Malaysia

and the Knowledge Economy:
Building a World-Class Higher Education System

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FOREWORD

Sound macroeconomic and human resource development policies have underpinned Malaysia's strong economic performance in recent years, making it one of the most rapidly developing economies in the world. The Government of Malaysia fully recognized the need to sustain its growth prospects in the long-term, to maintain its competitiveness and move up the technology chain to produce higher value-added technology-intensive products. Noting their important contribution to producing future leaders and developing high-level technical capabilities, Malaysia has successfully invested in universities and other institutions of higher learning.

The Government of Malaysia is considering new policy directions to make the country an even more competitive player in the world economy. Such a strategy will require bold innovations in many sectors, including the university system whose contribution to greater value-added production should come from the generation and diffusion of relevant knowledge and the production of a critical mass of graduates with appropriate skills. Malaysia is thus attempting to transform its universities into dynamic and responsive institutions which can hold their place internationally.

In this context, the study *Malaysia and the Knowledge Economy: Building a World-Class Higher Education System* was prepared at the request of the Economic Planning Unit to help develop a strategic vision for the evolution of the country's universities towards becoming world class. This work was co-financed by the Economic Planning Unit. The study, which seeks to add value by sharing international experience with relevant strategies and policy measures, provides practical recommendations for the government's consideration, and served as an input into the Ninth Malaysia Plan (2006-2010).

In responding to the request to contribute to an analysis of the higher education sector, we sincerely hope that this report will help facilitate the ongoing policy debate and the development of Malaysian university system.

Emmanuel Y. Jimenez

Director
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ABBREVIATIONS

APEC	Asia Pacific Economic Cooperation
APITD	Action Plan for Industrial Technology Development
AUCC	Association of Universities and Colleges of Canada
BCI	Business Competitive Index
BDC	BioValley Development Corporation
BERD	Business Expenditures on R&D
CASTL	Carnegie Academy for the Scholarship of Teaching and Learning
CFI	Canadian Foundation for Innovation
CGPA	Cumulated Grade Point Average
CONEAU	Argentina Comision Nacional de Evaluacion y Acreditacion Universitaria
CRC	Canada Research Chairs
CRDF	Commercialization of R&D Fund
DFID	Department for International Development, UK
DOS	Department of Statistics
EAC	Engineering Accreditation Council
ECTS	Educational Credit Transfer System
EO	Export Oriented
EPU	Economic Planning Unit
EU	European Union
FDI	Foreign Direct Investment
FOMEC	Argentina's Quality Improvement Fund
FTE	Full-time equivalent
FTZ	Free-trade Zone
FYE	First Year Experience
GCI	Growth Competitive Index
GDP	Gross Domestic Product
GERD	Government Expenditures on R&D
GOM	Government of Malaysia
GRI	Government Research Institutions
GRS	Graduate Re-Skilling Scheme
HRDF	Human Resource Development Fund
HEFCE	Higher Education Funding Council for England
HEI	Higher Education Institutions
HEIF	Higher Education Innovation Fund
HEROBAC	Higher Education Reach-Out to Business and the Community Scheme
HICOM	Heavy Industries Corporation of Malaysia
HRDS	Human Resource Development Scheme
ICA	Malaysia's Firm Competitiveness, Investment Climate and Growth Report
ICT	Information and Communication Technology
IGS	Industry Research and Development Grant Scheme
ILO	International Labor Office/International Labor Organization
IMP	Industrial Master Plan 1
IMP2	Industrial Master Plan 2
INTI	INTI College Malaysia
IP	Intellectual Property
IRPA	Intensification of Research Priority Area
IS	Import Substitution
ISCED	International Standard Classification of Education
ISIS	Institute of Strategic and International Studies
ITA	Investment Tax Allowance

ITAF	Industrial Technical Asístanse Fund
ITL	Institute for Teaching and Learning
ITRI	Industrial Technology Research Institute
JTM	Malaysian Telecommunications Department
LAN	Lembaga Akreditasi Negara
LFS	Labor Force Survey
MARDI	Malaysian Agricultural Research and Development Institute
MASTIC	Malaysian Science and Technology Information Center
MBS	Modified Budgeting System
MDC	Multimedia Development Corporation
MDG	Millennium Development Goal
MGS	Multimedia Super Corridor Research and Development Grant Scheme
MIDA	Malaysian Industrial Development Agency
MIGHT	Malaysian Industry Government Group for High Technology
MIMOS	Malaysian Institute of Microelectronic Systems
MIS	Management Information System
MITRI	Malaysian Industrial Technology Research Institute
MMU	Multimedia University
MNC	Multi-National Corporation
MOE	Ministry of Education
MOF	Ministry of Finance
MOHE	Ministry of Higher Education
MOSTE	Ministry of Science, Technology and Environment
MOSTI	Ministry of Science, Technology and Innovation
MQF	Malaysian Qualifications Framework
MSC	Multimedia Super Corridor
MSI	Millennium Science Initiative
MTDC	Malaysian Technology Development Corporation
NAHERI	National Higher Education Research Institute
NEP	New Economic Policy
NHEFC	National Higher Education Fund Corporation
NIS	National Innovation System
NSF	National Science Fellowship
NZQUAA	New Zealand Quality Assurance Agency
NZVCC	New Zealand Vice Chancellors' Committee
OBM	Original Brand Manufacturing
ODM	Original Design Manufacturing
OECD	Organization for Economic Co-operation and Development
OEM	Original Equipment Manufacturing
PDC	Penang Development Corporation
PPP	Postgraduate and Postdoctoral Programs
PPT	Primary Project Team
ProACT	Research Program for Advanced Technology Policy
PS	Private Sector
PSD	Public Services Department
QA	Quality Assurance
QAA	Quality Assurance Agency for Higher Education
QAD	Quality Assurance Division
QANU	Quality Assurance Netherlands Universities
RAE	Research Assessment Exercise
R&D	Research and Development
RM	Malaysian Ringgit
SEDC	State Economic Development Corporation
SET	Science, Engineering and Technology
SEP	Subcontracting Exchange Program
SIRIM	Standards and Industrial Research Institute of Malaysia

SJTU	Shanghai Jiao Tong University
SME	Small and Medium Enterprises
SPT	Secondary Project Team
SSL	Attachment and Training Scheme for Unemployed Graduates
S&T	Science and Technology
STI	Science, Technology and Innovation
STP	Science and Technology Policy
STPC	Science and Technology Policy Council
STPM	Sijil Tinggi Pelajaran Malaysia
TAF	Technology Acquisition Fund
TAF-W	Technology Acquisition Fund for Women
TCO	Technology Commercialization Office
TCS	Teaching Company Scheme
TEKES	Finland National Technology Agency
THES	Times Higher Education Supplement
TNC	Transnational Corporation
TPM	Technology Park Malaysia
UiTM	University Technology MARA
UM	University of Malaya
UNAM	National University of Mexico
UNESCO	United Nations Education, Scientific, and Cultural Organization
UNESCO-UIS	United Nations Education, Scientific, and Cultural Organization - UNESCO Institute of Statistics
UNIDO	United Nations Industrial Development Organization
UNTAD	United Nations Conference on Trade and Development
UPM	University Putra Malaysia
USM	University Science Malaysia
UTAR	Universiti Tunku Abdul Rahman
UTM	Universiti Terbuka Malaysia
WEF	World Economic Forum's Global Competitiveness Report
WIR	World Investment Report

EXECUTIVE SUMMARY

There is no prescription for how a country creates such a culture [of knowledge] . . . But government does have a role—a role in education, in encouraging the kind of creativity and risk taking that the scientific entrepreneurship requires, in creating the institutions that facilitate ideas being brought into fruition, and a regulatory and tax environment that rewards this kind of activity.

Joseph E. Stiglitz, Nobel Prize lecture, 2001

The progress of the Malaysia economy in recent decades has been nothing short of impressive, a reflection of strong macroeconomic management and political stability. This impressive track record contributed to a substantial reduction in poverty and the enhancement of living standards. Foreign direct investment (FDI) played an important role in the country's industrialization and has shaped its industrial structure. The country ranks high in most of the industrial development indicators. It has maintained one of the highest shares of high-tech exports in the world for the last 10 years, largely surpassing the level of Korea, Thailand and OECD countries.

However, Malaysia's sustained competitive edge is not guaranteed. As with many developing countries entering the global economy, Malaysia will need to transform itself into an innovative economy in which competitiveness is no longer based primarily on mass production, low cost manufacturing efficiency, relatively unskilled labor, and low wages to continue to prosper in the decades ahead. Malaysia needs an economy where science, technology, and engineering are integrated into the production process and where creativity, imagination, knowledge, and design capability are embodied in well-educated skilled workers who are the main source of national prosperity and wealth. Making this transition will require improving the overall effectiveness of the university and national innovation systems. This will involve much more than improving only the functioning of the university system, even though the university system is clearly one of the most critical elements that must be upgraded. Malaysian firms must develop increasingly innovative production modes; address skill shortages that hamper efforts to design, produce, market more sophisticated goods and services; and multiply backward linkages between foreign firms and local suppliers.

Are Malaysian Universities World Class?

Recent efforts by the Government of Malaysia have brought about significant achievements, attesting that with appropriate funding, dedication, and high caliber leadership, Malaysian universities can achieve excellence. Under the Eight Malaysia Plan, the GOM has successfully modernized its university system and increased opportunities through the establishment of a range of new tertiary institutions to address the growing demand for a skilled workforce needed to sustain economic growth and competitiveness. Such actions bode well for fulfilling the aspirations of the GOM to achieve "a world class education system which

will realize the full potential of the individual and fulfill the aspirations of the Malaysian nation".[1]

Notwithstanding the achievements of the country's higher education institutions, few Malaysian universities have achieved a competitive position internationally. The international league tables show that the highest ranked universities in the world are the ones that make significant contributions to the advancement of knowledge through research, teach with the most innovative curricula and pedagogical methods under most conducive circumstances, make research an integral component of undergraduate teaching, and produce graduates who stand out because of their success in intensely competitive arenas during their education and, more importantly, after graduation. The rise of tertiary education graduate unemployment in Malaysia and the productive sectors' complaints relative to shortages of qualified labor, suggest that the higher education system has some significant limitations to overcome. These include: (a) needed improvements in governance and financing, to achieve greater autonomy, stronger accountability mechanisms, and a unified higher education system; (b) quality concerns, including insufficient number of faculty with the highest credentials and a disjointed quality assurance system; (c) relevance and graduate unemployment problems; and (d) a disjointed research and innovation system, with weak private sector demand for R&D and weak university-industry linkages.

Steering the Future of Higher Education

The attainment of world class status by Malaysia universities hinges, in part, on keeping a fine balance between two competing objectives: expanding the system and improving quality. The achievement of both objectives calls for careful development of a strategic plan that supports concrete policy reforms in the areas of governance, financing, curriculum, and pedagogy needed to facilitate the transformation of the university system. Adopting the goal of building world-class universities does not imply that all universities can or should be developed to international standard

Relaxing the administrative and financial rules and controls that public universities are required to conform to in their daily management would allow them to focus on important institutional development issues. International experience shows that steering the higher education system at a distance, by providing greater institutional autonomy and accountability and relying on broad strategic orientations and financial incentives to entice the most dynamic universities to transform themselves, may be the most effective approach in the long run. Removing the rigid distinction between the public and private higher education institutions would also promote competition and increase efficiency in the sector.

[1] *Source: Education in Malaysia*, MOE, June 2005, p. 5.

The 1996 legislative framework that was designed to enhance public university autonomy as part of the "corporatization" reform should be fully implemented, along with some strategic additions. Critical decision-making capacities that would heighten public university autonomy include: (a) the ability to enroll the most qualified students; (b) the ability to employ the most competent professors and researchers through competitive compensation packages; and (c) the authority to appoint highly qualified university leaders.

The long term vision for enhancing the capacity to become a leading knowledge-base economy and creating world class universities should be closely articulated with: (a) the country's overall economic and social development strategy; and (b) the ongoing reforms at the lower levels of the education system. In the Ninth Malaysia Plan and in the Knowledge-Based Economy Master Plan, Malaysia has outlined its strategy for becoming a knowledge-based economy. Malaysia will need to focus on two critical tasks: (a) absorbing and adapting existing knowledge from around the world as well as producing and commercializing new cutting-edge inventions; and (b) supplying the skilled manpower with the requisite technical and managerial qualifications needed by a modern, innovative economy. Malaysian universities must play a leading role in achieving both objectives.

Another important determinant of the quality of learning in universities is the academic preparedness and motivation of incoming secondary schools graduates. Mainstreaming pedagogical practices that encourage critical thinking and the mastery of foreign languages, including English, will require mutually reinforcing measures at all levels of education. The role of tertiary institutions in the preparation of primary and secondary school teachers should also be carefully reviewed.

Ensuring the Financial Sustainability of the Malaysian Higher Education Sector

Defining a sustainable growth model and mobilizing additional final resources will enhance Malaysia's capacity to build world class universities. Although public funding has rightly remained the main source of support for tertiary education, new financing strategies have been put in place in recent years in the public universities to generate revenue from institutional assets, mobilize additional resources from students and their families, and encourage donations from third party contributors. The GOM has also promoted the creation of private institutions. To attain the ambitious enrollment targets for 2010 in a financially sustainable way, a three-pronged strategy is proposed: (a) further increase resource diversification in public universities, including higher levels of cost-sharing; (b) achieve a balanced growth of the university and non-university sub-sectors within the higher education system with clear quantitative targets; and (c) create strong incentives for further private sector growth.

