This centre provides a example of that could help transforming education provision throughout the higher education institutions and the region. McGuire Center is spreading entrepreneurship among school children across the region and collaborates with Southern Arizona emerging entrepreneurs. It is also collaborating with the university's office of technology transfer to identify commercially viable

faculty inventions and building entrepreneurial skills among the academic staff of the faculty (see Box 3.10.).

Box 3.10. The McGuire Center for Entrepreneurship

The McGuire Center for Entrepreneurship (established 1984) at the University of Arizona is ranked as the fourth best entrepreneurship programme among public universities in the United States according to US News. In 25 years, more than 1 200 graduates have launched hundreds of ventures, often based on the plan they conceived in the programme. McGuire teaches entrepreneurship to early-career business people, helps transfer research into the practice by identifying and transferring technology and innovations to the market place and serves on- and off-campus organisations through technical assistance on entrepreneurship activities.

The McGuire Center offers a limited-enrolment undergraduate degree stream, and entrepreneurship-focused MBA and a one-year Graduate Associates in Entrepreneurship. The year-long academic programme is available to students from all university disciplines and is completed during the regular course of study. McGuire has championed a number of innovations in embedding entrepreneurship into curriculum and providing interdisciplinary experiential learning opportunities. McGuire produces about seven to ten start-up businesses annually from student collaborations. These start-ups have a significant economic impact, particularly in terms of employment.

McGuire collaborates with the university's office of technology transfer in many different ways: it identifies commercially viable research in university and funnels technological innovators to entrepreneurship programmes; it offers workshops for university faculty to provide tools for assessing potential market and social value for their innovations; it hosts workshops for students and faculty to explore the implications of technologies available for commercialisations; it consults with McGuire venture teams on topics such as development, proof of concept and prototype creation via its on-staff technology mentors; and it helps to identify opportunities for collaboration in the university setting and beyond via shared McGuire/OTT knowledge transfer liaison.

Source: Southern Arizona's Regional Steering Committee (2009), "The Southern Arizona Region, United States: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE, *www.oecd.org/dataoecd/19/11/44269085.pdf.*

In supporting graduate enterprise the Galilee higher education institutions would also benefit from closer collaboration and sharing good practice among themselves and the key stakeholders. Examples of higher education institutions collaborating with each other and the key stakeholders

to boost graduate employment can be found in Brandenburg, Germany where all nine higher education institutions have established a joint resource centre, the Brandenburger Institute in Entrepreneurship and SMEs (BIEM) with the regional development agency in order to pool resources and gain critical mass. BIEM's activities include entrepreneurship education, start-up support, entrepreneurship research and networking with business support organisations and other universities (OECD 2009c; BIEM-Brandenburg (2010).

3.4 Challenges and concerns

Responding to business research and innovation demand in universities

The national policy and the research universities in the northern district emphasise excellence and global impact over regional considerations. Incentives for academic promotion are primarily based on publications and participation in the international peer community. Still, some research projects explore regional issues as research topics, e.g. in the social sciences, where the Galilee's diverse demographic landscape makes it a unique social laboratory, as well as in urban planning, water management, transportation and other engineering disciplines. However, these activities are not the result of higher education policy rather resulting from *ad hoc* initiatives driven by individual researchers or departments.

There are further three key reasons for the limited links between the Technion and the Galilee. First, the Technion research covers a large spectrum of engineering fields and does not target specifically the industry segments and specialisations in the Galilee. The second and more important reason is related to the business structure in the Galilee: small business rarely performs R&D activity in the Galilee and larger firms are branch plants or assembly industries. They are more focussed on manufacturing, their research and development is process-oriented and their research labs located in the centre of Israel or on the coastal regions. Third, there appears to be a weak inclination of companies to seek advice from the Technion: companies in the Galilee do not go to the Technion and the Technion does not go to see them, even when the company staff are graduates of the Technion. There is no powerhouse playing field where both parties could meet. A specific programme similar to the Japanese METI Industrial Cluster Programme that aims to enhance university cooperation with industries and clusters could help bridge the gap.[6]

The limited capacity of the colleges to meet the needs of SMEs

Skills development for industry

There was limited evidence of higher education institutions filling the needs for higher skilled personnel in the manufacturing enterprises in the Galilee. Technical schools, however, have a stronger emphasis on industry links and entrepreneurship. For example, Wertheimer's technical schools have been operating for several decades providing skills for non high tech industries. They emphasise a combination of practical and theoretical studies and training soft skills to facilitate social mobility. Technical schools are based on a multi-stakeholder collaboration: while a municipality donates an empty building for the training purposes, Wertheimer funds the equipment, and the daily operational budget is covered by the government or in some cases by industry, municipalities, Israeli Defence Force or Wertheimer himself. Schools generate small business spinouts for example in hard metal manufacturing and manufacturing for naval industry[7] (see also Chapter 2)

The Galilee is a net exporter of educated workforce. Knowledge transfer programmes based on people mobility between higher education institutions and industry in the region could help improve talent retention. An important channel of knowledge exchange is the internship system employed by several colleges.[8] Internships provide an entry point into the workforce when students continue working for the industry partner after the internship (see also Chapter 2). For example, the Best to Industries Programme at the Computer Sciences Department of the Tel Hai Academic College provides an example of systematic collaboration with the local high-tech industry that improves students' learning outcomes, strengthens the links between higher education and industry and helps attract and build high tech industry to the northern-most part of the country (see Chapter 2 Box 2.5).

To improve graduate retention and quality and attractiveness of local jobs, the establishments of specific programmes to link the students, graduates and university post-graduates with the local industry could be considered. The Knowledge Transfer Partnership Scheme in the United Kingdom has been running successfully (previously as Teaching Company Schemes) since the 1970s. Knowledge Transfer Partnerships improve the competitiveness of the companies through introduction of some form of innovation or new technology, while an additional benefit is usually the recruitment of the postgraduate associate; around 75% of associates in projects lasting from one to three years are offered jobs in the company (see Box 3.11.).

Box 3.11. UK Knowledge Transfer Partnerships

The Knowledge Transfer Partnership programme in the United Kingdom was launched in the 1970s as the Teaching Company Scheme, and was designed specifically to foster close collaborative partnerships between universities and companies with an explicit focus on the transfer of knowledge into company practice rather than supporting research in universities. The main focus is on improving the competitiveness of the industrial partner, through the work of post-graduate "associate" working in the company with supervision from the academic partner.

The scheme is partly funded by the companies involved and partly by a public organisation such as the Technology Strategy Board or a Research Council, with more advantageous terms available for small and medium-sized enterprises (SMEs). Typically an SME would pay around GBP 20 000 per year for involvement. The projects are usually 2 years in duration and the postgraduate associate is employed to work in the company during this period on a pre-defined project. The associate is paid a salary and in some cases is registered for a higher degree (usually devoting 10% of their working time to professional development), and forms the linkage between the company and the supervising academic in a university or research organisation. The academic partner is compensated for some of the time of the supervisor and for university overheads (KTP, 2010).

The primary outcome of the project is usually the implementation of some form of innovation or technology in the company, although an additional benefit is usually the recruitment of the associate and around 75% of associates in projects lasting 1-3 years are offered jobs in the company. The 2008/09 annual report for the scheme reported 977 active projects and estimated the benefits to UK business would be over 6 500 staff trained, 1 119 new jobs created and an increase in pre-tax profits of GBP 126 million (TSB, 2009).

Source: OECD (2010), *Reviews of Higher Education in Regional and City Development, The State of Victoria, Australia*, OECD, Paris.

The development of the Galilee would benefit from the US experience where community colleges play an important role in strengthening the local capabilities for innovation. Much of the community colleges' workforce training is state-sponsored and charge free to employees. Approaches vary from a one-stop-shop such as the Georgia Quick Start programme and to a centralised service of by 58 community colleges in Northern Carolina (see Box 3.12.).

Box 3.12. Free, employer specific training in the US

The Georgia Quick Start programme. The Georgia Quick Start programme offers a number of innovations in the process of training for job specific needs in new technology. An arm of the 33-campus Technical College System of Georgia (Georgia does not use the term "community college"), it is located in close proximity to the State Department of Economic Development. The programme is free for new employers but also for existing companies that are increasing employment and/or making substantial upgrades in plant and equipment. Quick Start has the centralised staff, resources and experiences to quickly develop and deploy customised training anywhere in the state. The basic programme, carrying Georgia's commitment to provide free training for new and growing businesses, dates back to 1967. The state modified it in the 1990s after finding that offshore competitors were undermining the state's traditional cost competitiveness. By early 2010 it has conducted almost 6 000 projects involving 780 000 trainees. The basic budge is USD 22 million a year, at times that is supplemented with extra funds allocated as part of the incentive package for a major plant.

When qualifying employers want training or retraining for their workers, Quick Start assigns teams of analysts to dig into the process of workflow in question. Then it develops a customised training programme, complete with handbooks, presentations, videos, online lessons or other training material produced by its own specialists. For all new projects, Quick Start will pre-screen potential hires for the company, using the technology it has acquired of the production system to match candidates with the skills required. The training is then deployed at the company location, at one or more of the technical colleges or at any five Quick Start facilities located around the state.

North Carolina Community College Collaboration. In North Carolina the provision of free, employer specific workforce training began in community colleges in 1958. Currently, North Carolina Legislature provides USD 12.4 million a year for its customised training programme. Each of North Carolina's 58 community colleges can access the funds to design and deliver training tailored to the specific needs of a new or existing company with no cost to the company. North Carolina is looking to help businesses that grow its economy. The company must demonstrate that it is making an appreciable capital investment, deploying new technology, creating new jobs or expanding and existing workforce or enhancing productivity and profitability. The training programme is developed at the local college in concert with the employer. Colleges design the programmes and their share their experiences. Each community college has an employee assigned to reach out to local business and industry, identify their training needs and find ways to meet them. The cost of this post is shared by the state and the local college. The cost to the state averages about USD 500 per employee. For the five years leading up to the current recession, North Carolina community colleges averaged training 26 277 employees a year at an average of 774 companies a year. The recession cut that to 19 861 employees at 671 companies in 2008/09. For example, Talecris Biotherapeutics has a longstanding training relationship with Johnston Community College. Every year the facility's production is put on hold for three weeks for maintenance and upgrades while the entire 550 person manufacturing workforce goes to training classes operated by the college.