There are clear indications that Malaysian students and families are willing to contribute to the cost of their education, provided they can enroll in universities perceived as offering good quality and relevant programs. This is a critical factor since, with the exception of the Scandinavian economies which have very high taxation levels, few countries in the world have been able to significantly expand their higher education system, while at the same time improving its quality, without requiring a growing financial contribution to the cost of studies from students and their families.

However, as universities consider increasing tuition fees to promote cost-sharing, they must ensure that this does not have adverse effects on equity, particularly with respect to student loans and grants. The student loan program (NHFEC) should operate as a mechanism to help students from the lowest socio-economic groups. A first step to improve the effectiveness and sustainability of NHFEC would be to tighten the eligibility criteria by creating an income ceiling so as to make sure that only students from low and middle income families benefit from the subsidized loans. Secondly, the loan amount for diploma students should be sufficient to cover actual tuition fees for their programs. Third, in order to improve loan recovery, NHFEC will need to reexamine its administrative arrangements, including finding more effective methods to locate students (computerized MIS, use of social security number, link to degree award ceremony, etc.) and enforcing stricter sanctions against delinquent graduates, possibly relying on the Income and Revenue Office. Finally, another factor that may improve loan recovery is to program the repayment schedule in line with the natural evolution of salaries. Relying on graduated payments or making payments proportional to earnings instead of fixed payments, as in the UK and Australian schemes, would help minimize the burden on graduates and improve loan recovery.

Balancing the growth of the university and non-university sub-sectors can be an effective enrollment expansion strategy from a public resources management perspective. In addition to protecting the resource base of the public universities by absorbing a significant proportion of secondary school graduates, the non-university institutions can make useful contribution by offering training opportunities that respond in a flexible manner to labor market demand. The GOM is effectively pursuing this move through the expansion of the network of polytechnics and community colleges as well as the Open University. At the same time, bridges to facilitate movement from one type of institution to the other should be put in place, such as a comprehensive credit transfer system and effective mechanisms for the recognition of qualifications.

- **To promote greater efficiency and innovativeness in the use of public resources, the GOM should consider expanding the amount of funds available to universities through performance-based funding mechanisms.** These mechanisms attempt to allocate funds to the best performing institutions or most promising proposals. They rely on performance indicators that reflect public policy objectives rather than institutional needs, and provide incentives for institutional improvement, not just maintaining the status quo. A recent study suggests that the GOM could save between 10 and 30% of the operating budget of the public universities if resources were allocated on the basis of a funding formula using unit costs benchmarked against the better performing institutions.[2] Four types of innovative allocation mechanisms might be considered**:**

[2] Innovation Associates. 2004. "Development of a New Funding Methodology for Malaysian Public Institutions of Higher Education". Report commissioned by the Ministry of Higher Education.

- Performance contracts - governments enter into regulatory agreements with institutions to set mutual performance-based objectives.

- Performance set asides - a portion of public funding for universities is set aside to pay on the basis of various performance measure.

- Competitive funds - support peer-reviewed proposals designed to achieve institutional improvement or national policy objectives.

- Payments for results - output or outcome measures are used to determine all or a portion of funding formula, for example universities are paid for the number of students they graduate, sometimes with higher prices for graduates in certain fields of study or with specific skills, as practiced in the Netherlands.

While, in most countries, public funds provide the largest share of support to higher education, some also provide a portion of the public funds directly to students and their families. In Malaysia, as in many other countries, substantial resources are allocated directly to students in the form of *grants and student loans*. **Another innovative student-based approach is demand-side vouchers which finance the recurrent expenses of institutions indirectly through vouchers provided to students.** These students may then make their own choice of the institution in which they want to enroll. The most prominent examples can be found in the state of Colorado (US), the former Soviet Republic of Kazakhstan, and Brazil. For example in the latter, the Brazilian government uses tax incentives to "buy" places in private universities for academically qualified, low-income students who were not admitted in the top public universities because of the limited number of spaces.

To integrate its research universities into the global research community, Malaysia will need to consider several options for restructuring its research funding mechanisms. The GOM could allocate more R&D resources on a competitive basis, provide special incentives for collaboration with foreign research institutes, universities and private companies, offer special R&D funding allocations that are not tied to undergraduate enrollment, and introduce programs for attracting world class researchers and professors from abroad, as done by South Korea, Singapore and China.

One of the most effective ways of allocating research funds is to promote the development of centers of excellence by concentrating on top level researchers and financing in particular institutions specializing in certain fields or endeavors. Centers of excellence have the potential of improving the relevance of research if the themes on which the centers focus accurately reflect national priorities and societal needs. Some of these successful centers can be found in New Zealand, the Netherlands, China, South Korea, Chile, and Venezuela.

In sum, there is a large range of resource allocation mechanisms that the GOM may consider pursuing as it seeks to enhance its policy objectives for higher education development. The experience with performance-based allocation mechanisms in various countries over the past decade suggests that tying policies to results can have many beneficial effects. It also indicates

that rather than relying exclusively on one funding method, countries are better off selecting a mix of allocation instruments to meet the various policy objectives sought as long as these instruments are deemed complementary.

Improving the Quality of Malaysian Universities

While quality education may be defined in terms of internationally accepted criteria and standards for academic programs and educational experiences, a "world-class" education implies achieving a much higher threshold of quality where academic performance and output are measured relative to a league of very select institutions. Having a clear vision of what it is that gives a particular university or program the attribute of being world-class will enable the GOM and, with increased autonomy, the universities to decide what fundamental changes need to be made and how best to prioritize and use resources to achieve international recognition. Various reforms that can contribute to the transformation of the Malaysian universities into world-class institutions should be considered, including rethinking academic programs, faculty management, pedagogical methods, and student learning.

Academic programs could be reformed to enhance the transparency and quality assurance mechanisms of the Malaysian higher education system. Such reforms could include: (a) ensuring academic standards are respected across institutions and programs, and that new programs are approved only if the demand exists and corresponding resources are available; (b) simplifying the centralized process of reviewing academic standards; (c) making standards and criteria for university entry simpler and more transparent, and applied to ensure the match of the most academically qualified students to the best programs while simultaneously recognizing the value of diversity; and (d) ensuring quality assurance bodies (LAN and QAD) are autonomous, with inclusive mandate to apply the same standards to both private and public universities. These bodies should have technical capacity, involve international peer reviewers, and produce transparent reports available to the public. In addition, universities should be prepared to respond to the growing preference for English language instruction, which would allow both students and faculty to become competitive at the international level.

High quality teaching and innovative methods of delivery, particularly at the undergraduate level, are key components of top level universities. To this end, faculty management reforms should ensure that: (a) the faculty is not overloaded with teaching assignments and there are opportunities to plan and introduce innovative teaching methods; (b) senior researchers and academics are more involved in the teaching of undergraduate students to promote better integration of research and undergraduate education; (c) student course evaluations have impact on faculty tenure and promotion considerations; and (d) faculty academic success is measured by the impact of teaching, scholarship and research, based on an agreed upon set of criteria, judged as appropriate by external and international peers. The faculty shortage can be addressed by creating flexible conditions to retain qualified academics beyond the current retirement age of 56, as well as systematically releasing junior academics to fast track the completion of the degree requirements for their Ph.D.

Student learning must be enhanced so that graduates can succeed in the local and international labor markets. These graduates:(a) have mastered specialized knowledge and can apply that knowledge to practice; (b) have developed complex cognitive abilities (e.g., analytical thinking, problem-solving, reasoning, etc.), strong communication skills in more than one language, and literacy in the use of technologies; (c) have the desire and ability to engage in life-long learning; and (d) will be able to make meaningful contributions to the advancement of their local community, their country, and the world. It is the international reputation of universities in promoting these achievements that make them world class. Moreover, it is their dynamism and their ability to foresee new challenges and respond to them that sets them apart from the rest.

The ability of graduates to be functional in international contexts and in different cultures and languages with ease is an indicator of the quality of education they have received. A cornerstone of internationalization is the extent to which local students are exposed to other educational systems. Malaysia has a long history of providing scholarships to its students to study abroad and indeed, it sends more students abroad than it receives. Although the consensus is that most Malaysians have strong national ties and prefer to return to their own country rather than be lured by more attractive opportunities in the countries where they study, without data, this claim cannot be substantiated. The GOM also intends to promote Malaysia as a regional educational hub and to attract increased number of international students to study in its primarily private universities. A strong evidence of quality will be the capacity of Malaysian universities to attract international students from OECD countries, and in particular those that have excellent systems.

To increase international recognition, the GOM will need to determine where its system and institutions stand today (in relation to other world class universities) and what support is needed to enable them to compete at an international level. Key areas of change to consider include:

- Ensuring that Malaysian universities complement each other in terms of their mission, priorities, and academic orientation at the national level and regional levels. Encourage universities to pursue diverse missions so that they are able to **respond to the changing needs of their constituencies.**

- Increasing autonomy of public universities and expecting full accountability in return. Empower universities to make independent decisions about their mission, governance, hiring of their academic leaders, academic and non-academic staff, selecting students, and introducing new programs and courses.

- Targeting resources to programs/institutions that have potential of achieving world-class status and reinforcing their capacity accordingly.

- Ensuring that the general academic context and governance structures create a climate that upholds academic values including autonomy, freedom of expression, collegiality, and integrity.

- Developing the capacity to compile and analyze data on all aspects of higher education. Make the output of such analysis and raw data available to all institutions to utilize in their own planning and decision-making.

Improving the Employability of Graduates

How well do Malaysian universities prepare graduates for the world of work? The issue of relevance arises because of growing numbers of unemployed graduates since 2000. Numerous people have voiced concerns about: (a) the capacity of the economy to absorb the expanded output of graduates; (b) the quality of tertiary education; and (c) the mismatch between what higher education institutions are producing and the skills demanded by employers.

Historical evidence indicates that the economy has the capacity to absorb the recent expanded supply of tertiary graduates. Furthermore, in the high-growth period in the early 1990s, employers were supply constrained in hiring graduates while post-2000, they employed more graduates than might be predicted by slower rates of economic growth. The growing *number* of unemployed graduates since 2000 is primarily driven by the expanded output from public and private tertiary institutions. Unemployment *rates* of graduates are initially high but fall with time in the labor market as a result of successful job search. Their unemployment profiles, as well as job search duration, have been largely unchanged over time, and should improve as the economy continues to recover.

Concerns about the workplace relevance of university education remain. Tracer studies, commissioned research, and employers point to the need for tertiary education institutions, public universities in particular, to better build into their curricula soft skills (language, team work, and problem solving), link faculty to industry, provide students with workplace experience through job attachments in the private sector, and provide career counseling. These steps should help to reduce problems in the initial transition of new graduates from university to the labor market.

The Government has responded to the post-2000 phenomenon of rising numbers of unemployed graduates with numerous commendable policy initiatives. These initiatives aim to make graduates more employable through job attachment and retraining programs, to place them in employment through incentives to employers, or provide them with the wherewithal to set up small businesses. They are recognized as short-term policies, and as stated earlier -- the graduate unemployment phenomenon is largely due to a short-term imbalance between supply and demand of graduates, and unemployment that accompanies initial search for a good match by young graduates. The latter implies that with expanding tertiary output, the continued presence of temporarily unemployed graduates is unavoidable.

The main challenge for policy makers is not simply ensuring that graduates find employment, but rather employment that best uses their education. The issue then is not just insertion of university graduates into any job, but the effective transmission of knowledge and skills acquired in universities to jobs that will best use them. This means that policymakers should be guided not just by whether graduates find jobs, but whether these are productive and well-paying jobs, and that policies to assist them are both efficient and cost-effective in

delivering the desired labor market outcomes as compared to the alternative of not intervening. This will require a greater degree of focus on monitoring and evaluation, and on evidence-based assessments of policy effectiveness than has hitherto been the case in Malaysia.

International experience with a wide range of active labor market programs (ALMPs) for the unemployed paint a cautionary picture about their effectiveness, including some that governments have introduced for unemployed graduates. Global experience suggests that some work well, others do not, and results can vary across countries, suggesting that individual countries must rigorously evaluate their own programs and, if needed, redesign them to improve effectiveness. Specifically, employment services (career guidance, information about available jobs, job search assistance, access to education and training programs, etc.) are an effective type of intervention. The effectiveness of other programs, including those that focus on training and retraining (including those that target youth), wage and employment subsidies, and self-employment assistance, have produced mixed-results. This broad review indicates that ALMPs are not a panacea, and governments should have realistic expectations about what can be achieved by these policy interventions.

The Government could focus on several longer-term policy priorities to encourage more efficient labor markets that will lead to improvements in labor market outcomes for university graduates and for other educational groups, and a more effective transmission of knowledge and skills from education and training institutions to the real economy. Key recommendations to increase the employability of graduates and other groups, and more broadly to improve the functioning of labor markets and the effectiveness of government interventions, include:

- Increase the workplace relevance of education and training. The government has already begun to address supply side issues of skills mismatch by incorporating private sector inputs into curricula design. Other recommendations include: (a) fostering stronger university-industry linkages through industry internships for students, faculty engagements in the private sector; (b) identifying and introducing programs in high-demand fields, with co-funding from the government for development costs; and (c) continuing tracer studies of graduates, with feedback to improve curricula design and career counseling.

- Strengthen employment services. A strong employment service is the cornerstone for the efficient operation of labor markets, and for delivery of active labor market policies. Employment services in Malaysia are provided by state labor offices (JTR) whose services are reportedly not widely used by job seekers. The Government has sought to improve employment services through internet-based employment matching and training management systems, and by licensing private employment agencies such as Jobstreet.com. To strengthen public employment services, the Government could develop a vision of the role of JTR as a provider of integrated employment services, and support its expansion and professionalization.

- Make surveys more policy relevant and accessible. Several modest changes to the ongoing labor force survey (LFS) should be made to realize its potential as the key source of labor market information in the country. This includes adding questions such as public or private

education, wage and salaries, and going towards a rotating sampling frame. These simple changes can vastly improve the usefulness of the LFS for labor market analysis and for rigorous impact evaluations of a wide range of government programs.

- Disseminate relevant labor market information widely. There is great demand for timely and relevant labor market information. The Government could provide greater and more ready access to the wealth of micro labor market information generated by the statistics department and government agencies. A labor market observatory should be set up, possibly along the lines of a national institute, and tasked to conduct labor market studies in the public interest, and for the government. Its mandate would include publication and wide dissemination of relevant labor market information to all stakeholders, including education and training institutions, government agencies, employers, and individuals.

- Institutionalize monitoring and evaluation. Rigorous and systematic evaluations could be conducted for all education and training institutions and for labor market programs targeting different groups, not just unemployed graduates, administered by various government agencies. The Government could consider institutionalizing systematic monitoring and impact evaluations within the framework of performance-based budgeting for all government programs that receive substantial public resources. The culture and capacity to undertake M&E in government agencies is limited, and the practice should be phased in gradually. Lessons from other countries highlight the need to adequately fund government agencies for staff training in M&E methods and to commission impact evaluation studies from independent experts

Strengthening the National Innovation System

The Knowledge-Based Economy Master Plan states that the Malaysian economy is at a crossroads. Malaysia prospered during the last 20 years because it established itself as a successful production-based economy. But other countries, with even lower wages and more FDI, are now also entering the global economy. Malaysia is currently facing a dual competitiveness problem: companies that export conduct primarily low-value added, assembly type operations – precisely the activities that are facing increasing competition from lower wage economies. At the same time, Malaysian companies that innovate actively are typically not doing so in ways that are likely to produce high value added, globally competitive goods and services for international markets. If Malaysia wants to ensure continued growth, prosperity, and rising standards of living, it has no choice but to become an innovative, knowledge-based economy. The GOM has stated unambiguously that it wants Malaysia to become a leading innovative economy. Improving the efficiency of the National Innovation System (NIS) is an absolute necessity.

Malaysia's quest to become a sophisticated knowledge-based economy is likely to be frustrated, unless policies to link Malaysian firms with universities and research institutes are strengthened. More than one-third of Malaysian firms responding to the Malaysian Science and Technology Information Centre (MASTIC) survey indicate that lack of skilled personnel and lack of information on technology is an innovation-hampering factor of high importance. The human capital constraint here is apparent. Universities and research institutes have the potential

to forge closer linkages between local and global technology markets and local and global research markets. Yet at the same time, they need more skilled personnel and sophisticated strategies and programs to achieve their stated objectives.

A world-class national higher education system is a sine qua non for improving the National Innovation System. First, most of Malaysia's S&T personnel are employed in the higher education sector. Improving the national R&D system will be impossible without the support and participation of research-intensive public and private universities. Second, higher education institutions will have to play a major role in training enterprises to use more sophisticated technology. And finally, via their standard science and engineering undergraduate curricula as well as via their lifelong learning programs, they will play a major role in both training and retraining workers to utilize new technology.

The Ninth Malaysia Plan sets the ambitious target that S&T activities contribute at least one-third of Malaysia's annual economic growth. To achieve this goal, the Ninth Malaysia Plan calls for optimizing the application of new and improved technology, increasing local innovation capability, providing an improved enabling environment for technology development, accelerating technology commercialization, and boosting private sector spending on R&D. The challenges inherent in the proposed strategy can be illustrated by looking at Malaysia's electronic industry. Despite tremendous growth, Malaysia's electronics industry remains characterized by relatively low skills and R&D intensities. It operates in a dual economy, with an export-oriented economy on one side, dominated by Multinational Corporations with few linkages to local firms, and on the other, a domestic economy, where skills-intensity, R&D intensity, and innovation activities have yet to become internationally competitive. In other words, Malaysia has succeeded essentially by focusing on a FDI-led strategy without a rapid shift towards higher value added activities.

Malaysia's skills and technology upgrading policies did not have the intended effects for a number of reasons. First, although fiscal incentives had worked very well in attracting FDI, they were less effective in promoting skills-upgrading and R&D. This is because foreign firms which already enjoyed generous tax exemptions were not very motivated by additional incentives aimed at promoting skills- and technology upgrading and increased local R&D. Second, the effectiveness of R&D grants has been quite limited by the lack of complementary support systems for new firms. Grants are only effective to the extent that firms already know *how* to innovate – without innovation know-how and training many firms may not be able to make high quality proposals for grants. Third, there is an issue of lack of skilled personnel. If Malaysia is to reap future *sustainable* benefits from achievements, international competitiveness must be achieved and large-scale upgrading of the skills of the work force is a *sine qua non*. Finally, differential treatment of domestic firms and Multi National Corporations are largely responsible for the dual economy that Malaysia has today. It will be crucial for Malaysia's future economic development that a different approach be adopted -- one that aims specifically at building institutions and linkages that foster technological learning and innovation across the entire economy.

Besides support to the university system to achieve "world class" status, and the policy to ensure continued growth, prosperity, and rising standards of living, Malaysia must move

towards becoming an innovative knowledge-based economy. This will both reinforce the demand for universities to produce students with skills for innovation and encourage a spirit of innovation throughout the education sector. To do so, the country must improve the effectiveness and the efficiency of its national innovation system, e.g. by supporting technology acquisition and diffusion, supporting development of high value-added products, taking full advantage of global knowledge and technology markets, connecting effectively with global value chains, embedding S&T efforts in a broader policy of competitiveness, linkages and entrepreneurship, and involving business entrepreneurs in technology commercialization.

Policies to reform the Malaysian science and technology policy framework should include four dimensions. First, the role of the State could be reoriented in Malaysia's economic development. The current mix of control, fiscal incentives, and preferential treatment is not conducive to Malaysia's transformation to a knowledge-based economy. Second, it is of paramount importance to adopt innovation system thinking as the overarching conceptual framework in all policy-making. Third, the GOM should be careful to formulate economic development strategies for each of the regions of the country, rather than just one strategy for the national economy as a whole. It is of paramount importance that the formulation of these regional economic development strategies are undertaken jointly by industry, government, and research institutions, and engage international expertise on global value chains in sectors identified as strategic for each region. Lastly, based on the previous two reform recommendations, the GOM, scientific research community, universities, and the business community should discuss and agree on a mission statement that identifies goals and priorities for Government Science Technology and Innovation spending.

A variety of complementary policy reforms can help to improve the efficiency of the Malaysian national innovation system in which universities will play a major role. Recommendations for encouraging innovation within the university sector itself include:

- Funding research competitively and selectively.
- Establishing professionally managed Technology Commercialization Offices housed in selected universities.
- Developing a Technology Broker program.
- Involving the universities in regional development efforts.
- Strengthening university-industry linkages.
- Building the institutional capacity for third mission activities.
- Developing entrepreneurship courses.
- Aligning the university culture with the business culture.

In conclusion, the Malaysian higher education system is at a critical point in its evolution. The GOM has the potential to continue to build on past achievements and foster a system that meets the needs of a leading knowledge-based economy. At the same time, without focused and strategic reforms, the Malaysian higher education system may lag behind neighboring countries that are actively developing and rewarding the most innovative and accomplished universities. Such reforms will need to focus on: (a) choosing more effective governance and financing models; (b) improving the overall quality of the universities with a focus on academic programs, faculty management, and student learning; (c) equipping university graduates with the tools necessary for a knowledge-based economy; and (d) strengthening the national innovation system by creating stronger links between Malaysian firms and universities.

Malaysia and the Knowledge Economy: Building a World-Class Higher Education System

In human affairs the logical future, determined by past and present conditions, is less important than the willed future, which is largely brought about by deliberate choices.

René Dubos

INTRODUCTION

Background

This report was prepared at the request of the Government of Malaysia (GOM) as a contribution to the long term development objectives for the university sector under the Ninth Malaysia Plan. The GOM is considering new policy directions to make the country a more competitive player in the world economy. Such a strategy will require bold innovations in many sectors, including the university system whose contribution to greater value-added production should come from the generation and diffusion of relevant knowledge and the production of a critical mass of graduates with appropriate skills. Malaysia is thus attempting to transform its universities into dynamic and responsive institutions which can hold their place internationally.

In this context, the Economic Planning Unit (EPU) and the Ministry of Higher Education (MOHE) have requested analytical and advisory services from the World Bank to help develop a strategic vision for the evolution of the country's universities towards becoming world class. The present study, which seeks to add value by sharing international experience with relevant strategies and policy measures, provides practical short-term, medium-term and long-term recommendations and an action plan for the government's consideration, and served as an input into the Ninth Malaysia Plan (2006-2010).

The team that worked on the report included:

- Omporn Regel (team leader, East Asia Department, World Bank).
- Jamil Salmi (coordinator of the World Bank's higher education network).
- Alfred Watkins (coordinator of the World Bank's science and technology program).
- Hong Tan (lead labor economist, World Bank).
- John Dawkins (higher education policy expert, consultant).
- Alenoush Saroyan (quality assurance expert, consultant).
- Jakob Vestergaard (innovation system expert, consultant).

To achieve the objectives mentioned in the terms of reference agreed with EPU and MOHE (see Annex 1), this report assesses and analyzes the current state of the Malaysian university system and makes recommendations on ways to further strengthen existing higher education institutions. It looks in particular at the policy framework needed to support the growth and development of the higher education system -- legal framework, quality assurance systems, incentives for investment, R&D policies, financing mechanisms that help low income students access education, and public financing programs that direct subsidies to strategically important institutions or fields of study. This report aims to identify key challenges and appropriate solutions which could constitute relevant policy advice for the GOM.

Scope and Methodology

As recommended by EPU and MOHE, this study concentrates on the higher education sector, including both public and private universities. Notwithstanding the overall focus on the university sector, the study makes occasional reference to the wider concept of tertiary education system as needed.[3] The study also makes reference -- particularly in Chapters 1, 6, and 11 -- to the broader concept of a national innovation system (NIS). This concept encompasses the way in which Government policies, private sector investment and innovation, higher education institutions, research institutes, and foreign investors interact to facilitate the transformation of knowledge into wealth. This study is not designed to provide a comprehensive overview and analysis of the strengths and weaknesses of Malaysia's NIS. Nevertheless, it does devote considerable attention to a number of critical issues related specifically to the way that improvements in the performance of higher education institutions can lead to an overall better performance of the NIS.

The study was conducted as an expert evaluation similar to the country reviews carried out by the OECD. The World Bank team visited Malaysia from September 18 to 30, 2005. During that period, it met with government officials from the Economic Planning Unit, the Ministry of Higher Education (MOHE), including the Quality Assurance Division (QAD) and the Lembaga Akreditasi Negara (LAN), the Ministry of Finance, university leaders, administrators, professors and students at public and private universities in and around Kuala Lumpur, Penang and Johor, as well as representatives of research institutes, professional associations and employers. The list of institutions visited and persons met is presented in Annex 2. A follow-up visit took place in December 2006, during which a draft version of the report was presented and discussed at a workshop organized by EPU and MOHE. This final version of the report incorporates comments and suggestions made during the workshop. The study team is grateful for the advice and guidance of Y. Bhg. Tan Sri Wan Zahid Nordin, the chairman of the in-country higher education committee. The team is pleased to note that there is a strong convergence between this report and the committee's own report on key issues and ways forward for the Malaysian higher education.

[3] The OECD defines tertiary education as "a level or stage of studies beyond secondary education. Such studies are undertaken in tertiary education institutions, such as public and private universities, colleges, and polytechnics, and also in a wide range of other settings, such as secondary schools, work sites, and via free-standing information technology-based offerings and a host of public and private entities." (Wagner, A. 1999. "Lifelong Learning in the University: A New Imperative?" In W. Hirsh and L. Weber, eds. Challenges Facing Higher Education at the Millennium. 134-52. American Council on Education. Phoenix, Arizona.: Oryx Press. p. 135).

Data sources used to undertake the analysis and elaborate on the recommendations presented in this report include the interviews conducted during the 2005 mission, official government reports and policy statements, documents and annual reports prepared by the universities visited, research reports, policy research studies, surveys, newspapers and other media including the Internet. Available quantitative information was retrieved from databases of international organizations such as UNESCO, ILO, OECD, the Asian Development Bank and the World Bank**.** The team made conscious efforts to use the latest information available. However, in some cases, in the absence of recent data, the analysis is based on data that is a few years old. Annex 10 gives the list of all documents consulted.