Source : Shaffer, D.F. and D. J. Wright (2010), A New Paradigm for Economic Development, in Higher education, The Nelson A Rockefeller Institute of Government, New York.

Limitations in offer

The college sector should be well placed to support the small and medium-sized enterprises (SMEs) in particular in managing the upgrading of their technologies, where the emphasis lies in the use of existing, established technologies and techniques, rather than in advanced technology development. There were some interesting projects being undertaken by the Tel Hai Academic College and ORT Braude to support local industry, connecting wider business improvement with training provision. This kind of sectoral and locally focused comprehensive support for SMEs is in need of development across the Galilee a whole.

From the industry perspective, an appropriate formula is a semi-academic institution that provides skills and practical R&D for industry. For example, in addition to the MIGAL research centre, the Tel Hai faculty work on biotech issues of relevance to the local agriculture. In most cases, however, firms have narrow ties with the Galilee colleges, for example in the case of ORT Braude on meeting industry demand for engineers and technicians. These colleges focus on providing undergraduate education and may also have a narrow portfolio of courses, mainly in social sciences and education. Therefore they have a limited capacity for industrial collaboration.

Small and medium-sized enterprises (SMEs) face a range of barriers in accessing the knowledge resources of the higher education institutions which discourages regional university/SME collaboration. The first barrier an SME faces in contacting a higher education institution in search of help is the lack of knowledge of whom to contact. Some regions have established a single point of contact for all higher education institutions in the region (for example Knowledge House in the North East of England). There is currently no collaborative mechanism to pool the expertise of universities and colleges in the Galilee.

Limitations in the demand

In the Galilee, small and medium-sized enterprises especially in the traditional industries are devoting limited funds to R&D spending and often have not embarked in innovative activities. Creating a demand pull and channelling funds to enhance business-college linkage and applied research projects would contribute to strengthening the Galilean innovation system. In the Netherlands, the RAAK procedure has improved the regional innovation systems (see Box 3.13.).

Box 3.13. RAAK Regulation in the Netherlands

The proportion of innovative enterprises that co-operate with higher education institutions and with research institutes is relatively low in the Netherlands as compared to other EU15 countries. Moreover, the universities of applied sciences are not eligible for basic government research funding. To overcome this bottleneck, a number of government incentives have been launched to support knowledge transfer.

The Department of Education launched the Regional Action and Attention for Knowledge Innovation (RAAK) to strengthen the relationship between the universities of applied sciences, regional training centres and small and medium-sized enterprises (recently also the public sector) in order to facilitate knowledge transfer. Approximately EUR 6-8 million is available on an annual basis. The recent evaluation of RAAK 2005-08 shows that RAAK has been well implemented by all participants. It has contributed to the transformation of universities of applied sciences from teaching institutes to knowledge institutes. According to the study, universities of applied sciences have improved their visibility and capacity in the regional knowledge and innovation network significantly.

Source: Stichting Innovatie Alliantie (2009), *www.innovatie-alliantie.nl/?id=223&*t accessed 29 April 2009; OECD (2008a), "OECD Reviews of Tertiary Education: Netherlands," *www.oecd.org/document/47/0,3343,en_2649_39263238_41570095_1_1_1_37455,00.html*, accessed 09 April2009; Weert, E. de and P. Boezerooy (2007), "Higher Education in the Netherlands," International Higher Education Monitor Country Report, Center for Higher Education Policy Studies (CHEPS).

Incentives and disincentives to regional engagement

Although colleges are committed to a regional mission, regional impact is not part of the incentive system and there are *de facto* disincentives to regional activity (see Chapter 4). The Israeli binary system of higher education is based on strong demarcation between research-intensive universities and colleges which are intended to focus on bachelor's level education. Currently the national regulations by the Council of Higher Education limit the colleges' ability to build critical mass and engage in applied R&D and innovation activities: teachers at the academic colleges and colleges of education teach longer hours than university staff. In practice, however, the teaching staff at colleges performs independent research and research activity, and excellence is an important factor in academic career progress. Colleges can enter into agreements with universities concerning the use of their facilities and infrastructure, but do

not receive direct support for R&D infrastructure. In other words colleges have to rely on their own funds to embark in significant research projects.

Relaxing the current restrictions on colleges regarding applied R&D would benefit regional development in the Galilee. In many countries universities of applied sciences (for example in Germany, Finland and the Netherlands) are playing an important role in the regional innovation systems by providing applied R&D services to the industry, particularly small and medium-sized enterprises. This activity is supported by the government through various funding arrangements.

Conclusions and recommendations

The Galilee is a peripheral region with a lack of dynamic clusters, a low level of applied R&D and innovation due to the predominance small and medium-sized enterprises (SMEs) in traditional sectors and branch plants whose headquarters are outside of the region. The innovation support institutions have a limited presence in the region and a lack of networking and idea circulation between different population groups. R&D assets are concentrated on the research-intensive universities in Haifa and generate limited spillovers in the Galilee. Various forms of "lock-ins" are present in the region ranging from narrow orientation of knowledge providers, to a "low wage equilibrium" including low job creation. Population groups live and learn in separate communities limiting the innovation potential of a multi-cultural, multi-ethnic population.

The fragmentation of the regional innovation system of the north is a challenge for the sustainable development of Israel. Contribution of higher education institutions to R&D remains limited, except in the case of the Technion. The Technion would have the capacity to guide industry and innovation in the Galilee, but plays this role to a very limited extent. The contribution of the Galilee colleges to the regional innovation is not significant due to national regulations that limit their capacity in this domain. New business creation from the colleges is also at a low level. None of the academic colleges have embraced this task as part of their mission, i.e. embedded in their daily practical operations. The full potential for innovation has not been met because of low level of human capital development and brain drain (see Chapter 2). Collaboration between academic colleges remains limited. The lack of a recognised regional mission for higher education institutions which would include clear goals and a significant role for academic researchers is a weakness in the present higher education and innovation system. There is a need for more focussed policies and incentives that could drive stronger regional engagement by higher education institutions and academic researchers.

Whilst efforts have been made by the national government and private investors to support the research infrastructure and attract talent from the centre to the Galilee, the connection with indigenous human capital development, innovation and business formation is not yet adequately developed. There remain a number of challenges which the region faces and where higher education institutions could offer more support to the development of businesses and public sector innovation, particularly in health and environmental sustainability. These challenges include:

- Limited human capital and a limited sense of a regional innovation system.
- Low absorptive capacity and weak innovation culture in small and medium-sized enterprises in traditional industries and a lack of tradition of collaboration.
- Fragmented support from higher education institutions for enterprise at early stages of development.

The Arab population continues to face structural obstacles and constraints in entering higher education and labour market. The gaps in higher education attainment are more noticeable in the Galilee where the share of Arab population is closer to 50% against 20% in the country as a whole. The educational disparities generate income inequalities and result in a waste of talent for the economy. For example, the management capacity among Arab population is at a low level and acts as a constraint in both public and private sector development.

There is limited evidence of the development of an innovation system in the form of a regional system in the Galilee. While there is investment from the national government in the research components of the system, this focuses on research universities in Haifa. The wide array of RDI programmes does not fully benefit the Galilee. There are limited spillovers from the centre to the Galilee and an absence of an underlying culture of collaboration. The academic colleges do not present themselves as a coherent system, and there was no attempt to set out the collective needs of the region in terms of innovation infrastructure or for the academic colleges or universities to coordinate their actions in meeting such needs.

Within the region as a whole there is a low absorptive capacity and nascent innovation culture in the small and medium-sized enterprises (SMEs), and a lack of tradition of collaboration between the SMEs. One consequence of this is a poor articulation of demand for services from the higher education institutions for the SME sector. Support for innovation remains limited and fragmented within and among higher education institutions. There is no effective guidance system for business to identify

where best to source support for innovation. While the main emphasis is on science and technology-driven innovation, Stef Wertheimer's technical colleges present a good practice example on incremental demand-led innovation. There seems to be few attempts to connect up technologically-oriented centres with business faculties and with other disciplines to provide support for service and industry.

There is a lack of information and data on innovation performance within the private sector and also within higher education institutions. There has not been a detailed investigation into the nature of innovation within firms, the barriers and problems and the experiences of collaboration with higher education institutions. Policy seems to be developed in the absence of evidence about the region's needs.

Entrepreneurship attitudes remain underdeveloped. While there was evidence of students' willingness to stay in the region and interest in entrepreneurship, there was limited evidence of enterprise support being mainstreamed in degree programmes and through supporting infrastructures. Where such support existed, it was fragmented with no real collaboration across higher education institutions in the region.

The OECD review team recommends that the following measures are taken to promote regional innovation:

- Special regional innovation policy instrument should be created, for example in the form of a regional innovation fund. The Higher Education Innovation Fund (HEIF) model in the UK could serve as a source of inspiration (see Chapter 5). A strategy with emphasis on endogenous development of traditional industry that is engaged in R&D would better serve the region. Higher education institutions should be encouraged to draw upon business schools, humanities and social sciences in providing assistance to business.

- Considerable efforts should be made to develop general competencies among the population to help adjustments to rapid changes in the labour market and to facilitate lifelong learning. Systematic joint efforts should be made by the authorities, educational institutions and key stakeholders to raise the levels of education attainment, particularly among the Arab population. Authorities should provide adequate support for the existing Arab colleges and allow colleges of education to diversify their provision according to the needs of the local industry. Investing on Arab colleges would generate mid- to long-term benefits for the regional economy in the form of tax revenues and job creation. Technical and vocational education should be strengthened for the benefit of the regional industry and underrepresented groups.

- To improve productivity and innovation in traditional industry and services and to improve graduate retention, specific mobility programmes should be established to link the students, graduates, post-graduates and academic staff with the local business and industry in a more systematic way. Models for linking postgraduate students with the local industry include the Knowledge Transfer Partnership Scheme (see Box 3.11.) in the United Kingdom that has improved the competitiveness of the companies through introduction of some form of innovation or new technology and around 75% of postgraduate associates are offered jobs in the companies.

- The universities in Haifa should play a more active role in helping the Galilee to build a more robust economy based on knowledge and innovation. The universities and colleges should focus their concerted efforts on challenge-driven innovation on the key issues in the region, such as water, health and social challenges stemming from the multicultural population and use the region as a "laboratory" for research and knowledge transfer. Job creation should be seen as the focus of innovation activities in the Galilee. Technology Transfer Offices should be strengthened and organised at an arms length from the university in order to be managed as a quasi market service reporting to the university but independent from it. Incentives for higher education institutions should be strengthened to increase their capacity to act as technology transfer "agents" to bring non-local knowledge to the region and to create community partnerships.