Report Outline

The report is organized into two main parts. It starts with a diagnosis of the present situation, relying on a range of key indicators to benchmark Malaysia's national innovation and higher education systems against select OECD and East Asian countries and on an in-depth analysis of the universities' main strengths and areas of weaknesses. The second part provides policy recommendations and detailed action plans to improve the Malaysian higher education system, with special attention paid to the research and innovation nexus, graduate employment, quality assurance systems, financing mechanisms, and the governance and management framework.

In order to provide the GOM with as many useful options and relevant international examples as possible, the recommendation chapters are quite detailed, which explains the length of the report. To guide the readers of the report who want to focus on a specific set of issues, it may be more convenient to look at the corresponding diagnosis chapter and policy options chapter together. For example, financing issues are discussed in detail in chapter 3 on the diagnosis side, and in chapter 8 on the suggested policies side. Quality issues are discussed in chapter 4 (diagnosis) and chapter 9 (policy options). Graduate employment issues are covered in chapters 5 and 10. Similarly, innovation policies are treated in chapters 6 and 11.

PART I. DIAGNOSIS OF THE PRESENT SITUATION

Chapter 1. Benchmarking the Malaysian Innovation System

Main Findings

- *Malaysia has one of the most remarkable economic growth records in modern history, a reflection of strong macroeconomic management and political stability.*

- *Inward foreign direct investment played an important role in the country's industrialization and has shaped its industrial structure. However, the success of the economy has been built largely on the expansion of relatively basic technology, sustained by a steady flow of foreign direct investment.*

- *For Malaysia to continue its growth prospects in the long-term, the country will need to maintain its competitiveness in scientific fields and to move up the technology chain to produce higher value-added technology-intensive products. It should address an increasing human resource constraint, i.e. shortage of qualified workers with scientific and technical skills.*

The challenges facing Malaysia in realizing its policy objectives in the domain of higher education can only be properly addressed on the basis of a thorough understanding of the reforms needed to ensure its transition to a knowledge-based economy. This first chapter benchmarks the progress of the Malaysian economy and innovation system against relevant comparators among OECD and neighboring countries. The innovation system is defined as the nexus of firms, research centers, universities, consultants and other organizations which access the growing stock of global knowledge, assimilate it and adapt it to local needs.

In conducting this benchmarking exercise, several broad sets of data illustrate significant areas of success for Malaysia. From recent economic performance to technological development and innovation strategy, from expansion of the higher education system to graduation rates to graduate unemployment, from university rankings to government expenditures on research and higher education, useful and significant data are available to help illustrate the current conditions in Malaysia. However, in reviewing the benchmarking data presented below, it is important to note that the data indicates how far Malaysia has come. But despite this impressive progress, the benchmarking data say little or nothing about how much further and faster Malaysia must travel if it is to meet the challenge of prospering in the increasingly competitive 21st century global economy.

As will be discussed in more detail below, the Malaysian economy has recorded remarkable progress in the past two or three decades. Per capita incomes, economic growth, and exports (mainly high tech) have risen dramatically; poverty has been reduced; competitiveness has

increased; and literacy rates and other MDG indicators have all improved noticeably. Much of the growth and expansion of exports was fueled by large Foreign Direct Investment (FDI) inflows. But the Malaysian growth model – like that in Mexico and Mauritius, among others -- is in danger of slowly running out of steam. Simply stated, Malaysia prospered during the last 20 years because it established itself as a successful production-based economy in which competitiveness was based primarily on mass production, low cost manufacturing efficiency, relatively unskilled labor, and low wages. Malaysia's global competitiveness rose significantly during this period as a result of this outward-oriented growth strategy. But other countries, with even lower wages and greater FDI inflows, are entering the global economy and eroding Malaysia's former competitive advantage. Ironically, Malaysia's past success (which led to rising per capita incomes and rising wages) has rendered this tried and effective development model less appropriate for Malaysia's future progress.

As a result, if Malaysia is to thrive and prosper in the decades ahead, it will have little choice but to transform itself into an innovative economy in which competitiveness is no longer based on low wage, abundant labor but rather on integrating science, technology and engineering into the production process. Creativity, imagination, knowledge and design capability would be embodied in well-educated skilled workers as the source of national prosperity and wealth. Making this transition will require improving the overall effectiveness of the national innovation system. This will involve much more than improving only the functioning of the university system, even though the university system is clearly one of the most critical elements that must be upgraded. However, as the Investment Climate Assessment (ICA)[4] also suggests, Malaysian firms are not sufficiently innovative. Skill shortages hamper efforts to design, produce, and market more sophisticated goods and services, and there are limited backward linkages between foreign firms and local suppliers. These issues must also be addressed if Malaysia is to become a truly innovative economy, and a revamped university system will have an important role to play in solving these problems.

Moreover, as the Knowledge-Based Economy Master Plan points out (Chapter 6)[5], Malaysia lags far behind virtually all OECD economies and such dynamic East Asian economies as Korea and Singapore on a wide range of technology indicators. Once again, Malaysia will have to find a way to boost its performance so that it is closer to that of the leading global economies. To be a truly successful innovative economy, in the future it will have to find a way to compete effectively with the leaders and also with its strongest competitors who are also looking for ways to strengthen their global competitiveness. Constant attention is needed to these issues in today's rapidly changing world.

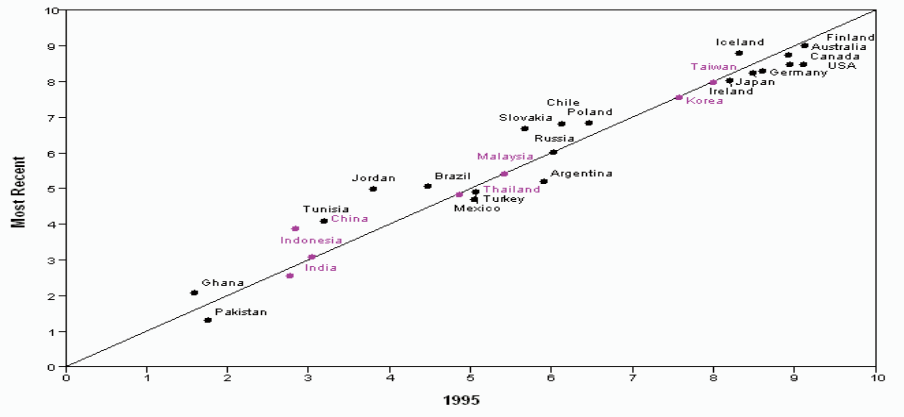
The World Bank's Knowledge Assessment Methodology (KAM) illustrates these points in vivid detail. On the one hand, Malaysia would appear to be well positioned to prosper in the global knowledge economy. Malaysia is right in the middle of the pack of successful middle income countries -- slightly behind many of the so-called transition economies, Argentina and Chile, but ahead of many East Asian economies as well as Brazil, Turkey and Mexico. On the other hand, many of these same countries are working diligently to improve their higher education and

[4] World Bank 2005. Malaysia's Firm Competitiveness, Investment Climate and Growth" Washington D.C: World Bank

[5] http://www.epu.jpm.my/New%20Folder/publication/knowEco/CHAPTER_6.pdf

national innovation systems. These are precisely the countries that are likely to be among Malaysia's fiercest competitors in the immediate future. If they proceed to run faster, Malaysia will have to run even faster simply to avoid losing ground. And it will have to run faster still if it wants to gain ground and become one of the world's leading innovative economies. This is a daunting challenge, but by no means an impossible one.

Figure 1.1 Global View: Knowledge Economy Index



Economic Performance

Macroeconomic Performance. From the mid-1960s to the mid-1990s, the East Asian economies exhibited the highest growth rates in the world. During that period, they grew three times as fast as the Latin American economies, twice as fast as the other Asian economies and three times as fast as the US. Among the East Asian countries, Malaysia was considered to be among the three most successful, along with Korea and Taiwan. It has one of the most remarkable economic growth records in modern history, a reflection of strong macroeconomic management and political stability. This impressive track record, evidenced by 9% annual GDP growth in real terms from the late 1980s to the mid-1990s, contributed to a substantial reduction in poverty and enhancement of the standards of living. With the exception of two periods in recent times -- the Asian Financial Crisis in 1997-1998 and the downturn in global demand in 2001 -- Malaysia has experienced consistent economic growth. The country's Gross Domestic Product increased by 7.1% in 2004 (the highest since the 1997 economic crisis), just behind that of the East Asia Region trend in GDP growth of 7.2%, but well ahead of the OECD country trend of 3.1%.

However, the record of rapid growth will not necessarily ensure continued growth in the future. As the recent ICA points out, most of Malaysia's rapid growth has been driven by factor accumulation. Productivity growth, especially over the past two decades has been relatively modest. Malaysia will need to find ways to reverse this declining productivity growth trend if it is to become an innovative economy.

Despite strong economic performance in 2004, the growth outlook for 2006 and 2007 is more moderate. The slowdown reflects a lower growth rate of domestic demand and global demand for electronic and electrical products, as well as more subdued world trade generally. These

trends are anticipated to continue, and lead to a return to moderate, but still respectable rates of real growth of at least 5% in both years.

Table 1.1 Malaysia's Recent Economic Performance in Perspective

	GDP growth (%)			Merchandise export growth (%)			Foreign reserves minus gold (US$ billion)			Overall balance of payments (US$ billion)			Gross FDI inflows (US$ billion)		
	2004	2005	2006	2004	2005	2006	2004	2005	2006 (up to Sep)	2004	2005	2006	2004	2005	2006
Malaysia	7.1	5.2	5.9	20.8	11.4	13.6	66.4	70.2	79.5	21.9	3.6	7.9 (up to Sep)	4.6	4.0	3.9
China	10.1	10.2	10.4	35.4	28.4	24.4	614.5	821.5	987.9	206.2	207.3	n.a	60.6	72.4	70.0
Indonesia	5.1	5.6	5.5	12.6	20.1	10.0	36.2	34.7	42.4	-2.2	-5.6	11.8 (up to Sep)	1.9	5.3	2.0
South Korea	4.7	4.0	5.1	31.0	12.0	14.5	199.0	210.3	228.2	38.7	19.9	22.1	7.7	7.2	1.9 (up to Nov)
Philippines	6.2	5.0	5.5	9.6	3.9	15.8 (up to Nov)	13.1	15.9	18.3	-0.3	1.6	2.6 (up to Sep)	0.7	1.4	2.0 (up to Oct)
Thailand	6.2	4.5	4.5	21.6	15.0	16.0	48.7	50.7	60.0	5.7	5.4	12.7	1.4	3.7	7.9
Emerging East Asia	8.0	7.5	7.8												
Developed East Asia	9.1	9.0	9.2												
OECD	3.2	2.6	3.0												

Notes:
1. All data are taken from the World Bank, except balance of payments (from the IFS) and FDI inflows (from the UNCTAD).
2. Balance of payments data in 2006 are taken from the national sources (mostly central bank websites)
3. FDI inflows data for the Philippines are *net*, rather *gross*, inflows, taken from the central bank of the Philippines

Employment. Sustained high rates of economic growth over the 1990s had salutary effects on job creation in the labor market. Over 2.5 million new jobs were created between 1990 and 2000. Many of the new jobs were created in manufacturing, construction, and the finance, insurance, real estate and business services sectors, with employment in the agriculture, forestry and fishing sector contracting throughout the period. Reflecting this structural transformation of the Malaysian economy, between 1990 and 2003, total employment in the agricultural sector shrank from 26.0% to 13.8% of the workforce, while employment in the manufacturing and financial services sectors grew from 19.9% to 27.9% and from 3.9% to 6.2%, respectively.[6]

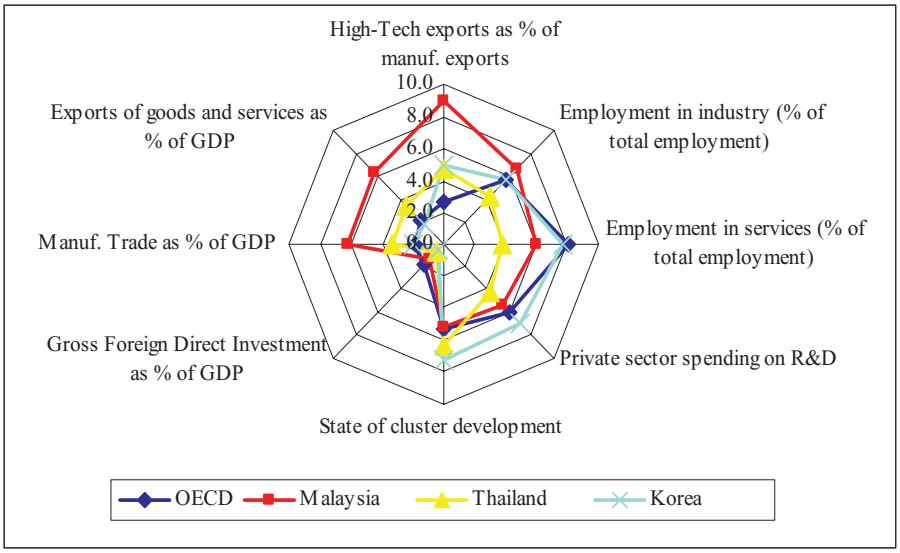
[6] As reported in the 6th, 7th and 8th Malaysia Plans and Mid-Term Review of the 8th Malaysia Plan, Economic Planning Unit, Prime Ministers Department.