- Colleges should be allowed to build their applied R&D and innovation capacities for the benefit of the regional development in the Galilee. Incentives for higher education institutions and their staff to engage in local and regional development should be developed. The government should seek to encourage greater collaboration between higher education institutions through joint investments in R&D facilities and incentive programmes. The higher education institutions should also develop a practical engagement with business and a collaborative way of referring enquiries from businesses and industry with the help of virtual and face-to-face collaboration. Authorities should channel funds to enhance SME/business/college linkage and related applied research projects that would contribute to strengthen the Galilean innovation system. The RAAK procedure in Netherland is an example to consider (see Box 3.13.).

- The higher education institutions should support entrepreneurship throughout the curriculum and build comprehensive support programmes encompassing entrepreneurship training, practical

experience of creating new businesses for groups of students and incubation facilities together with seed funds for new graduate ventures. Finnish, German and US initiatives are examples that could be emulated.

Notes

1. In addition to the Yozma programme (established in the 1990s), a number of venture capital funds have been successfully. Initially they were funded by the government but also included local and foreign private investors.
2. NOFAR is a purely academic research programme. Its goal is for research to attain a milestone that will enable an industrial company to access sufficient information for investing in R&D. Budget granted is up to USD 100 000.
3. The Magneton track provides for dual cooperation between academic groups and industrial company. The aim is to transfer technologies resulting from academic research. Grants are up to USD 800 000.
4. A kibbutz (plural kibbutzim) is a collective community in Israel that was traditionally based on agriculture. Today, farming has been partly surpassed by industrial plants and high-tech enterprises. Moshav (plural moshavim) is a type of Israeli town or settlement, in particular a type of cooperative agricultural community of individual farms, pioneered by the Labour Zionists during the wave of Jewish immigration in the early 20th century.
5. The Technion faculties include: civil and environmental engineering, mechanical engineering, electrical engineering, chemical engineering, biotechnology and food engineering, aerospace engineering, industrial engineering and management, materials, biomedicals, mathematics, physics, chemistry, biology, architecture and town planning, computer science and medicine. Departments include education in technology; science, humanities and arts.
6. The Japanese METI Industrial Cluster Programme (2001-05) was launched by the Ministry of Technology and Industry (METI) to capitalise on the existing endogenous capabilities of 19 major regions and their R&D and industry base, the programme aimed to support exchanges

and co-operation between the university, industry and the government, the development of technologies for local application and training for entrepreneurs. The 500 civil servants in the regional METI offices cooperated with 5 800 SMEs and researchers from more than 220 universities. METI invested USD 350 million into the programme over a 5-year period. The programme entered the Phase 2 in 2006-10.

7. Professional trainers lead business operations and purchase cutting-edge machinery. The school first takes on small orders from industry. Three months later the operation is running. After that students start to work on technology, testing and design. The team moves to full scale operation (orders, specifications). Next student group starts learning about entrepreneurship. Berufsakademies were established 15 years ago and have trained 100 people.

8. In some cases companies are very involved in the internship process. They conduct interviews directly in the college to select students for internships. In other cases students have to negotiate directly with the companies to obtain an internship.

Annex 3.A1. Regional taxonomy

Box 3.A1.1 Peripheral regions and old industrial regions

The main characteristic of **peripheral regions** is "organisational thinness". There is a lack of dynamic clusters, support organisations and strong institutions promoting entrepreneurship and innovation. If there are clusters they are normally found in traditional industries with limited R&D and innovation activities. The emphasis is on incremental innovation and on process innovations. Although low and medium level qualifications may be readily available, the more specialised qualifications are rare due to a less developed knowledge infrastructure of specialised knowledge suppliers such as universities and research organisations. Networks are weakly developed in particular those to more specialised knowledge suppliers, such as universities and research organisations. The lower level of higher education and R&D provision reduces the internal innovation activity in the region and leads to a low absorptive capacity of the local firms. As a consequence, local firms – especially SMEs – have difficulties in accessing knowledge outside of the region which they need for technological upgrading as well as diffusing such knowledge which local gatekeepers have acquired among themselves in regional clusters. Technology transfer offices and organisations have been set up by higher education institutions – typically universities of applied sciences - or local business organisations but they are often not effective due to the lack of absorptive capacity in the economy. This implies that the knowledge does not reach the local firms (SMEs) or it does not meet their demand well enough, being too sophisticated to support the mode of innovation (producing incremental innovations) applied by the local firms.

Old industrial regions suffer from various forms of "lock-ins" that constrain their development potential and innovation capabilities. They are characterised by overspecialisation in mature industries which has led to a loss of regional competitive advantage and innovation capacity. Innovation activities follow mature technological trajectories and are focused on incremental and process innovations. Process innovations dominate over efforts to introduce radically new products in to the market. Old industrialised regions often have a developed and specialised knowledge generation and diffusion system oriented on the traditional industries and technology fields. A supply oriented approach to technology transfer reaches larger firms but fails to reach the smaller ones.

Source: Tödtling, F. and M. Trippl (2005), One Size Fits All? Towards a Differentiated Regional Innovation Policy Approach, *Research Policy*, Vol. 34, pp. 1203-1219.

Table 3.A1.1 Types of regions and innovation policy approaches

	Type of region	
Focus	**Peripheral regions (organisational thinness)**	**Old industrial regions (lock-in)**
Strategic orientation of regional economy	Strengthening/upgrading of regional economy	Renewal of regional economy
Innovation strategy	Support "catching up learning" (organisation, technology). Improve strategic and innovation capabilities of SMEs.	Support innovation in new fields/trajectories Support product and process innovation for new markets.
Firms and regional clusters	Strengthen potential clusters in the region. Link firms to clusters outside the region. Attract innovative companies. Support new firm formation.	Support clusters in new/related industries or technologies. Restructure dominant industries. Diversify existing industry. Support new firm formation. Attract cluster-related FDI.
Knowledge providers	Attract branches of national research organisations with relevance to the regional economy.	Set up research organisations and HEIs in new relevant fields.
Education/skills	Build up medium level skills *e.g.* technical colleges, engineering schools, management schools. Mobility schemes *e.g.* "innovation assistants" for SMEs.	Build up new skills required (technical colleges, HEIs). Attract new skills.
Networks	Link firms to knowledge providers and transfer agencies inside the region and beyond, following a demand-led approach.	Stimulate networking with respect to new industries and technologies on regional, national and international levels.

Source: Tödtling, F. and M. Trippl (2005), One Size Fits All? Towards a Differentiated Regional Innovation Policy Approach, *Research Policy*, Vol. 34, pp. 1203-1219.

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Chapter 4

Capacity building for regional development

The extent to which colleges and universities are engaged in regional human resource development and innovation depends to a large extent on the policy context relating to financing, regulation and institutional and governmental policies.

This chapter examines the current higher education and regional development policies in Israel and their impact in the Galilee.1 It will highlight where these policies and practices could be improved to enhance regional engagement of higher education. Drawing from examples in the OECD countries, the chapter will conclude with recommendations to help capacity building for regional and local engagement among the higher education sector.

The key message of this chapter is that if Israel wants to mobilise higher education for regional development, higher education policy and funding mechanisms should be aligned to support more demand-led educational provision and regional-based innovation. Policy incentives for higher education institutions need to be improved in staff promotion, review and approval of new academic programmes and allocation of funding. Furthermore, progress can be made through four major actions: i) enhancing regional government, ii) focusing on endogenous assets of the, iii) improving connectivity in the region and iv) directing the work of the medical school to address health problems in the region by community-based training and innovation in the delivery of health services.

1. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

Israel has witnessed a rapid expansion in higher education with the total number of higher education students increasing from 76 000 in 1990 to 265 000 in 2008. Much of this growth was in the colleges which were also established in the periphery – the Negev and Galilee, areas which had limited access to higher education. It is important to ensure that the increased prominence of colleges will have a positive impact on the local and regional development. This is particularly important in the case of the northern part of the country where the nearest research universities remain located in Haifa and the colleges are the only higher education players. Much depends on the higher education policy and regional strategy to mobilise higher education institutions and stakeholders. At the same time the capacity of the local economy needs to be improved so that it can absorb tertiary education graduates and new innovations. For this to happen, supportive policy instruments and incentives need to be put in place.

Higher education institutions in Israel generally emphasise the pursuit of excellence based on national (or international) goals with little regard for local needs. Given the diversity of Israel's regional assets and characteristics, it is important to strengthen the links between the regional development and higher education and R&D. Achieving this goal would require: i) human capital policies that are sensitive to the characteristics of the regional environment, ii) greater participation of education institutions in regional development matters, iii) stronger collaboration and links among higher education institutions, research and innovation centres, regional and local authorities, local businesses and regional development agencies. The goal should be to raise the quality and relevance of education, training and R&D, making them more relevant to the local and regional economic and social needs of the Galilee and orientated towards achieving the regions' potential.

In this context, this chapter examines:

- Whether the current policies and mechanisms support and incentivise regional and civic engagement of higher education institutions in the Galilee?
- Whether the existing coordination, governance and financing mechanisms effective and do they help institutions to play their regional role?
- What lessons can be learnt from international experience?

4.1. Alignment of HE policy with the regional engagement mission

Most of the higher education institutions in the Galilee have formal missions and goals that relate directly to providing opportunities for the region's population and contributing to regional development (see Box 4.1.).

Box 4.1. Regional missions of selected HEIs in the Galilee

Gordon College of Education, located in the Haifa sub-district, emphasises the composition of its academic staff and student body as a microcosm of the city of Haifa and the core mission of training teachers from different ethnic and religious groups to educate children to live in the multicultural Israeli society.

The University of Haifa, located on southeast of the city of Haifa, was established in 1963 under the joint auspices of the Hebrew University of Jerusalem and the Haifa Municipality. In 1972, it gained academic accreditation as a separate institution from the CHE. The university considers the link between academic excellence and social responsibility as its flagship, and service to the community as one of its important goals. Examples of the University's involvement in the community include: assisting students to access higher education (Pre-academic Unit), aiding students to overcome economic obstacles (Social Involvement Unit) and offering special curricula for managers in different fields and for a range of professionals (Continuing Education and External Studies Unit). It has produced many of the region's leaders and educated elite. They university's focus on social and political science together with its location in Haifa make it a regional hub for non-technical higher education.

The College of Sakhnin, Academic College for Teacher Education, located within the heart of Sakhnin, an Arab town, has a goal of fulfilling the wide range of needs of the Arab population in the Galilee. The college trains Arab-speaking educators and is seeking to provide more diverse opportunities for study for Arab students, especially women.

Nazareth Academic Institution (NAI) formerly Mar Elias College, a branch of the University of Indianapolis (USA) and located in Ibilin, is now an independent institution of higher education located in Nazareth. NAI has a core mission to serve the Arab community and draw together students from all backgrounds and religions in an environment of learning and relationship building.

Box 4.1. Regional missions of selected HEIs in the Galilee (continued)

ORT Braude Academic College of Engineering, located in the development town of Karmiel to the east of Haifa, was founded as part of the Zionist vision for the development of the Galilee and has a core mission to serve as a centre for attracting young people from the centre of the country to settle in the region. Karmiel is largely a Jewish town, including many recent immigrants from the former Soviet Union, but is adjacent to Sakhnin and several other Arab towns as well as Druze villages.

Technion, located in the city of Haifa, has a nation-wide mission as a globally competitive research university, but also a long tradition of department-driven links to the Galilee through education, research and service.

Tel Hai Academic College, located in the Upper Eastern Galilee Region cites two main functions which serve as the foundation for its existence and various activities. The first is to promote and carry out study programmes and educational initiatives that help the rural and urban peripheral areas in the Upper Galilee and the second is to continue to engage in community initiatives that empower the rural and urban peripheral areas in the Upper Galilee.

Western Galilee College, located in a sub-district of Akko, north of Haifa in an historic area on the Mediterranean coast, has a vision of facilitating social change and contributing to the region's economic development. Its core mission focuses on responding to the needs of the region's diverse population

Despite the regional missions of the higher education institutions, regional engagement is not embedded in the core teaching/learning, research and service missions of the higher education institutions in the Galilee.

The experience in OECD countries indicates that it is a challenge for higher education institutions to be engaged with their regions unless policies at the institutional and national level are aligned with this mission. A basic question is whether policies that affect the higher education institutions in the Galilee, especially the colleges, support the higher education institutions to play a regional role. Key policies relate to: i) the criteria and processes for faculty in appointment, promotion, compensation and tenure, ii) review and approval of new academic programmes and iii) allocation of funding.

Incentives for faculty

The current higher education policies do not recognise or reinforce the initiatives by the higher education institutions, especially the colleges, to relate their missions to regional issues. The promotion and tenure criteria

and process for faculty at the colleges in the Galilee is centrally administered through the Council of Higher Education (CHE), where faculty from the universities play a prominent role. The criteria for promotion emphasise research and publication and not a broader definition including regional engagement. Faculty members seeking promotion already face a tension between the centrally defined criteria emphasising research performance and the realities of their teaching obligations. There is limited evidence of positive incentives to encourage faculty members to engage in regional development and the integration of research, service and teaching.

To make colleges more relevant for their region and to provide stronger incentives for regional engagement, criteria for promotion and tenure can emphasise:

- Research on issues relevant to the region, giving more emphasis to application, synthesis and integration than to discovery of new knowledge.
- Service to community while requiring evidence that contributions to the community and the region are documented and externally validated.
- Stronger relationships among research, teaching and service through integration of research relevant to the region in the curricula and student learning and integration of service to the community in curricula, research and student learning.

Accreditation of HEIs and programme review and approval

The Council for Higher Education Law (1958) empowers the Council for Higher Education (CHE) to approve the transformation of an educational institution into an institution of higher education and to authorise it to award academic degrees.[1] Some of the actions of the CHE regarding new academic programmes respond to needs of the Galilee, particularly the approval of institutions to move from a status of university branches to independent institutions with authority to grant their own degrees. University affiliation can have advantages by extending programmes to a region while maintaining quality controls through the university's faculty. But affiliation can also result in diminished responsiveness to regional needs, especially when university faculties, already facing several budget constraints, resist diverting resources from the main campus to branches.

The accreditation of new programmes of study in higher education institutions involves two stages in Israel: the stage of authorisation to advertise, register students and commence study and the stage of authorisation to award an academic degree to graduates of the specific

programme. The CHE process for review and approval of new academic programmes applies primarily national criteria to: *i)* ensure compliance with national quality standards, *ii)* encourage colleges to develop distinctive academic programmes that will attract students nationwide, *iii)* develop nationally recognised centres of excellence (e.g. in educating students with special needs) and *iv)* avoid unnecessary programme duplication.

Currently, the higher education programme review and approval process gives significantly more weight to national considerations than to the unique needs of the region. The two most frequently heard concerns about the programme approval process were the lack of support from university faculty for integration of field experience, work-experience and community service within the curricula and the long delay in the process for approval of new academic programmes (reportedly five to six years in some cases) which inhibits the responsiveness of higher education institutions to changing regional needs.

While respecting the rationale of the nationwide criteria, the experience of other OECD countries suggests that criteria emphasising regional engagement and responsiveness can be included in programme review and approval. In the case of Israel, these regional criteria could include:

- Data documenting the specific gaps in access and opportunity for the population and important sub-groups (e.g. the Arab population with attention to different needs of Arab men and women).
- Data documenting relevant regional labour market needs and potential future needs arising from regional economic development plans.
- Evidence of the engagement of regional stakeholders (employers, community representatives and representatives of under-served population groups) in programme planning and design.
- Emphasis on regional engagement (e.g. internships, community service, student research on regional issues) within the curricula and student experience.

Furthermore, there is a need to reduce the prominent role that university faculty members play in the approval of college academic programmes. The process for programme review and approval should be adapted to emphasise regional engagement through increased representation of college faculty on CHE review committees. Efforts should be made to seek the advice of regional leaders (employers, community leaders, regional economic development officials) in the CHE review process in order to guarantee labour market relevance and more demand-led education provision.

Funding to support HEIs' regional development

Funding policy is the most influential policy tool that governments can use to affect the behaviour of higher education institutions and their faculty. All higher education institutions in the Galilee, with the exceptions of Carmel Academic College and Nazareth Academic Institution are "budget" institutions, meaning that they receive budget allocations from the Planning and Budget Committee (PBC).

The PBC allocations account for 61% of the budgets for universities, 64% of the budgets of academic colleges of engineering, 54% of the budget of academic comprehensive colleges and 56% of the budgets of the regional colleges. (Colleges for teacher education are not under the responsibility of the PBC but the Ministry of Education.) Direct allocations to the colleges are divided into three main categories: *i)* block grant allocations, *ii)* earmarked allocations and *iii)* matching allocations. In addition the PBC provides indirect allocations to colleges through its support of research funds in external research funding bodies. The block grants include a teaching component and a research component, but the research component applies only to universities. While the PBC establishes the enrolment levels at each institution for the purpose of allocations, institutions can enrol students outside these limits on a tuition fee basis within limits established by the PBC.

The current PBC funding policies do not give provide incentives for regional engagement of colleges. The principal incentive for the colleges is negative: their exclusion from research funding. Student numbers are established centrally and are most likely driven by budget constraints. Institutions may enrol above these limits, but they must finance these students through tuition fees. There are no incentives to enrol students from within the region; in fact, because the institutions depend to a degree on revenue from tuition fees (within limits set by the PBC), they have incentives to recruit paying students from outside the region to generate additional revenue. Furthermore, there are no explicit incentives for institutions to reach out to and increase the enrolment of under-served population groups, especially the Arab and ultra-Orthodox Jewish populations who lag in participation rates.

Experience in OECD countries shows that a variety of funding mechanisms can be used to provide incentives for regional engagement of higher education institutions, for example:

- Formulae for block grant funding could include higher weights for enrolment of students from within the region, from special populations such as Arabs and ultra-Orthodox Jewish students or for enrolments in academic programmes related to regional labour market needs.

- Policies governing tuition fees could allow for lower fees for students from the region and policies for financial aid to students can provide higher amounts for in-region students and special populations.
- Eligibility for special or "categorical" funding could be contingent on evidence of regional engagement and focus.
- Requirements that institutions collaborate in order to obtain funding. This could provide incentives for higher education institutions to facilitate mobility of students (credit transfer within the region) and share programmes and other resources in efforts to serve the region.
- Special funding to provide matched funding obtained by higher education institutions from contracts with regional employers for education and training services.

International examples

The Regional Stewardship Initiative of the Commonwealth of Kentucky in the United States illustrates a comprehensive strategy to provide incentives for higher education institutions to support regional engagement (see Box 4.2.). An application of this approach in Israel could be through the establishment of a special regional investment fund (funded from public and private resources) to provide funding for building capacity within higher education institutions for regional engagement. It could also provide incentive funds to institutions and individual faculty members for regional initiatives. For example, these could emphasise increasing tertiary education access and opportunity for the region's population (especially target populations), engaging faculty members and students in teacher/learning and applied research.

Box 4.2. Kentucky Regional Stewardship

The Regional Stewardship Programme encourages universities to focus their missions on improving quality of life in their regions, including the counties making up their area of geographic responsibility, and on achieving the aspirations set forth in The Kentucky Postsecondary Education Improvement Act of 1997 (House Bill 1) and the Public Agenda for postsecondary and adult education in Kentucky for 2005-10.

The overarching goal of the Regional Stewardship Programme is to promote regional or state-wide economic development, liveable communities, social inclusion, improved P-12 schools, creative governance and civic participation through public engagement activities initiated by university faculty and staff. To help accomplish this goal, campus administrators are expected to design and implement programmes that align institutional resources and infrastructure to support their missions as "stewards of place", and to create partnerships and undertake engagement activities that address regional and state needs.

The programme provides three forms of funding incentives to institutions: *i)* infrastructure funds to support the development and maintenance of organisational structures, personnel, information systems and community relationships directed toward the identification of regional needs, opportunities and stewardship priorities, *ii)* regional grant funds to support comprehensive university efforts to build intellectual capacity in stewardship priority areas (to qualify for regional grant funds, each institution must submit a strategic plan for stewardship activities and a priority area proposal to the state Council on Postsecondary Education) and *iii)* the stewardship initiatives pool to support specific public engagement activities at the institutions that improve economic prosperity, quality of life, or civic participation in the region or state, while furthering the goals and mandates of the state's public agenda to increase the educational attainment of the state's population.