High rates of economic growth also led to full employment in the labor market. With the exception of the financial crisis in the late 1990s, total employment expanded at an average annual rate of 3.0% to 3.4%, which exceeded growth of the labor force of between 2.8% to 3.0% per annum. The consequence was a secular decline in overall unemployment rates from over 6% in the 1980s to 5.1% in 1990, and about 3.1% by 2000. Full employment led to rising labor shortages that were met through increasing use of foreign labor. In the period since 2000, however, unemployment rates have inched upwards – to 3.8% by 2005 – as the growth of the labor force exceeded growth in employment due to slower than projected economic growth rates.

Industrialization. Rapid industrialization has been a key to Malaysia's exceptional performance, triggered to a great extent by its insertion into global value chains through transnational corporations. Inward foreign direct investment (FDI) played an important role in the country's industrialization and has shaped its industrial structure.

Unlike many OECD countries where the services sector is gradually taking a leading place, industry and especially manufacturing industry is the largest sector of the Malaysian economy. Manufacturing constitutes 70% of the industrial production and is mostly export-oriented, as reflected in Figure 1.2.

Figure 1.2 Malaysia's Industrial Development in Perspective



Source: KAM Database 2005

As Figure 1.2 suggests, Malaysia ranks ahead of the OECD and such East Asian competitors as Korea and Thailand on such indicators as high tech exports as a percentage of total exports, exports of goods and services as a percentage of GDP, and manufacturing trade as a share of GDP. On the one hand, this exceptional performance is a testament to Malaysia's success as a site for high tech manufacturing and foreign direct investment. On the other hand, as the recent growth slowdown implies, it also means that Malaysia could be exceedingly vulnerable to any decline in its global competitiveness and the subsequent shift of future FDI flows to other, more competitive locations. Moreover, it is important to point out that a large share of high-tech exports is not necessarily indicative of high value added, high wages, and high rates of innovation and competitiveness. For example, assembling and exporting computers (using

innovation and competitiveness. For example, assembling and exporting computers (using primarily imported components) is not a high wage, high value-added activity, even though computers are classified as a high tech export in international trade statistics. Similarly, forestry sector exports are classified as a low tech activity, although forestry products can be either high tech or low tech depending on how much skill, knowledge, and research is applied. For example, Latvia, whose forestry sector exports consist primarily of raw logs, is at the low tech end of the forestry sector value chain, while neighboring Finland, which exports high value paper, engineering services, and paper making machinery, is at the high tech, high value added end of the same forestry sector value chain. Put differently, the forestry sector activities taking place in Finland are much more knowledge intensive than those taking place in Latvia.

Global Competitiveness

To assess Malaysia's global competitiveness, the World Economic Forum (WEF) Global Competitiveness Report publishes two complementary competitiveness indices: the Growth Competitive Index (GCI) which attempts to measure future competitiveness over the next five or ten years; and the Business Competitiveness Index (BCI) which attempts to measure a country's current competitive position. The GCI ranks 116 countries around the world and consists of three 'pillars,' all of which are generally seen to be essential for economic growth: the quality of the macroeconomic environment, the state of a country's public institutions, and a country's "technological readiness." The BCI evaluates 117 nations on two specific dimensions: the sophistication of local companies' operating practices and strategies, and the quality of the microeconomic business environment in which a nation's companies compete.

Table 1.2 Competitiveness Rankings

Countries	Growth Competitiveness Ranking[7] 2005 (2004, 2003)	Business Competitiveness Index[8] 2005 (2004)
Finland	1 (1, 6)	2 (2)
Korea, Rep. of	17 (29, 18)	24 (24)
Malaysia	**24 (31, 29)**	**23 (23)**
Ireland	26 (30, 30)	19 (22)
Thailand	36 (34, 32)	37 (37)
China	49 (46, 44)	57 (47)
India	50 (55, 56)	31 (30)
Singapore	6 (7, 6)	5 (10)
Philippines	77 (76, 66)	69 (70)

Table 1.2 shows the ranking of Malaysia on the 2005 GCI and BCI Indexes, in comparison with a select group of countries. In both rankings, Malaysia appears to be well positioned, appearing in the top 20% of countries on each ranking, ahead of China, India, Philippines, and Thailand,

[7] WEF (2005). Global Competitiveness Index. Retrieved October 19, 2005, from http://www.weforum.org/site/homepublic.nsf/Content/Global+Competitiveness+Programme%5CGlobal+Competitiveness+Report

[8] WEF (2004) Global Competitiveness Index and Business Competitive Index. Retrieved September 5, 2005 from http://www.weforum.org/pdf/Gcr/Business_Competitiveness_Index_Porter

and on par with the competitiveness of such a dynamic economy as Ireland. In the ASEAN region, only Singapore, Korea, and Japan (not shown) rank ahead of Malaysia. Moreover, Malaysia appears to have registered a sharp jump in the recent GCI ranking, moving from 31st place in 2004 to 24th place in 2005. While any improvement is generally a cause for congratulations, this sharp increase needs to be assessed with a bit of caution. Over the past year, Malaysia did not make any bold moves or announce new initiatives that would actually move the economy significantly closer to the Government's goal of becoming an innovative economy. The same challenges and problems that were present in 2004 still loomed just as large in 2006 and will continue to be present in 2007. Transforming an economy is a long-term process and effective reform will not generate quantum leaps in the course of 12 months.

Moreover, disaggregated data that is available for the 2004 GCI and BCI suggests that some of Malaysia's greatest weaknesses are in such variables as "nature of competitive advantage," "enterprise capacity for innovation," "value chain presence," 'centralization of economic policy making," "availability of scientists and engineers," and "foreign ownership restrictions."[9] It is highly unlikely that any of these perceived weaknesses improved dramatically over the course of 12 or 24 months. More hard work remains to be done and many of the recommendations in Chapter 11 are designed to assist the GOM in addressing precisely these items.

Innovation

Malaysia ranks 60th in terms of Innovation Capability according to UNCTAD's 2005 World Investment Report (WIR 2005: 114). This places Malaysia in the middle-category of Medium Innovation Capability. The report registers an improvement of Malaysia's ranking from 1995 to 2001, from 67th to 60th position. Unfortunately, the report has no data on developments in innovation capability after 2001. Though the improvement from 67th to 60th position is, needless to say, a positive development, Malaysia remains behind other Asian economies such as Japan (11th), Korea (19th), Singapore (26th), and Thailand (54th).

Table 1.3 Innovation Capability Index 2001

Economy	Innovation Capability Index	Position
Malaysia	**0.467**	**60th**
China	0.358	74th
India	0.285	83rd
Indonesia	0.261	87th
Japan	0.885	11th
Korea	0.839	19th
Singapore	0.748	26th
Taiwan	0.865	15th
Thailand	0.488	54th

Source: UNCTAD 2005: 114.

[9] WEF Global Competitiveness Report: 2003/2004, p. 295.

Based on this data, Malaysia would appear to be ahead of China and India in terms of innovation capability. However, many of the variables that UNCTAD uses to assess a country's relative Innovation Capability are scaled in per capita terms. Thus, in comparing Malaysia to either India or China, it is important to note that these countries have dual economies: a modern globally competitive segment and a traditional peasant economy. In the case of China, about 250 million people are in the modern sector while about one billion are in the traditional economy. The UNCTAD indicators are, in effect, a weighted average of these modern and traditional economies. The traditional economies of both China and India have lower labour costs and their modern sectors are stronger than Malaysia in terms of innovation performance and capability. Malaysia too has a dual economy with its modern sector being dominated by multinational companies which rely on R&D and technology from foreign parent companies. Available information suggests that these companies do not conduct much in-country R&D nor do they purchase many high value-added goods and services from Malaysian enterprises. Malaysia, therefore, faces the risk of a 'regional squeeze', leaving it with limited competitive advantage since China and India have both lower labor costs and stronger innovation capability.

The UNCTAD innovation capability index is a weighted average of two indices: the technological activity index and the human capital index. The Technological Activity index measures three components: R&D personnel, US patents granted, and scientific publications (all per million population). The Human Capital Index also measures three components: the literacy rate (weight of 1), secondary school enrolment (weight of 2) and tertiary enrolment (weight of 3).

Broken up in its two main indices, Malaysia compares with the other countries as follows:
From the perspective of Malaysia's future competitiveness, it is important to note that China is close to Malaysia in the **Technological Activity Index** as shown in Table 1.4. Malaysia's 0.466 score places the country at 55th position, only marginally ahead of China at 58th, signalling the fact that the modern part of the Chinese economy is most likely significantly ahead of Malaysia in the technological activity index. Another important observation to draw from this is that Malaysia is ahead of Thailand in the technology component, which focuses on production of new knowledge, not absorption and diffusion of knowledge. Despite this lead, Malaysia is behind Thailand (60th position vs. 54th) in the **Aggregate Innovation Capability Index** because it lags behind Thailand in human capital.

Table 1.4 Technological Activity and Human Capital Indices, 2001

Economy	Technological Activity Index	Human Capital Index
Malaysia	**0.466**	**0.488**
China	0.417	0.298
India	0.323	0.247
Indonesia	0.175	0.347
Japan	0.935	0.835
Korea	0.875	0.866
Singapore	0.812	0.621
Taiwan	0.902	0.829
Thailand	0.361	0.615

Source: UNCTAD 2005: 290-291.

Furthermore, as Table 1.5 shows, China's relatively stronger position in innovation and technology is reflected by the significantly larger number of patents recorded in the US Patent and Trademark Office. This is a key indicator of innovation performance. In the absolute terms, China is closing in on Singapore, whereas Malaysia is performing only marginally better than Thailand and Indonesia.

Table 1.5 US Patents by Asian Economies, 2001-2003

Economy	Domestic firms	Foreign affiliates	Public institutions	Total
Malaysia	**43**	**5**	**1**	**49**
China	408	18	49	475
India	177	2	379	558
Indonesia	27	-	4	31
Korea	9,829	562	761	11,152
Singapore	610	41	144	795
Taiwan	11,621	118	947	12,686
Thailand	36	-	2	38

Source: UNCTAD 2005: 136.

Science and Technology

In addition to generating a low number of patentable innovations, Malaysia is also rather weak in terms of various "upstream" S&T indicators. For example, in terms of research output, according to the National Science Index database commissioned by MASTIC, Malaysia contributed 0.08% of the total flow of scientific papers in the past 22 years, which is far below the contribution of South Korea (0.77%), Taiwan (0.77%), Singapore (0.25%), and Thailand

(0.11%). Clearly to become a world-class knowledge economy, this performance will have to improve over time.

The potential for Malaysian higher education is enormous, given its commitment to investing in knowledge-based, innovative, and modern economic development. By comparing its current higher education capacity to that of similarly positioned neighboring countries, as well as the successes of nations of similar size and development in other regions, Malaysia can better inform its policies in support of higher education and R&D.

The principal indicators examined in this section are the following:

- Researchers per 1,000 population.
- Total expenditure on R&D as a percentage of GDP.
- Business expenditure on R&D as a percentage of GDP.

For each of these indicators, Malaysia will be compared with four Asian economies: China, Japan, Korea and Singapore. Further, the indexed diagrams in this section include a benchmarking to the OECD average, with all data indexed to OECD reference values (OECD=1).[10]

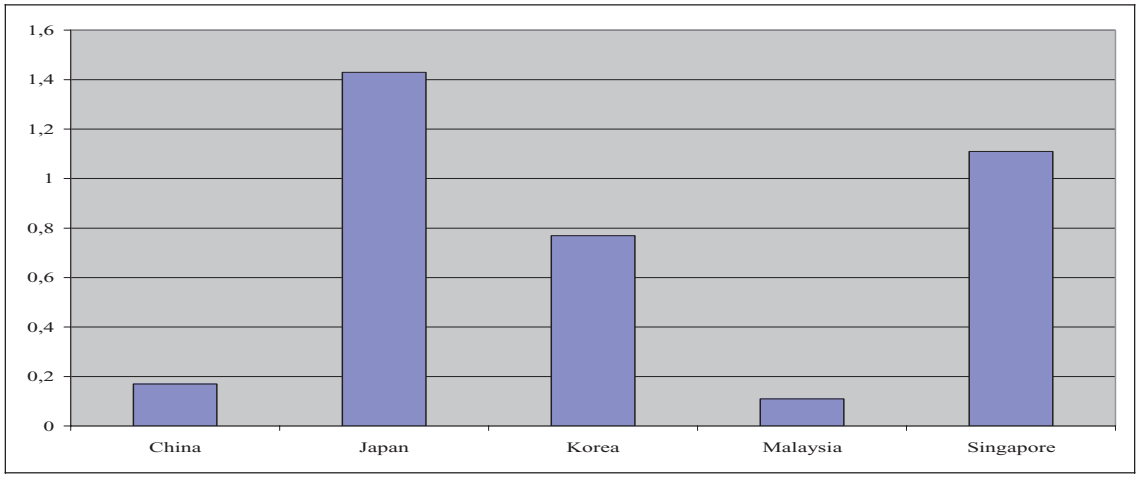
Researchers per population[11]

In terms of researchers per 1,000 population, Malaysia lags behind Japan, Korea and Singapore. More worrisome, however, China too has a strong lead over Malaysia even though as noted earlier, its data are depressed by the fact that nearly one billion people are not yet participating in the modern economy. In absolute terms, therefore, China is far ahead of Malaysia and growing rapidly.

[10] All these indicators are indexed in relation to an OECD reference value. For detailed information on data sources and reference values; see APEC 2004: 104-107.

[11] ***Advanced Research Qualifications (ISCED 6)***: Advanced Research Qualifications refer to tertiary programmes that lead directly to the award of an advanced research qualification, e.g., Ph.D. The theoretical duration of these programmes is three years in full-time in most countries (for a cumulative total of at least seven years full-time equivalent at the tertiary level), although the actual enrolment time is typically longer. The programmes are devoted to advanced study and original research.
Source: http://www.oecd.org/dataoecd/36/7/35325710.pdf

Figure 1.3 Researchers per 1,000 Population (index) in 2004



Source: APEC 2004

Malaysia is lagging behind in this area despite having increased the number of researchers per million people more than three-fold in the period from 1996 to 2002. In 2002, there were 294 researchers per million people in Malaysia, as compared to only 90 in 1996, as shown in the Table 1.6 below. This data would seem to suggest that the increase in researchers per million people from 1996 to 2002 is much higher in Malaysia than in other countries. However, this is not so much a reflection of an impressive achievement, as a rebound from the low number of researchers in 1996, following a downward trend from 1990 to 1996. In fact, Malaysia was the only East Asian economy where the number of researchers went down in this period, from 208 per million in 1990 to only 93 per million in 1997.

From a knowledge-based economy perspective, it is striking that the relative number of researchers was ten (Korea), fifteen (Singapore) and seventeen times (Japan) higher in key Asian economies than in Malaysia in 2002, as the following table indicates.

Table 1.6 Researchers per Million People

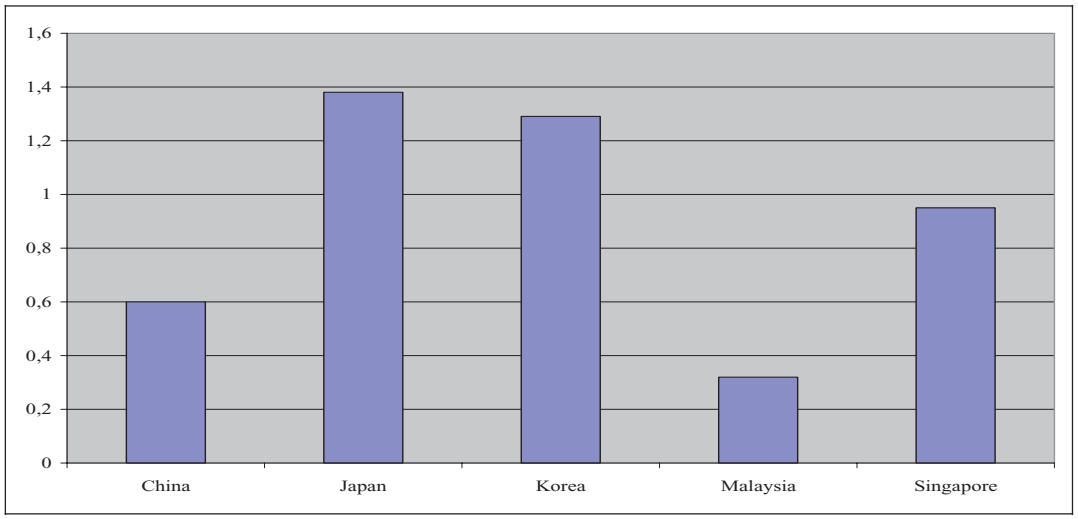
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
China	450	479	391	424	550	584	633
Japan	4,909	4,960	5,165	5,203	5,104	5,320	5,085
Korea	2,184	2,234	1,999	2,150	2,305	2,880	2,979
Malaysia	**90**	N/A	**154**	N/A	**276**	N/A	**294**
Singapore	2,482	2,558	2,905	3,188	4,140	4,053	4,352
Thailand	102	74	N/A	173	N/A	289	N/A

Source: WDI online

R&D Expenditures

Variation in aggregate public and private expenditure in research and development is high among the Asian economies. Japan and Korea are well above the OECD reference value, and Singapore slightly below. China's level of total R&D is at 60% of the OECD reference value, almost twice that of Malaysia.

Figure 1.4 Total R&D as of GDP (index)



Source: APEC 2004

Though Malaysia has increased its expenditures on R&D as a percentage of GDP from 0.21% in 1996 to 0.69% in 2002, it has remained far behind its key Asian competitors (except Thailand) throughout the period, as shown below.

Table 1.7 R&D Expenditure as a Percent of GDP

	1996	1998	2000	2002
China	0.60	0.70	1.00	1.20
Japan	2.78	2.95	2.99	3.12
Korea	2.42	2.34	2.39	2.53
Malaysia	**0.21**	**0.40**	**0.49**	**0.69**
Singapore	1.38	1.82	1.91	2.15
Thailand	0.12	0.22	0.25	0.24

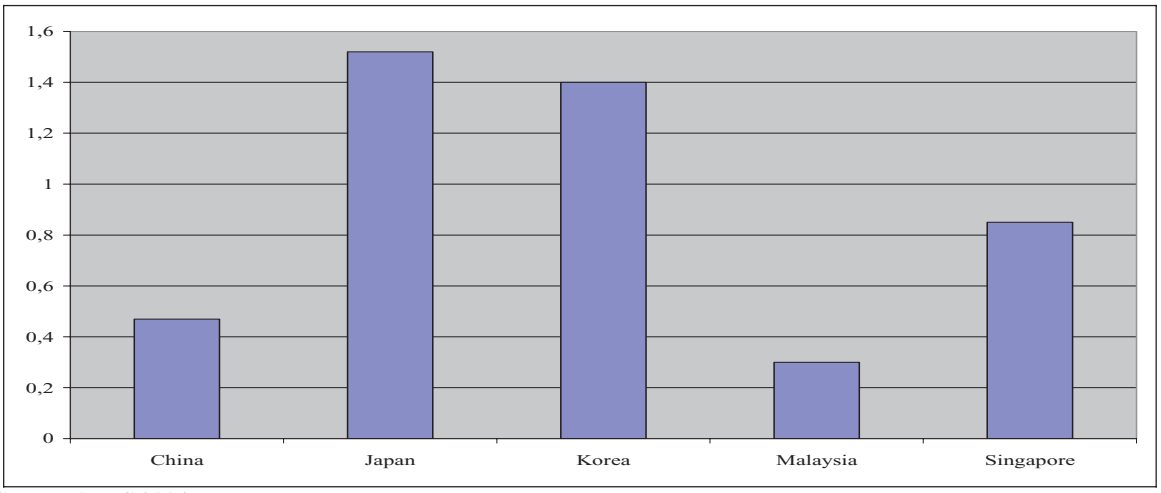
Source: WDI online

Note: 1998-data for Thailand not available. Replaced with 1999 figure.

With regard to business R&D, a similar pattern applies. Japan and Korea are well above the OECD average, with Singapore a bit further behind the OECD reference value in business R&D than it was in total R&D. As with total R&D, China comes out favorably in business R&D in a

comparison with Malaysia. China's 50% lead in Business Expenditure on R&D (BERD) is smaller than in its lead in Government Expenditure on R&D (GERD), but still substantial.

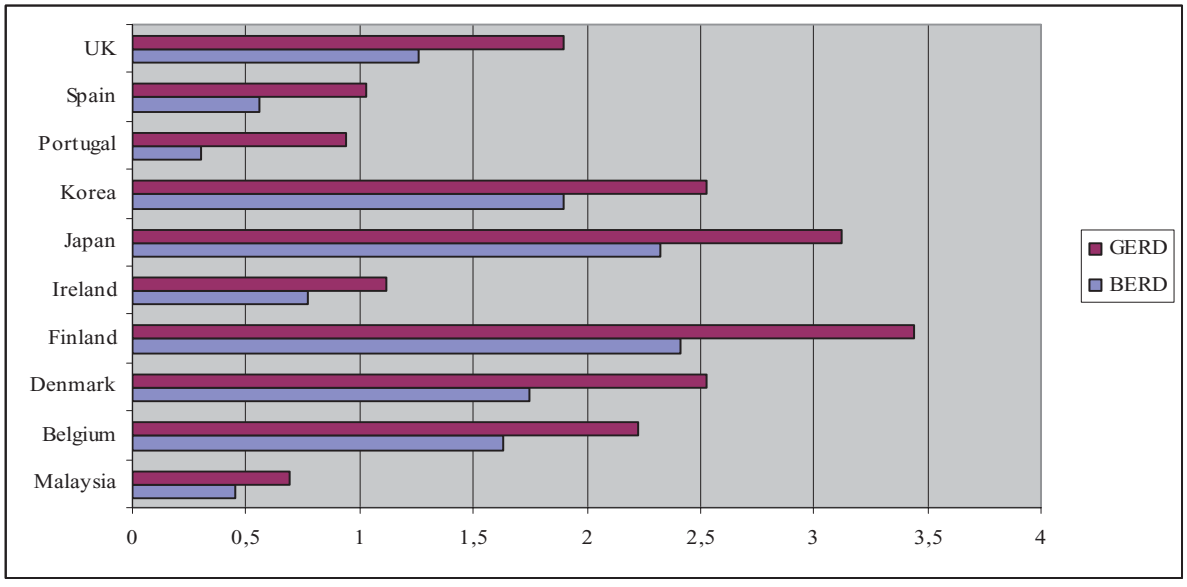
Figure 1.5 Business R&D as Percent of GDP (index)



Source: APEC 2004

When compared to a broader range of countries, Malaysia's BERD is still rather comparatively low. For instance, BERD in Belgium (1.63%) and Finland (2.41%) is four to five times higher than that of Malaysia (0.45%). Malaysia is, however, more or less on par with countries such as Portugal (0.3%) and Spain (0.56%) in this area. But when compared in terms of gross domestic expenditure on R&D (GERD), both Portugal and Spain take a significant lead over Malaysia, due to much higher public R&D spending in both these countries.

Figure 1.6 Business and Gross Expenditure on R&D as a Percent of GDP

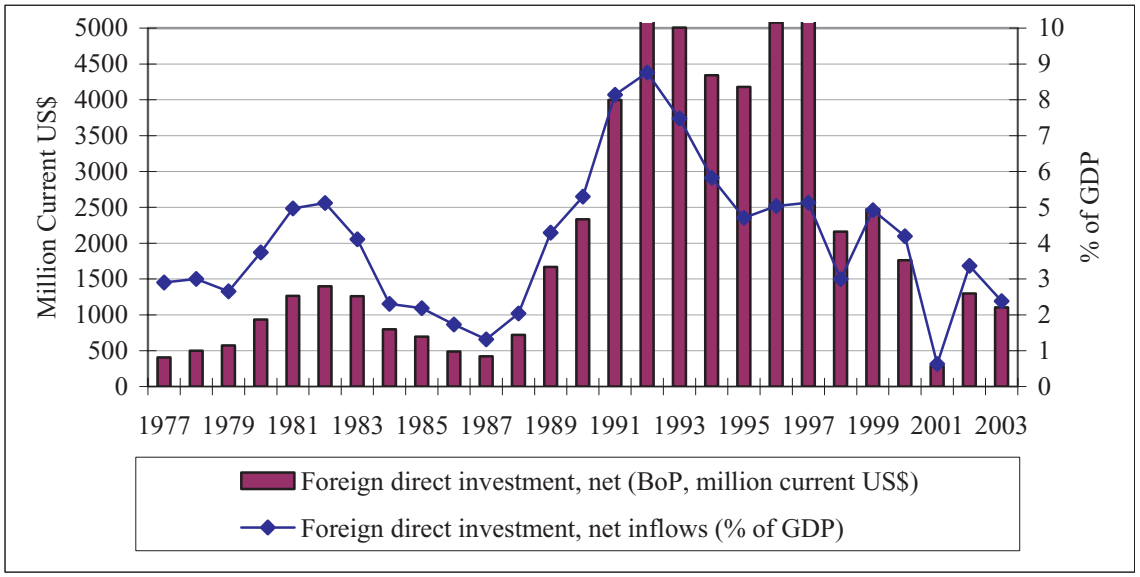


Source: MASTIC 2004 and OECD 2005.

FDI Inflows: Past Achievements and Recent Trends

High inflows of FDI have been an important element in Malaysia's impressive economic growth in recent decades. During the decade from 1984 to 1994, Malaysia's cumulative FDI inflows were 4.5 times higher than Korea's, and 3.5 times higher than those of Taiwan (APEC 2004). As a percentage of GDP, FDI inflows rose from less than 1% in the late 1970s to more than 10% in the mid-1990s.

Figure 1.7 FDI Inflows in Malaysia – 1977 to 2003



Source: Agapitova 2005

In recent years, however, Malaysia has seen a significant decline in FDI inflows. In 2001, FDI inflows fell to less than one-half percent of GDP, and in 2003 FDI inflows were still quite modest at just over 2% of GDP.

UNIDO's 2005 World Investment Report (WIR) measures the extent to which an economy receives inward FDI relative to its economic size. This is the so-called Inward FDI Performance Index. The WIR also publishes an Inward FDI Potential Index which is computed as a weighted average of 12 economic and structural variables, including GDP per capita, share of exports in GDP, telecoms infrastructure, share of R&D in gross national income, etc. While Malaysia maintained a high ranking among the 140 countries included in terms of Inward FDI Potential in the period from 1990 to 2003, its ranking in Inward FDI Performance declined substantially.