Source : Kentucky Council of Postsecondary Education "Kentucky Regional Stewardship", *http://cpe.ky.gov/policies/budget/reg_steward_program.htm*

The Higher Education Innovation Fund in the United Kingdom has contributed to a significant increase in the locally relevant activities of universities and has also generated considerable changes in the institutional management of knowledge exchange (see Box 4.3.).

Box 4.3. The Higher Education Innovation Fund (HEIF) in the United Kingdom

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

Funds are provided through a formula allocation to all eligible higher education institution. They are released once their knowledge exchange strategy has been assessed as satisfactory. The formula is based on two components:

- The first component (40%) has a focus on capacity-building and higher education institutions' potential and is based on full-time equivalent academic staff number.

- The second component (60%) is allocated on the basis of performance, using various measures of income from business and non-commercial sources as a proxy for the value placed on higher education institutions' activities by users of knowledge in the wider economy and society.

Evaluation of the use of HEIF funds suggest that it has generated significant changes to the institutional management and increases in the scope (type of activity, target sectors, etc.) of knowledge transfer and exchange activities. There has also been investment in development/training for mainstream academic staff and collaboration with one or more higher education institutions in the region.

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

A potential source of funding can come from charitable donations, the trusts, persons of wealth and alumni. While voluntary donations have a strong tradition in Israel, higher education institutions or the authorities did not seem to well-developed mechanisms to support it. Recognising that the investment in the infrastructure of fundraising can generate real rates of return, some OECD countries, for example the United Kingdom, have sought to stimulate this activity by matched funding schemes (see Box 4.4.).

Box 4.4. The UK matched funding scheme for charitable donations to universities

In April 2008, the UK Government launched a GBP 200 million matched funding scheme for voluntary giving. The matched funding scheme began in August 2008 for a three year period. Funding was available to match eligible gifts raised by English higher education institutions and directly funded further education colleges. There were three levels of funding:

- First Tier – 1:1 private to public: intended for the least-experienced fundraising institutions and those looking to build capacity from a low base. Every GBP 1 raised will be matched in full.
- Second Tier – 2:1 private to public: intended for the majority of institutions with existing development programmes. Every GBP 2 raised will be matched by GBP 1.
- Third Tier – 3:1 private to public: intended for the most experienced fundraisers. Every GBP 3 raised will be matched by GBP 1.

Higher education institutions were able to request their own tier, with the exception of the Universities of Oxford and Cambridge which were included in the third tier. All directly funded further education colleges wishing to participate in the scheme were automatically included in first tier. Each institution's tier and cap level was confirmed by the Higher Education Funding Council (HEFCE) prior to the start of the scheme.

The following forms of donations were eligible for match funding: actual gifts of cash, gifts of shares, gifts from small/medium-sized charitable trusts and foundations, gifts through higher education institutions own non-consolidated development trusts, corporate gifts and overseas gifts. Legacies and gifts in kind were not eligible for matching. Higher education institutions had the freedom to decide how the revenue from match funding was spent.

Source: HEFCE (2008), "Matched Funding Scheme for Voluntary Giving 2008-2011", Circular Letter, No. 11/2008, HEFCE, Bristol.
www.hefce.ac.uk/pubs/circlets/2008/cl11_08/.

4.2 Policy framework for regional development

Throughout the OECD area there is a general trend of comprehensive regional policies that complement economic and structural policies by helping to generate growth in the regions (see Box 4.5.).

Box 4.5. Towards comprehensive place-based policies

Over the past decade, regional policy has been subject to debate, formal review and/or new legislation in many OECD countries. There is widespread evidence of a shift in the regional policy "paradigm": while in the past regional policy was used to absorb "shocks" (industrial restructuring, rural decline, etc.) and to support particular regional economies that had failed to modernise, today regional policy is focused on developing regional potential for competitiveness. The precise nature of change is country-specific, but common features to the new approach include the following:

- Regional competitiveness is strengthened by focusing on growth-oriented activities (notably innovation, education and employment).
- Policies are context-specific, based on the region's particular strengths and challenges.
- Comprehensive regional economic strategies are used instead of national sectoral instruments and the different aspects that affect the development of a region are considered in an integrated way.
- Different levels of actors (national, regional and local) co-operate in the policy process.

Source: OECD (2009), *OECD Territorial Reviews: Chile.* OECD, Paris.

The assets of the different regions in Israel are diverse and their potential for growth will depend on how public policy is adapted to the specific challenges within these regions. Currently, the strategic approaches remain unclear at the regional level in the Galilee. The Galilee higher education institutions have no real framework or platform on which they could build and develop their regional engagement, collaborating with each other and the regional stakeholders. The experience in the OECD countries suggests that it is challenge to higher education institutions to engage in regional development unless there are regional policies and mechanisms in place to support this. A basic question in this respect is: does the current regional policy framework support engagement of higher education institutions in the Galilee? Clear commitment to focus on four key areas would help the region and their higher education institutions to move forward: *i)* regional governance and HE collaboration, *ii)* endogenous assets in the region – developing the existing human capital as well as traditional

industry and public services, *iii)* connectivity and mobility and *iv)* regional health issues.

Enhancing regional government and collaboration

The development of the Galilee has been the official policy of the Israeli government for decades. For example in the 1980s and 1990s more than 40 policy plans were prepared by three governmental offices in addition to the Jewish agency and two other national authorities (Yiftachel, 1992). The plans have often focused on attracting Jewish population and international companies to the region with the help of tax breaks.

However, Israel has not had a clearly identifiable regional policy. Interventions at the regional level have been largely defined and implemented in a top-down fashion from the centre of Israel. This is in line with Israel's centralised administrative structure which leaves little scope for regional initiative and capacity building. There is no regional government, but within the national government, there is a ministry for the development of the peripheral regions (Ministry for the Development of the Negev and the Galilee). Within this ministry there is an authority for the Galilee (the Galilee Development Authority).

There are three forms of local government: *i)* cities that are governed by city councils, *ii)* towns that are governed by local councils and *iii)* regional councils that aggregate several towns and villages. With few exceptions, councils are either wholly Jewish, Arab or Druze. In total, there are 251 local governments in Israel. Local government is funded through a combination of local taxes and national funding. Local revenues vary greatly according to the socio-economic level of the population. At the high end, local revenues of Tel Aviv-Jaffa constituted 85% of total income in 2007. In Shagur, an Arab town in central Galilee, only 30.8% of total income was derived from local sources. The balance is provided by the national government. However, discrepancies in public investment in infrastructure in Arab and Jewish communities are barriers to employment and educational opportunities for the Arab population. This manifests itself in limited investment in industrial and /or commercial business parks and the lack of regular public transportation. There is also evidence of large class sizes for Arab children.

Local authorities have no formal influence over the provision of tertiary education or R&D. Despite some examples of collaboration between higher education institutions and local governments, there are no formal channels or mechanisms through which local authorities can develop regionally relevant initiatives with higher education institutions.

The Galilee Development Authority is the only stakeholder whose stated mission is regional in nature. The development authority operates a forum of local governments which is the practical means of the central government interfacing with the multiplicity of local leaders. Despite this mechanism, local governments are competing with each other and directly lobby the government for funding. Regional and local levels remain weak, particularly in the Arab sector and there is an absence of an underlying tradition of collaboration despite fragmented bottom-up initiatives, such as the gathering of the municipalities in the Eastern Galilee to support knowledge-based development, innovation and entrepreneurship (see Chapter 3, Box 3.3.).

The challenges in the Galilee are manifold, ranging from poverty, illiteracy, low educational attainment levels, non-employment, poor health outcomes and brain drain to low absorptive capacity in the manufacturing industry, limited connectivity, growing urban-rural divide and ethnic tensions. No single higher education institution, organisation or agency has the capacity to address these issues alone. Broad-based collaboration between regional agencies, business and industry, higher education institutions and civil society is required. By working together, these regional stakeholders could generate a greater dynamism and change in the local economy and society.

In order to build up capacity for regional development and to encourage common initiatives, capacity needs to be built among local leaders. A regional plan for action would facilitate stakeholder mobilisation and increase citizen participation. Focussing collaboration on key issues such as environmental and health challenges in the region could help bring local and regional leaders together. They would also benefit from challenge-driven research and development conducted by higher education institutions which seeks to increase the economic and social impact of higher education institutions. The Council of Higher Education and the Galilee Development Authority could create a forum to enhance regional collaboration and demand-led education provision in the region. Other important participants in this forum would be the Ministry of Minority Affairs and the Arab Affairs Desk with the Prime Minister's Office. In addition, the region would benefit from sustained community development programmes that help build capacity in communities in responding to change and social, economic and environmental challenges (see Box 4.6.).

A regional competitiveness framework is often seen as the key to regional development. The regional competitiveness approach argues that regional capacity can be nurtured and developed by identifying their competitive advantages. Furthermore, public investments must be aligned with economic niches (Porter, 1998 and 1999). Table 4.1 shows the progress

made in the Galilee in terms of the four essential elements for competitiveness in the global economy: strategy, governance, innovation and entrepreneurship. It identifies a number of gaps that need to be bridged.

Table 4.1. The Galilee competitiveness framework and higher education institutions' role

Essential ingredient	Target (Ideal)	The Galilee (Actual)
Strategy	To identify the region's distinct competitive advantage. To align public and private actions necessary to seize it.	Driving internal migration. Attracting talent and business from the centre.
Governance	To supply a framework to unite public, private and non-profit leaders as a collective guide and owner of the strategy.	No regional government, but 50 local councils with limited tradition of collaboration. The Galilee Development Authority within the Ministry for the Development of the Negev and Galilee. No collaborative mechanisms to bring together HEIs, business and government.
Innovation	To link the region with new technologies and new ways of working and living that can transform the region's social and economic assets.	Universities' innovation activities with limited alignment to the economic assets and needs of the Galilee. Colleges with low RDI capacity.
Entrepreneurship	To provide a fertile climate in which new ideas can be transferred successfully into the marketplace.	Technion with limited spill-overs to the North. Entrepreneurship activities at early stages in colleges. Discrepancies in public investment in infrastructure and support.

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

International experience in community development in rural areas

Community development programmes build capacity by enabling communities to respond to change and emerging social, economic and environmental challenges. Higher education institutions, in collaboration with local and regional authorities, can play an important role in training community development practitioners, providing lifelong learning and

reskilling and upskilling opportunities, conducting research into specific issues and best practices and developing co-operation and research opportunities. One of the most innovative examples to approach local development is the European Union LEADER programme which provides tools for bottom-up capacity building and assessment (see Box 4.6.).