Table 1.8 Malaysia's Inward FDI Index Rankings: Potential and Performance

	1990	1995	2000	2001	2002	2003	2004
Potential	38th	33rd	30th	32nd	32nd	35th	-
Performance	5th	9th	51st	71st	74th	77th	57th

Source: UNCTAD 2005: 275.

Until 1995, Malaysia was performing above its potential – but since then it has performed considerably below its potential. This may well be due in part to the 1997-1998 Asian financial crisis. That Malaysia continues to perform below its potential seven years afterwards is likely to be a reflection also of its declining competitiveness vis-à-vis other economies in the region.

Malaysia still remains far ahead of India (112th), Indonesia (136th), Korea (109th) and Thailand (106th) in terms of Inward FDI Performance. Nevertheless, the declining trend is troubling. Two of the critical factors in attracting future FDI are labour costs and the quality of the labour force. On these criteria, China is beginning to look preferable to Malaysia. With comparable levels of labour force education[12], the average manufacturing wage in China is 5-8 times lower than in Malaysia (Yusuf 2003). In other words, the low levels of FDI inflows that Malaysia has experienced in recent years may continue or even decline further in coming years.

The issues confronting Malaysia go beyond declining FDI inflows. Whether by default or design, Malaysia has pursued a "passive FDI" learning strategy. (See Annex 4 for a detailed discussion of learning strategies.) Passive, in this case, does not connote that Malaysia has failed to attract foreign investors actively. It most certainly has attracted. Rather, passive in this case means that Malaysia has not done enough to ensure that the foreign investors doing business in Malaysia generate spillovers and backward linkages to local suppliers and research institutes. In other words, even if foreign investors come to Malaysia primarily for the low cost labor and favorable business climate, there is no reason that Malaysia cannot take advantage of their presence to develop supplier relationships with these investors and to use their presence to strengthen Malaysia's indigenous S&T capacity. This opportunistic approach has not been pursued as effectively as it could have been. Some of the recommendations in Chapter 11 are designed to address this problem.

The issue confronting Malaysia goes well beyond that of missed learning opportunities. To the extent that Malaysia offered primarily a low wage production site, Malaysia will now risk losing foreign investment to newly emerging, lower wage production sites. However, had Malaysia offered foreign investors high quality, high value-added (upstream and downstream) goods and services, foreign investors would have been much more embedded in Malaysia and much more reluctant to switch to other production sites. Thus, backward linkages and spillovers are a way of diversifying the Malaysian economy, attracting more stable foreign investment, and enhancing national competitiveness.

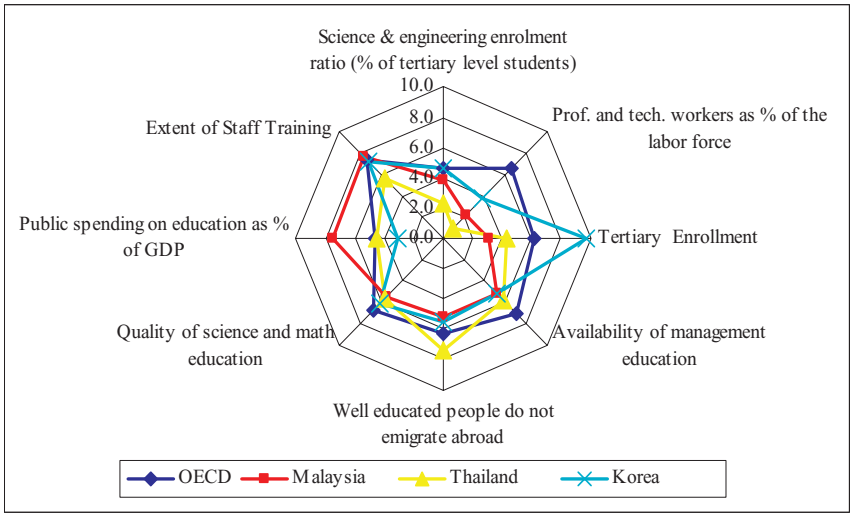
Human Capital

Malaysia must address an increasing human resource constraint, as revealed by a recent study entitled "Firm Competitiveness, Investment Climate, and Growth" which found that the shortage of qualified workers with scientific and technical skills, in particular university graduates, is a pervasive problem among the firms surveyed. In an attempt to address this problem, the government of Malaysia is spending a high share of its GDP on education, which generated

[12] The average years of schooling of adults in 2000 were 6.4 in China and 6.8 in Malaysia, while UNDP's Education Index (based on literacy and combined enrolment rates in 2002) is exactly the same for both countries (0.83).

considerable economic benefits. The quality of labor has been one of the main attractions for foreign investors considering whether to locate a new facility in Malaysia (see Figure 1.8 below).

Figure 1.8 Education for Knowledge Economy



However, some weaknesses remain. For example, even though science and engineering enrollment ratio is as high as in OECD economies, the low tertiary enrollment results in a low number of technical workers and engineers in the labor force.

Despite the significant progress in expanding tertiary education opportunities in the past decades, Malaysia lags behind comparator countries such as Korea, the Philippines, and Thailand with regard to the percentage of its adult population that has completed degrees at that level. In addition, the numbers for Malaysia are only marginally better than those for China and India, two countries heavily challenged by their enormous populations, which cannot be said for Malaysia. At only 2.9%, the segment of Malaysia's adult population having completed higher education is only slightly better than China (2.1%) and India (2.2%), countries with a significantly larger overall population. In contrast, the tertiary education completion rate of the adult population of Korea, which is more than twice the size of Malaysia's adult population, is 12.1%. Likewise, the Philippines boasts a 12% tertiary completion rate among its adult population; and Thailand, 7%. Singapore's adult completion rate is also higher than Malaysia's at 3.7%. This data clearly indicate that there is a great deal of room for improvement in allowing students to enter and complete tertiary education.

Table 1.9 Educational Attainment of the Adult Population (15 and over)

			Highest level attained				
			Secondary		Post-Secondary		
Country	Year	Population over age 15 (1000s)	Total	Complete	Total	Complete	Average Years of School
Malaysia	**1990**	**11,070**	**31.9**	**11.9**	**3.3**	**1.9**	**6.03**
	1995	**12,497**	**33.8**	**12.6**	**4.4**	**2.5**	**6.49**
	2000	**14,429**	**36.2**	**13.5**	**5.2**	**2.9**	**6.80**
China	1990	837,940	41.3	13.5	1.9	1.4	5.85
	1995	898,953	43.2	14.1	2.4	1.8	6.11
	2000	958,997	45.3	14.8	2.8	2.1	6.35
Finland	1990	4,023	52.1	37.2	13.2	5.3	9.38
	1995	4,133	50.2	35.9	17.4	6.9	9.65
	2000	4,230	47.6	34.0	22.3	8.9	9.99
India	1990	542,391	20.5	5.6	3.3	1.7	4.10
	1995	606,250	22.2	6.1	3.7	2.0	4.52
	2000	680,072	23.8	6.5	4.1	2.2	5.06
Ireland	1990	2,545	50.5	16.7	15.6	5.9	8.78
	1995	2,684	51.1	16.9	18.1	6.9	9.08
	2000	2,812	51.3	17.0	21.0	8.0	9.35
Korea	1990	31,791	61.9	44.7	13.9	6.4	9.94
	1995	34,373	57.2	42.9	22.2	10.2	10.56
	2000	36,708	55.2	41.4	26.3	12.1	10.84
Philippines	1990	36,664	34.2	12.0	18.8	9.7	7.28
	1995	41,712	38.4	21.2	21.9	11.3	7.88
	2000	47,487	40.6	22.4	23.2	12.0	8.21
Singapore	1990	2,079	34.8	10.0	4.3	1.6	5.96
	1995	2,201	34.5	9.9	7.3	2.7	6.72
	2000	2,325	34.6	9.9	10.0	3.7	7.05
Thailand	1990	37,883	9.8	2.8	7.1	4.5	5.58
	1995	42,153	13.0	3.7	9.0	5.7	6.08
	2000	45,495	15.1	4.2	10.9	7.0	6.50

Source: Barro R. and Lee J.-W., 2000. International Data on Educational Attainment:Updates and Implications. http://www.cid.harvard.edu/cidwp/042.htm

Looking at the evolution of tertiary enrollment since 1990, it appears that a few of the comparator countries (Korea, the Philippines, Singapore, and Thailand) have experienced notable growth (of at least one percent) in the percentage of the population having completed post-secondary education. Korea, with an increase of 3.8% from 1990-1995 and an additional 1.9% between 1995 and 2000, experienced the largest growth in the segment of its population among comparator countries, from 6.4% of its adult population in 1990 to 12.1% in 2000. Over this same period, the Philippines experienced growth of 1.6% and 0.7%; Thailand, 0.8% and 1.3%; and Singapore, 0.9% and 1%. In contrast, Malaysia, with growth rates of only 0.6% from 1990-95 and 0.4% from 1995-2000 (with a total growth during this period from 1.9% to 2.9%) seems to have lost ground compared to the benchmark countries.

Examining the flows of students from secondary into tertiary and to graduation in this comparator group sheds light on where the efficiencies of the education system may be breaking down.

Table 1.10 Graduation and Enrollment Rates

	Graduation Rates Secondary Education University-Bound 2004 [c]	Graduation Rates Secondary Education TOTAL 2002-03	Gross Enrollment Rate (%) Tertiary Education 2004 [c]	Graduation Rates Tertiary Ed. (A) 2004[c]
Malaysia	**20**	**84**	**29**	**14**
China	17	31	19	n/a
Finland	92	84	87	56
India	19	21	11	n/a
Ireland	91	91	55	38
Korea, Rep. of	64	91 (1999)	89	34
Philippines	59	60	29	19
Singapore	58[f g]	58[f]	46[f]	19.7[f]
Thailand	31	59	41	24
OECD Mean	61[a]	79	53[a]	35[a]

[a] OECD. (2006). Education at a Glance 2006. Retrieved 8 February 2007 from http://www.oecd.org/document/6/0,2340,en_2649_201185_37344774_1_1_1_1,00.html

[b] UNESCO. (2003). World Education Indicators: Financing Education 2003. Retrieved 5 September 2005 from http://devdata.worldbank.org/edstats/td12-2.asp

[c] UNESCO (2006) from Global Education Digest 2006. Montreal: UNESCO-UIS.

[d] World Bank. (2005). EdStats. Retrieved 5 September 2005 from http://devdata.worldbank.org/edstats/query/default.htm

[e] UNESCO. (2002). World Education Indicators 2002. Tables: Finance: http://www.uis.unesco.org

[f] Singapore Ministry of Education. (2004). Education Statistics Digest 2004. Retrieved 7 September 2005 from http://www.moe.gov.sg/esd/Default.htm

[g] Tertiary education (A) refers to the classification of education levels developed by UNESCO in its International Standard Classification of Education (ISCED97). ISCED 5A specifically indicates "programs (that) are largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programs and professions with high skill requirements."

The first two columns in Table 1.10 distinguish between those students who pursue university-level education after secondary school (first column) and those who directly enter the labor market or pursue any form of post-secondary education. The table indicates that although Malaysia has an overall secondary graduation rate of 84%, only 20% of secondary school graduates went on to pursue full university education in 2004. This percentage is low among all comparator countries, showing that Malaysia's tertiary educations system is fundamentally disadvantaged by a secondary system that is not preparing its students for university education at rates high enough to nurture a growing and improving tertiary system. The percentage point difference (64%) between the two categories of secondary graduation rates is also the largest among the comparator countries. India and China, again, show rates similar to Malaysia's, but Thailand (31%), Singapore (58%), Korea (64%), and the Philippines (59%) are examples of

culturally and economically close nations experiencing a completely different educational reality in the movement from secondary to tertiary education.

Where Malaysia is competitive, however, is in the percentage of secondary graduates enrolling in tertiary education. The rate of 29% indicates that just under one-third of students in the corresponding age cohort pursued tertiary education in 2004, a rate higher than only India (11 percent) and China (19%) but very close to that of the Philippines. Thailand and Singapore show impressive enrollment rates of 41% and 46%, respectively, while Korea's enrollment rate is a stunning 89%. Again, there is definitely room for improvement for Malaysia, but in this case, the status quo is actually relatively solid and will be a useful foundation for improvements and innovation in the system.

Malaysia's tertiary graduation rate, which measures the ratio of graduates to the population at the typical age of graduation, is again somewhat disappointing but within a realm that indicates that improvements are around the corner. Data for China and India are unavailable, but against other comparator nations, Malaysia's 14% is clearly comparable to the rates of Singapore (19.7%), and the Philippines (19%), though completely overshadowed by Korea's 34% graduation rate. In this area, as in the others, there is certainly a successful foundation onto which to load new initiatives for improving the quality and number of secondary school graduates applying for and attending tertiary education.

The latest available data from the UNESCO Global Education Digest 2006 indicate that progress is in the works. While only 20% of the secondary graduates of Malaysia are preparing for tertiary education, 90% of the total secondary student population completes some form of secondary school program. Improvements at the secondary level, promoting a shift among more of the adult population to continue on to tertiary education over time, would likely lead to dramatic increases in the overall adult population with higher education levels, indicating a better prepared and more highly skilled labor pool for the local, regional, and national economies.