Box 4.6. LEADER: bottom-up local development in the European Union

LEADER (*Liaisons entre Actions du Développement de l'Économie Rural*) is an European programme based on an integrated and endogenous approach to local development. Since 1991, the LEADER initiative has had three different editions. The programme was first launched for a five year period in 1991 and applied in 220 rural areas of the former EU 15 countries. LEADER II (1994-99) spread to 1 000 rural areas and to more than 1 500 in the enlarged EU 27 countries. The LEADER+ (2000-06) was the last edition of the LEADER as an EU rural development initiative. It had an emphasis on integrative strategies that connect all aspects of rural life. The last phase of the LEADER focused on the use of knowledge and technologies, improvement of quality of life, added value to local products and the increase of value of natural and cultural resources. This bottom-up programme based on a method for the definition, selection and implementation of small projects (many do not exceed EUR 2 000) in rural areas has met success and is now mainstreamed for the present EU programme period (up to 2013), many member countries having integrated LEADER principles and guidelines into their national rural development policies that are increasingly "place-based".

LEADER is based on eight principles: an area-based approach, a bottom-up approach, local partnerships, innovation, multi-sector integration, inter-territorial co-operation, networking, and decentralised management and financing, Most of these principles can be found today in rural development programmes in the EU countries. LEADER not only pioneered these in local development strategies but devised a methodology combining these different features of processes at grass-roots levels. Implementation of LEADER is voluntary: the public and private actors within a self-defined area based on historical, geographical considerations and/or local assets and know-how get organised as a Local Action Group (LAG) that includes representatives of civil society such as NGOs. A local development strategy is then devised by the LAG on the basis of inputs from workshops and citizen forums. Projects are submitted to board approval within the priorities defined by the strategy. Choice of projects is ensured on the basis of objective criteria and funding is also decided by the board that disposes of an annual budget integrating EU, national and regional contributions. Beneficiaries deliver milestone reports; evaluation is conducted by independent experts and/or specialists and researchers from universities.

Box 4.6. LEADER: bottom-up local development in the European Union (continued)

The participatory democracy approach has given new momentum to rural development: empowering people to think about their own future and how to use local assets amounts to recognising them as the best experts with knowledge of the local context and area. Unleashing the human capital potential requires capacitation and training, which is an integral part of the LEADER programme. Innovation in processes or content, including social innovation, is particularly important. LEADER also seeks to promote mutual learning: projects are interconnected through regional, national and European networks to exchange experiences and promote best practices by on-line access to shared resources and regular events.

Notable LEADER projects include: village renewal, youth clubs, promotion of female entrepreneurship, tourism as a second source of revenue for farming families, environmental protection, support to handicraft production and commercialisation of local products. Among the main outcomes of LEADER are new governance practices with increased co-operation between the national, regional and local levels requiring efficient vertical co-ordination; development of coherent local territorial development strategies promoting fruitful dialogue with regional authorities; a holistic vision of rural spaces going beyond traditional agricultural models, promoting sustainable economic diversification and social integration.

Source: LEADER (Liaison Entre Actions de Développement de l'Économie Rurale), (Links between the rural economy and development actions), http://ec.europa.eu/agriculture/rur/leaderplus/index_en.htm .

Developing endogenous assets of the Galilee: human capital and traditional industry

Regional policies should not only promote growth in areas in which economies of agglomeration are present, but they should encourage all types of regions to use their endogenous assets to reach their growth potential.

While the development efforts for the Galilee have often focused on attracting talent from elsewhere, the key question is how to improve the educational attainment levels and employment outcomes of the endogenous Galilee population, half of which are Arabs. This calls for sustained investments in education, schools and infrastructure; active widening access policies; providing diverse educational opportunities to Arab women and building up vocational tertiary education opportunities for Arab men. It also

calls for diverse and flexible reskilling and upskilling opportunities of the population to help the population adjust to rapid changes in the labour market. Results from the investments in education are visible on a medium-long term perspective. However, a failure to focus on endogenous development of human capital will have a serious impact on the sustainable national development, endangering its international competitiveness and security (see also Chapter 2).

Israel's over-dependency on ICT makes the economy vulnerable to sudden changes and constrains the country's long-term balanced growth potential. There is a need to develop higher skills and innovation in traditional industries and public services that employ most of the population. Improvements in productivity and diversification in the productive base would require context-specific regional policies. A rebalancing of priorities to improve productivity and innovation in traditional industry and services would convey a clear message to the Technion, the University of Haifa and the colleges about the needs of the region for skilled human resources and for R&D. The Northern District has 17% of the population, but a negative migration balance. One of the main missions of higher education institutions should be to develop human capital which is adjusted to the regional demand (see also Chapter 3).

Authorities agree that Israel would benefit from policies aimed at boosting productivity, such as those targeted at innovation and entrepreneurship and improving education and vocational training (National Economic Council 2007). These areas have a strong regional dimension given the heterogeneity of the Israeli regions, as growth opportunities are linked to local conditions and resources are underutilised. This calls for tailored place-based policy for the Galilee that can make targeted efforts to improve the quality of public investments and services to the regions. Enhancing regional growth through context-specific regional policies would benefit national growth and regional cohesion which is important to sustainable development of Israel.

Improving connectivity and mobility

Connectivity is a major challenge for the development of Israel and the Galilee. The geographical, topographical and ethnic-religious situation presents a number of challenges for providing access to transport infrastructure, communications and public services, especially in peripheral regions. Connections between urban centres and rural areas are crucial for greater development and further improvements in infrastructure are needed to connect peripheral regions and rural areas. Greater involvement of local institutions in infrastructure planning is necessary to improve the

information available about regional needs and to make local actors embrace the projects and feel part of them.

Access to the Galilee for both passengers and goods should be improved. With most of the population in the Galilee living in small towns and villages, connectivity – both intra-regional and between rural and urban areas – is also a challenge. Public transport in the Galilee is provided by the Egged Co-operative and some smaller bus companies. Trains from the coastal cities of Haifa, Acre and Nahariya have now become available. While the Israel Railway Authority has plans to expand train service into the interior of the Galilee, plans to improve the accessibility of Arab communities remain a subject of controversy.

Interregional disparities in access to telecommunications remain significant and pose a challenge for regional development in terms of widening access to education in remote areas, improving teleworking opportunities for place-bound Arab women and dissemination of innovation for in small and mediums-sized enterprises. While no robust data was available about the inequilities in access to communication, they are likely to broadly correspond to disparities in GDP per capita. Improving access to telecommunications represents a potential source of growth and should be favoured.

International experience in improving connectivity

In the Spanish region of Andalusia, improving connectivity has received priority attention of the regional government. Systematic investments in high speed trains and high-speed internet improved the connectivity and mobility in the region which has the second lowest GDP in Spain. In addition, the regional government invested in the developing broadband network for the Andalusian higher education system and online learning platform (see Box 4.7.).

Box 4.7. Enhancing connectivity in Andalusia

During the recent decades, the Regional Government of Andalusia has systematically improved the connectivity and mobility by developing the railroad network and increasing high speed trains. It has also made considerable investments in improving intraregional connectivity, now providing the region's rural areas with adequate infrastructure and services.

In 2001, the regional government launched a plan of strategic initiatives for the development of the information society. One of its principal milestones was the Guadalinfo programme, started in 2002, aiming to create a network of public broadband internet centres. By the end of 2006, altogether 637 centres had been created, one in each town of less than 10 000 inhabitants in Andalusia, with a permanent local "facilitator". The current phase within the Information Society Plan for Andalusia aims to extend the network of centres to the fringe areas in these municipalities. This Information Society Plan for Andalusia (2007-10) is one of the major components of the Andalusian Modernisation and Innovation Plan (PIMA).

Availability of high-speed internet in rural areas is crucial for dissemination of innovation in small and mediums-sized enterprises. The attention given to ICTs in Andalusia provides its rural firms with the required access and services. The network of technology centres in Andalusia (RETA) provides training and support to promote their use by small firms.

The Regional Government of Andalusia has also made considerable investments to develop broadband networks in the Andalusian University system. Online learning platform pools the e-learning provision of ten universities in Andalusia and diversifies the available teaching offered in the region which is characterised by long distances and a lack of student mobility.

Source: OECD (2010), *Higher Education in Regional and City Development, Andalusia, Spain*, OECD, Paris.

Improving health outcomes in the region

Whereas public health profile in the centre of Israel is similar to that of other industrialised western countries (e.g. low infant mortality, cancer, diabetes and heart disease), the epidemiology of the Galilee shows health issues more often found in developing countries, including higher infant mortality, infectious diseases, brucellosis and hepatitis. The health conditions of the Galilee demonstrate a high correlation between the poor health outcomes and the lower socio-economic status of the region's population (the high levels of poverty and illiteracy). These problems are

especially acute in the region's Arab populations. Furthermore, the hospital infrastructure in the Galilee is inferior to that of the centre. For example, while there 2.5-2.7 beds per 1 000 population in the major cities in Israel, there are only 1.58 beds per 1 000 in the Galilee. In certain areas such as rehabilitation, the difference is greater. Accessibility to medical specialities is also and residents often need to travel to Haifa for specialised care. There is also a lack of professional medical personnel.

In January 2010, the Council on Higher Education (CHE) selected Bar-Ilan University to develop Israel's fifth medical school in Safed, in the centre of a Jewish area. The new medical school facility with an accompanying research institute will work in close concert with hospitals in Afula, Safed, Tiberia, Nahariya and Nazareth as well as community clinics throughout the Galilee region. The intent is also to encourage collaboration between the colleges and the new medical school in the training of nursing and allied health professionals[2]. As noted in the regional self-evaluation report, the "CHE has taken a decision to prioritise and encourage the development of study programmes in related fields. The Safed College, located in proximity to the anticipated medical campus, has applied for programmes in health, social work, and medical imaging" (CHE, 2009).

The new medical school provides many opportunities to improve regional development in the Galilee, for example by providing an opportunity to: *i)* address the regional health problems; *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 new medical school will not only provide additional training capacity, but it can radically change the medical education in Israel. Community-based approaches to medicine and medical education would also benefit the region and improve students' learning outcomes. Medical students will spend far less time in hospitals and far more time in communities. Students will learn from an early stage to work in multi-disciplinary teams alongside nurses, social workers, psychologists and other allied health professionals. The medical school selection process will be altered to favour students who excel at teamwork as well as interpersonal and cross-cultural communications.

There is a need to upgrade medical education in Israel by shifting from the current emphasis on specialisation, treatment of acute diseases and hospital-based care to a greater emphasis on prevention, treatment of chronic disease and community-based medicine. This will require a change in clinical training based in acute care hospitals to training in community-

based ambulatory care facilities. Furthermore, considering the current underinvestment in health infrastructure and personnel in the Galilee, systems of collaboration should be created among hospitals and between hospitals and the new medical school. Joint research centres between hospitals and the medical schools could be established in the areas that focus on the epidemiology of the region, including genetics, metabolic diseases and health promotion.

Innovation in the use of information technology (IT) in the delivery of health services should be a core mission of the new medical school. The new school and research institute provide an opportunity to link Israel's leadership in the IT industry with more effective health care delivery – from new individualised computer-based medical records systems to the use of telemedicine to reach isolated populations. Rather than traditional university-based research in the biosciences that requires high-cost facilities, the school should focus on applied research that integrates and synthesises existing knowledge using information technology to achieve improved health outcomes for the region's population.

The experience of other OECD countries shows that innovations in medical education and health care delivery are more likely to succeed if supported by deliberate public policies, to counteract the inevitable resistance to change. The following are examples of strategies that can be used to support the new initiatives:

- Partnerships with innovative medical schools and health care delivery systems that have actually implemented community-based medical education to boost innovation in medical education or new forms of health care delivery. [3]

- 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, the inevitable pressure will be to shift back to a focus on a traditional research agenda in competition with the existing four Israeli medical schools.

- Incentive funding for recruiting and training the region's population in health careers. There will be pressures to give higher priority to attracting to the Galilee a new, better educated population from the centre of Israel to fill jobs in the new health care system while giving lower priority to developing the region's existing human resources.

As a final point, the development of the new medical school and research institute provides an excellent opportunity for collaboration between the existing higher education institutions and research institutes in

the Galilee to strengthen their capacity. This collaboration is not likely to occur unless the authorities – Council for Higher Education (CHE) and Planning and Budgeting Committee (PBC) – establish policy incentives encouraging it to take place. Examples of incentives include:

- Encouraging new academic programmes in social work, psychology and the allied health professions to be offered in collaboration with the new medical school programmes that could provide opportunities for joint community-based clinical training.
- Providing opportunities for college students to transfer credits to the new medical school. For example, college students should be able to complete the physical and biological science and other requirements of the first three years of medical education and then transfer credits to the medical school where they can complete specialised courses and clinical training.
- Providing opportunities for college faculty to compete for funding for research to be conducted through the new institute.
- Providing opportunities for college faculty to have joint appointments with the new medical school and research institute.
- Providing incentives in college faculty appointment and promotion policies that recognise and reward faculty engagement in scholarship on the region's health, social and economic issues.

Conclusions and recommendations

Despite the regional missions in place, there is currently a lack of integration of regional engagement within the core teaching/learning, research and service missions of the higher education institutions in the Galilee. Collaborative mechanisms among higher education institutions to build capacity and foster joint efforts for regional development remain limited in scope and representation. Modest resources are spread thinly and there is a lack of critical mass to generate projects which will have real impact at the local and regional level and also generate multiplier effects. The higher education policies at the institutional and national level are not sufficiently aligned to support regional engagement of higher education institutions.

The promotion and tenure criteria for faculty at the colleges in the Galilee is centrally administered through the Council of Higher Education (CHE) in which faculty from the universities play a prominent role. The

criteria for promotion emphasise research and publication and not a broader definition which includes regional engagement.

The higher education programme review and approval process gives significantly more weight to national considerations than to the needs of the region. University faculty members play a dominant role in the approval of college academic programmes. There is a lack of support for integration of field experience, work-experience and community service within the curricula. The long delay in the process for approval of new academic programmes inhibits the responsiveness of higher education institutions to changing regional needs.

The higher education funding policies do not give explicit consideration to providing incentives for regional engagement of colleges. The principal incentive for the colleges is negative: their exclusion from research funding. Student numbers are established centrally and there are no incentives to enrol students from within the region. Because the institutions depend to a degree on revenue from tuition fees (within limits set by the Planning and Budgeting Committee), they have incentives to recruit paying students from outside the region to generate additional revenue. There are no explicit incentives for institutions to reach out to and increase the enrolment of under-served population groups, especially the Arab and ultra-Orthodox Jewish populations who lag in participation rates.

While the development of the Galilee has been the official policy of the government for decades, efforts have often focused on attracting talent or businesses from elsewhere. Interventions at the regional level have been largely defined and implemented in a top-down fashion from the centre. Regional and local levels remain weak, particularly in the Arab sector and there is an absence of an underlying tradition of collaboration. The ability to design concise and targeted strategies is not yet well developed and this limits the scope for the development of strategies to reflect unique and pressing issues affecting the region and provide a coherent plan how to address these. There is a lack of information and robust data, particularly in the field of skill gaps, business formation and productivity which undermine opportunities for evidence-based decision making and make it difficult to evaluate the outcomes of local policies. There is no mechanism or platform for higher education institutions and regional stakeholders to discuss regional development. With most of the population living in small towns and villages, connectivity and mobility – both intra-regional and between rural and urban areas – and discrepancies in investments in infrastructure between different population groups are a serious challenge that has impact on educational and labour market outcomes. There is a high correlation between the poor health conditions (e.g. infant mortality, chronic disease)

and the lower socio-economic status of the region's Arab population (the high levels of poverty and illiteracy).

The OECD review team recommends that following measures are taken to promote capacity building for regional development:

- Authorities should widen the criteria for promotion and tenure to emphasise relevance and regional engagement. The criteria could include: *i)* research on issues relevant to the region, giving more emphasis to application, synthesis and integration than to discovery of new knowledge, *ii)* service to community while requiring evidence that contributions to community and region are documented and externally validated and *iii)* stronger relationships among research, teaching and service through integration of research relevant to the region in the curricula and student learning and integration of service to the community in curricula, research and student learning.

- Authorities should ensure that higher education programme review and approval process is streamlined to allow for quick and greater responsiveness to regional needs. The process should be adapted to emphasise regional engagement through increased representation of college faculty on CHE review committees and efforts to seek the advice of regional leaders (employers, community leaders, regional economic development officials) in the CHE review process. Criteria emphasising regional engagement and responsiveness should be included in the review and approval process, for example: *i)* data documenting the specific gaps in access and opportunity for the population and important sub-groups (e.g. Arab population with attention to different needs of Arab men and women), *ii)* data documenting relevant regional labour market needs and potential future needs arising from regional economic development plans, *iii)* evidence of the engagement of regional stakeholders (employers, community representatives and representatives of under-served sub-populations) in programme planning and design and *iv)* emphasis on regional engagement (internships, community service, student research on regional issues) within the curricula and student experience.

- Authorities should develop higher education funding mechanisms to provide incentives for regional engagement of higher education institutions, for example through: *i)* formulae for block grant funding could include higher weights for enrolment of students from within the region, from special populations such as Arabs and ultra-Orthodox Jewish students or for enrolments in academic programs related to regional labour market needs, *ii)* policies governing tuition fees could provide for lower fees for students from the region and policies for

financial aid to students can provide higher amounts for students from the region and special populations, *iii)* eligibility for special or "categorical" funding could be contingent on evidence of regional engagement and focus, *iv)* requirements that institutions collaborate in order to obtain funding and *v)* special funding could be established to provide matching of funding obtained by higher education institutions from contracts with regional employers for education and training services. Israel could establish a special regional investment fund (funded from public and private resources) to provide funding for building HEI capacity for regional engagement and provide incentive funds to institutions and individual faculty members for regional initiatives. These could emphasise increasing tertiary education access and opportunity for the region's population (especially target populations), engaging faculty members and students in teacher/learning and applied research projects related to regional priorities. Kentucky Regional Stewardship and various HEFCE (Higher Education Funding Council in England) programmes provide examples.

- The new medical school should address the unique regional health challenges in the Galilee. Its focus should be on community-based medical education and new forms of health care delivery as well as generation of innovations that link Israel's IT leadership with effective health care delivery (telemedicine and individualised computer-based medical records systems). Authorities could support partnerships 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. Authorities could provide 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) and incentive funding for recruiting and training the region's population for health careers. Authorities could incentivise collaboration to strengthen the capacity of the existing higher education institutions and research institutes in the Galilee by: *i)* encouraging new academic programmes in social work, psychology and the allied health professions to be offered in collaboration with the new medical school programmes that provide opportunities for joint community-based clinical training, *ii)* providing opportunities for college students to transfer credits to the new medical school, *iii)* providing opportunities for college faculty to compete for funding for research to be conducted through the new institute, *iv)* providing opportunities for college faculty to have joint appointments with the new medical school and research institute and *v)* providing incentives in college faculty appointment and promotion policies that

recognise and reward faculty engagement in scholarship on the region's health, social and economic issues.

- Israel should enhance capacity building in regions. Experience in OECD countries shows that increased decision-making power at sub-national levels of government combined with co-ordination mechanisms can unleash the potential in the regions. As regional capacities are built through "learning by doing", increased responsibilities at the regional level are necessary to build skills and develop problem-solving approaches. A regional strategy platform should be developed in the Galilee. The joint resources of the higher education institutions should be mobilised for the preparation and implementation of regional strategies. The capacity for regional engagement should be improved in the region among key agencies and higher education institutions through fora for communication where good practices can be fostered through targeted training programmes which focus on practical problem solving. Evidence-based decision making should be strengthened in the region by focusing on a specific set of key indicators that the key regional stakeholders can monitor over time. This can result in a shared local knowledge base which will galvanise the development of a strong local strategy for change.

- Connectivity and mobility between urban centres and rural areas should be improved and further improvements in infrastructure should be made to connect peripheral regions and rural areas. High speed internet connections should be developed to enhance access to education in remote communities and teleworking opportunities for place-bound population groups.

Notes

1. The stages in the accreditation of an educational institution in Israel include: *i)* the stage of authorisation to advertise, register students and commence study (granted on the basis of preliminary examinations of the institution and the programmes of study that it proposes to offer). At this stage the institution is not yet accredited as an institution of higher education and is not authorised to award academic degrees to graduates, *ii)* the stage of a permit, *i.e.* the approval to open and maintain a higher education institution. At this stage, the institution is not yet accredited as an institution of higher education and is not authorised to award academic degrees to graduates and *iii)* the stage of accreditation and authorisation, during which the Council of Higher Education accredits the institution as an institution of higher education and authorises it to award an academic degree. An institution that is accredited according to the Council of Higher Education Law is a corporation and is competent to sue and be sued and enjoys academic and administrative autonomy. Authorisation of an institution to award academic degrees refers to the specific programmes of study that have been examined and approved by the Council.

2. The Council of Higher Education (CHE) originally approved the proposal to establish a medical school in the north in 2007 but it was not until August 2009 that the government gave its final approval. The CHE limited the competition to establish the new school to the three research universities that did not have an affiliated medical school: Weisman Institute of Science, Bar-Ilan University and the University of Haifa which liaised with the Technion in the application process. The colleges were not among the eligible applicants, but the intent has been to encourage collaboration between the colleges and the new medical school in the training of nursing and allied health professionals.

3. Often new schools look for partnerships with well-known medical schools (e.g. Harvard or Johns Hopkins) because of the prestige that they might bring to the new initiative. But the prominence of these institutions stems from leadership in medical research and solving the most complicated health care problems, not necessarily from innovation in medical education or new forms of health care delivery.

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Annex A Review team members

Jaana Puukka, a Finnish national, leads the OECD work on Higher Education and Regional and City Development. She joined the OECD Programme on International Management in Higher Education (IMHE) in 2005 to co-ordinate and manage the first round of OECD Reviews of Higher Education in Regional Development which took place in 2005-07 and embraced 14 regions in 12 countries. She is leading the second round of reviews in 2008-10 which is reaching out to 14 regions and city-regions in G8 countries and emerging economies. She is the co-author and editor of the OECD publication "Higher Education and Regions – Globally Competitive, Locally Engaged" (OECD, 2007). Before joining the OECD, Puukka had experience in higher education and regional development in Finland as a national and local government adviser, programme manager, practitioner and evaluator. She has management experience from both the university and polytechnic sector and has worked in university internationalisation, PR and communication and stakeholder management. In addition, she has experience in the corporate sector in the pharmaceutical industry.

Patrick Dubarle, a French national, former Principal Administrator at the OECD Public Governance and Territorial Development Directorate (GOV), has co-ordinated and contributed to a number of OECD territorial reviews at the national and regional level and has recently participated in the regional innovation reviews in Italy and Mexico. In 2004-2007 he represented GOV in the OECD project on supporting the Contribution of Higher Education Institutions to Regional Development and coordinated the review of the Mid-Norwegian region. Patrick Dubarle is a graduate from the French "Ecole des Mines", and holds a Master's degree in Economics from the University of Paris Sorbonne. He joined the OECD in 1978 as Administrator in the Directorate for Science Technology and Industry. He was appointed Secretary of the OECD Working Party on regional development policies in 1992, where he was responsible for country regional policy reviews and horizontal programmes. He has worked with national governments in many OECD countries and has spoken at several international conferences. He is the author of documents on high technology policies and sectoral questions including space industry, technological

change, technology fusion, innovation and higher education in regional development.

Aims McGuinness, a US national, is senior associate with National Centre for Higher Education Management Systems (NCHEMS), a private non-profit policy centre in Boulder, Colorado. At NCHEMS, he specialises in state coordination and governance of higher education and advising state governments on long-term strategies to improve the effectiveness of their education systems and linking education to the state's future economic competitiveness and quality of life. Prior to joining NCHEMS in 1993, he was a senior staff member for 17 years at the Education Commission of the States (ECS), one of the principal sources of policy advice on education reform for state governments. On the international level, he has served as examiner for Organisation for Economic Co-operation and Development (OECD) reviews of education policy in the Dominican Republic, Egypt, Estonia, Ireland, Korea, Latvia, Lithuania, the Russian Federation and Turkey, He is currently a consultant to the World Bank on governance of technical/engineering in India. He was general rapporteur for the September 2007 OECD International Conference, *Globally Competitive, Locally Engaged*. McGuinness earned his undergraduate degree in political science from the University of Pennsylvania, an MBA from The George Washington University and a PhD in social science from Syracuse University (Maxwell School).

Francisco Marmolejo, born in Mexico, serves as executive director of the Consortium for North American Higher Education Collaboration (CONAHEC), a network of more than 140 colleges and universities from Canada, the US and Mexico, headquartered at the University of Arizona, and Assistant Vice President for Western Hemisphere Programs. Previously, Marmolejo was an American Council on Education fellow on higher education leadership development at the University of Massachusetts-Amherst. His past positions include vice president for administration and academic vice president at the Universidad de las Américas in Mexico. He has taught at several universities and has published extensively on administration and internationalisation. Marmolejo consults for Latin American universities and governments, and has been part of OECD and World Bank peer review teams conducting evaluations of higher education in Europe, Latin America and Asia. Currently, he serves on advisory boards at a variety of universities, and professional organisations, including the Mexican Association for International Education (AMPEI), the American Council on Education and NAFSA. During the 2005-06 academic year he collaborated as an international consultant in the OECD Programme on IMHE. Marmolejo holds a MA in Organisational Administration from the

Universidad Autónoma de San Luis Potosí, and has conducted doctoral work at the Universidad Nacional Autónoma de México.

Ami Volansky is a professor at Tel Aviv University, School of Education. He specialises in education policy including centralisation and decentralisation processes, school reforms, school leadership, school-based management and higher education policy. His recent books are Academia in a Changing Environment: Higher Education Policy in Israel 1952-2004; The Pendulum Syndrome: Centralisation and Decentralisation of Education in England and Wales (2003); and School-Based Management: An International Perspective (2003), co-edited with Friedman., I. Professor Volansky is the former Deputy Director General at the Israeli Ministry of Education for Policy Planning and Assessment, and has served as the advisor on higher education policy of four Ministers of Education. He earned his first degree at bar-Illan University in education, his second degree in Criminology at Tel-Aviv University and his DPhil at Oxford University (Wolfson College).

Annex B OECD review visit agenda

21 November 2009

20:30 — 21:30	OECD review team meeting, Haifa

22 November 2009

09:00 — 11:00	Western Galilee College, Haifa Gideon Fishman, President Avishai Avdi, Chair, student organisation Amir Zaatut, Student, Economics and Business Administration Inbal Ozen, Student, Sociology and Human Resources Tal Koren, Student, Economics and Business Administration
12:00 — 15:00	Gordon College of Education, Akko Tzipi Oshrat, Head of College Stan Sofer, Sr. Lecturer Shannon Praeger, Student Kareen Salim, Student Anwar Aburish, Student
16:00 — 18:00	Technion - Israel Institute of Technology, Haifa Moshe Sheintuck, Deputy Senior Vice President Benny Sofer, Manager, Business Unit Shmon Gepstein, Head of Pre-Academic Studies Muli Dotan, Manager, Pre-Academic Center

23 November 2009

09:00 — 11:00	ORT Braude College, Karmiel

	Yohanan Arzi, President Various faculty members in a round-table setting Student representatives
11:30 — 14:00	Sakhnin College of Education, Sakhnin Mahmoud Khalil, General Manager Yaser Awad, Assistant General Manager Reuven Lazarowitz, Chairman of the Academic Council Student representative
15:00 — 16:00	Keter Plastics Factory, Karmiel Ruti Goldenberg, General Manager
16:00 — 17:00	Carmiel Economic Company and Technology Park, Karmiel Ami Nadir, General Manager
17:00 — 18:00	Elbit Systems, Ltd., Karmiel Elias Cohen, Vice President, Production and Maintenance Goren Albachari, Project Manager, Avionics

24 November 2009

09:30 — 11:00	Iscar, Ltd., Tefen Industrial Zone Stef Wertheimer, Founder and Honorary Chairman Dan Sharon, Director, Lavun Galilee Training Center
12:30 — 13:15	Ayalim Programme, Kiryat Shmona Hayim Schulman, General Manager Myriam Lasry, Manager, External Relations
13:30 — 14:00	Community Stress Prevention Center, Kiryat Shmona Mooli Lahad, President Dorit Elmaliach, Director General Ruvi Rogel, Member of Staff
14:00 — 15:00	Upper Galilee Regional Council, Kiryat Shmona Aharon Valenci, Chairman

15:00 — 18:00	Tel Hai Academic College, Kiryat Shmona Yonah Chen, President Rachel Rabin, Member, Board of Trustees Yossi Malca, General Manager Zevik Greenberg, Dean Hayim Goren, Vice President, Research Yael Meltzer, Head, Support Center Ron Ziv, Manager, Industry Relations Snait Tamir, Manager, Sustainability and Community Nutrition Programme Irit Sason, Manager, Youth Academic Center Tami Hagar, Head, Democracy and Peace Center Uri Mar-Hayim, Head, Migal - Galilee Technology Center

25 November 2009

09:00 — 09:45	Lower Galilee Regional Council, Kiryat Shmona Yitzhak Aschar, Head, Education Department and Founder, *Hesegim* Programme.
10:30 — 11:30	Nazareth Academic Institution, Nazareth Raed Mualem, Vice President Shani Paz, Head, Peace Studies Programme Various faculty members in roundtable
12:00 — 13:00	English Hospital, Nazareth Bishara Bisharat, Director
14:00 — 14:45	NGT Nazareth Tecnology Incubator Nasri Said, Vice President Nizar Mishael, CFO
14:45 — 15:00	Motus G. I. Medical Technologies—an NGT Portfolio Company Noam Hassidov, CEO
17:00 — 18:00	Subcommittee on the 5th Medical School, Jerusalem Prof. Yaron Cohen
18:00 — 19:00	Council of Higher Education (CHE) and Planning and Budgeting Committee (PBC), Jerusalem Steven Stav, Director General Manuel Trachtenberg, Chairman Galit Eizman, Manager, Research and Foreign Relations

26 November 2009

09:00 — 15:00	Review team internal meeting
16:00 — 17:00	Regional Steering Committee meeting and feedback from the OECD review team to the CHE and PBC

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Higher Education in Regional and City Development

The Galilee, Israel

Israel has developed a strong economy with entrepreneurial drive and high tech driven growth, but the socio-economic divide between population groups is growing. In the Galilee, about half of the population is Arab. A key challenge for the Galilee and Israel is the disparity between Arab and Jewish populations in terms of employment and education outcomes.

How can the government ensure that investment in education is equitable for different population groups? How can universities and colleges fuel local growth by developing relevant skills and improving educational attainment levels across the multi-ethnic, multi-religious population?

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

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