Where Malaysia exhibits its most prominent strength is in its enrollment share for women, which at 55% is equal to the OECD mean and on par with that of Finland, Ireland, Singapore, Thailand, and the Philippines.

Chapter 2. Main Issues and Recent Developments in the University Sector

Main Findings

- *Recognizing the critical constraint of skilled manpower to support economic growth, the GOM generously supported the expansion of the higher education system in the Ninth Malaysia Plan, placing high priority on increasing accessibility and in creating a critical mass of trained, skilled and knowledgeable workforce to sustain economic growth, to increase competitiveness and to support a knowledge-based economy.*

- *The investment resulted in a highly developed university sector, with a strong commitment to quality and equity. Most universities have excellent infrastructure, and sophisticated technology to support the teaching and research missions of the institutions. Academic programs go through a rigorous process of approval.*

- *However, when benchmarked against international standards Malaysian universities have yet to achieve "world class" status. Several factors limit their development prospects:*

  - *Inadequate governance and financing, including insufficient autonomy and accountability mechanisms and absence of a unified higher education system*
  - *Quality concerns, including insufficient number of faculty with highest credentials and a disjointed quality assurance system*
  - *Relevance and graduate unemployment problems*
  - *A disjointed research and innovation system, with insufficient research funding and weak university-industry linkages*

After conducting a benchmarking analysis of the Malaysian economy and innovation system, the report focuses now on recent developments and main challenges faced by the university sector. This general discussion of the main issues that the GOM needs to address sets the stage for a more detailed analysis in subsequent chapters.

The Government's Strategy to Develop the University Sector: Orientations and Results

The Ninth Malaysia Plan (2006-2010) placed high priority on increasing accessibility to higher education in order to create a critical mass of trained, skilled and knowledgeable workforce who would sustain economic growth, increase competitiveness, and support a knowledge-based economy. The Plan provided for a series of measures to improve the quality of education, notably through increased coverage and utilization of ICT, the introduction of a quality assurance system, and improvement in infrastructure facilities. The Plan also recognized that a more advanced technological future for Malaysia must be underpinned by greater emphasis on education in science, mathematics, and foreign languages at all levels. It included programs for increasing the supply of quality science and technology human resources to enhance scientific and technological capabilities in support of intensified innovative R&D activities. Measures

were also taken to promote and develop Malaysia as a regional center of education excellence. Finally the Plan called for the promotion of lifelong learning.

In recent years, the GOM has linked more specifically the development of the university sector to the requirements of economic growth, articulating the following complementary policy objectives: (a) establishing a world class university system in Malaysia; (b) making Malaysia a regional education hub; and (c) transforming Malaysia into a knowledge-based economy. For example, the 2002 report entitled "*Knowledge-Based Economy*", prepared by the Institute of Strategic and International Studies (ISIS), observes in its analysis of Malaysia's transition to a knowledge-based economy that, "While the export-led industrialization strategy of the past fifteen years has been highly successful in bringing growth and prosperity, the need for fine-tuning the country's economic strategy in light of new realities is also obvious...Malaysia must address these challenges squarely. It must ensure that it remains one of the most dynamic, productive and fastest growing economies of the world."

Education is a critical element of this strategy. As the report observes, "Education plays a crucial part in developing human capital and will play a critical role in shifting the economy towards a knowledge-based economy." To respond to this growing demand and with the view that universities are some of the best engines to advance a society toward a knowledge economy, the GOM carefully laid the foundation for the expansion of the system in its Ninth Malaysia Plan (2006-2010). It placed high priority on increasing accessibility to higher education and in creating a critical mass of trained, skilled and knowledgeable workforce to sustain economic growth, to increase competitiveness and to support a knowledge-based economy. To address this priority, it supported the establishment and expansion of a range of tertiary institutions including public universities, private universities with both public and private investment, degree granting private university colleges, non-degree granting technical colleges and polytechnics.

This vision of the importance of higher education has translated into a significant investment to develop the sector. During the Eighth Malaysia Plan, education in general accounted for 20% of total government expenditure. Nearly 47% of the total development allocation for education was set aside for tertiary education, or RM 8.9 billion out of RM 18.7 billion.

The numbers were slightly revised during the Mid-Term Review of the Eighth Malaysia Plan, with an increase in the share of education as a percentage of total investment to 25%, and a decrease in the share of higher education to 32% of the total allocation (RM 11.3 billion out of RM 35.0 billion). Nevertheless, tertiary education commands the largest share of the education budget of all the sub-sectors in both reports, but the RM 2.4 billion rise from the original to the revised Eighth Malaysia Plan was outpaced by increases at other levels.

The commitment to higher education and the large-scale investment in that sector have paid off handsomely. Students enrolled in undergraduate (first degree, diploma and certificate) programs at public higher education institutions increased by 37.6% during the 2000-2003 period and by 20.0% between 2003 and 2005 (Ministry of Higher Education Malaysia, 2005). Similarly, in the private universities and university colleges, enrollments increased by 60.1% during 1998-2000 and by 19.2% during 2000-2005.

Today, there are 17 public and 27 private universities and university colleges in the system and they have played a major role in enabling about 30% of the youth in the 17-23 age cohort to realize their aspiration of obtaining a higher education degree - 7.9% are enrolled in the public or government assisted universities and the remaining in private universities and university colleges. In 2005, this translates into 649,653 students enrolled in the entire system, representing 29.9% of the 18-24 population. Undergraduate (including diploma, certificate, and bachelor degrees) and graduate enrollments (including postgraduate diploma, master's and doctorate degrees) at public institutions are 270,605 (88.1%) and 36,516 (11.9%) respectively (Ministry of Higher Education Malaysia, 2005). These data suggest that the GOM has been successful in achieving its goal of increasing accessibility as outlined in the Eighth Malaysia Plan. Data presented in the mid-term review of the Eighth Malaysia Plan also suggest significant improvements in the quality of the labor force during the recent expansion years. The proportion of working individuals with tertiary education increased from 13.9% in 2000 to 17.1% in 2003.[13]

Thus, Malaysia can boast a highly developed university sector which includes a range of diverse types of institutions with a strong commitment to equity and quality. Many have excellent infrastructure, including scenic campuses and well-equipped facilities and libraries, and sophisticated technology to support the teaching and research missions of the institutions. Academic programs go through a rigorous process of approval and are more often than not benchmarked against international standards. A well-developed Quality Assurance Division (QAD) and a National Accreditation Board (LAN) monitor quality in public and private institutions respectively. These units have been instrumental in promoting systematic reviews of programs and courses based on specific criteria and standards. The proposal to establish a Malaysian Qualifications Framework is another positive step that can push the system closer to best international practices, as will be discussed more extensively in Chapter 9. Most faculty members with doctoral degrees have been trained in reputable universities overseas. First degree graduates who wish to continue their studies abroad are able to secure entry into the best universities in the world.

The system's capacity to attract international students has been on a steady climb in the last 5 years, setting the path to achieving the goal of enrolling 100,000 international students by 2010 (at secondary and tertiary levels). Foreign students enrolled in private higher education institutions grew from around 13,000 in 2001 to 34,000 in 2005.

On the research side, pockets of excellence clearly exist in the universities. Over the past 22 year period, several public universities have produced the vast bulk of scientific papers generated by Malaysian institutions. Moreover, there are fields in which Malaysia seems to be making significant contributions in terms of numbers of papers produced, in particular in chemistry, clinical medicine, engineering, material science, physics, and plant and animal science. One example of globally excellent university-based research is the National Center for Drug Research and the pharmacology program at University Science Malaysia (USM). Another example is the award winning digital media program offered by the private Multimedia University (MMU).

[13] Source: *Mid-term Review of Eighth Malaysia Plan*, Chapter 4, p. 94

Are Malaysian Universities World Class?

Notwithstanding the methodological limitations of any ranking exercise (see Table 2.1), international league tables show that the highest ranked universities in the world are the ones that make significant contributions to the advancement of knowledge through research, teach with the most innovative curricula and pedagogical methods under most conducive circumstances, make research an integral component of undergraduate teaching, and produce graduates who stand out because of their success in intensely competitive arenas during their education and, more importantly, after graduation. It is these concrete accomplishments and the international reputation associated with these achievements that make these institutions world class.

How do Malaysian universities fare compared to the league of best universities or, more importantly, the best publicly funded universities in the world? Two prominent international rankings present a picture of a burgeoning internationally competitive university system in Malaysia, particularly in comparison to neighboring countries. The United Kingdom's Times Higher Education Supplement (THES) produces a ranking of the top 200 universities in the world. The methodology for this ranking focuses on international reputation, using subjective inputs, such as peer reviews, quantitative data, such as the numbers of international students and faculty, and the influence of the faculty, as represented by research citations, to compare the international stature of institutions. In the 2004 THES ranking of the top 200 world universities, the top Malaysia universities (University of Malaya and University Science Malaysia) were ranked 89th and 111th, respectively, while the top two Chinese universities were 17th and 61st, the top two Singaporean universities were listed at 18th and 50th, and the top Indian institution ranked 41st.

The THES 2005 ranking added another subjective component, employer recruiting surveys, resulting in some significant changes in the rankings. Malaysia's universities did not fare well in the 2005 ranking, with University of Malaya dropping from 89th to 169th, and University Science Malaysia falling out of the rankings' top 200 universities. China now has four universities in the top 100 (15th, 62nd, 72nd, 93rd); Singapore's two premier institutions remained among the top 50 (22nd and 48th); India's Institutes of Technology (50th) and Management (84th) rank in the top 100 and are actually composed by multiple campuses within India; and Thailand's Chulalongkorn University (121st) was added to the rankings after being omitted altogether from the 2004 ranking.

In the 2006 ranking, which follows the same methodology as in 2005, two Malaysian universities are recognized (Universiti Kebangsaan Malaysia and University of Malaya), ranked 185 and 192 respectively. The National University of Singapore is number 19, China still has two universities in the top 100 and four in the next 100.

Table 2.1 International University Rankings
(Malaysia, China, India, (Rep. of) Korea, Pakistan, Philippines, Singapore, Thailand)

Times Higher Ed. Supplement[14] 2006 (2005, 2004)	Shanghai Jiao Tong University[15] 2005	Asia Week[16] 2000 (1999)
14 (15, 17) Beijing University (China)	101-152 Natl Univ Singapore (Singapore)	01 (1) Korea Adv. Instit. of Sci & Tech. (Kor)
19 (22, 18) National University (Sing.)	101-152 Seoul Natl Univ (South Korea)	02 (2) Pohang Univ. of Sci. & Tech. (Kor)
28 (62 ,61) Tsing Hua University (China)	153-202 Tsing Hua Univ (China)	03 (6) Indian Institute of Tech, Bombay (India)
61 (48, 50) Nanyang University (Sing.)	203-300 Peking Univ (China)	04 (4) Indian Institute of Tech., Dehli (India)
63 (93 , 118) Seoul National University (Kor)	203-300 Yonsei Univ (South Korea)	04 (3) Seoul National University (Kor)
68 (84 , n/a) India Institutes of Management (India)	301-400 Fudan Univ (China)	05 (5) Indian Institute of Tech., Madras (India)
68 (50 , 41) Indian Institutes of Tech. (India)	301-400 Nanjing Univ (China)	05 (6) National University (Singapore)
116 (72 ,195) Fudan University (China)	301-400 Shanghai Jiao Tong Univ (China)	07 (7) Indian Institute of Tech., Kanpur (India)
150 (184, n/a) Korea University (Kor.)	301-400 Univ Sci & Tech China (China)	08 (n/a) Indian Inst. of Tech., Kharagpur (India)
161 (121, n/a) Chulalongkorn University (Thailand)	301-400 Zhejiang Univ (China)	09 (8) Nanyang Tech. University (Singapore)
165 (93 , 154) China University, Sci. & Tech.	301-400 Indian Inst Sci (India)	14 (16) Korea University
179 (169, n/a) Shanghai Jiao University (China)	301-400 Nanyang Tech Univ (Singapore)	14 (17) University of Roorkee (India)
180 (150, 192) Nanjing University (China)	301-400 Korea Advanced Inst S& T (S. Korea)	15 (9) Univ. of Science and Tech. (China)
183 (192, n/a) Jawaharlal Nehru University (India)	301-400 Pohang Univ Sci & Tech (S Korea)	17 (16) Beijing Univ. of Post & Tel. (China)
192 (169, 89) University of Malaya (Malaysia)	301-400 Sungkyunkwan Univ (South Korea)	17 (9) Yonsei University (Kor)
198 (143, 160) Korea Adv. Inst. of S& T (Korea)	401-500 Jilin Univ (China)	18 (11) Huazhong Univ. of Sci. & Tech. China)
Na (n/a , 111) Science Malaysia University (Malaysia)	401-500 Indian Inst Tech – Kharagpur (India)	19 (n/a) Birla Institute of Tech. & Sci. (India)
	401-500 Univ Calcutta (India)	20 (29) National Univ. of Sci. & Tech. (Pak)
	401-500 Hanyang Univ (South Korea)	**30 (22) Technological University (Malaysia)**
	401-500 Korea Univ (South Korea)	**47 (27) University of Malaya**
	401-500 Kyungpook Natl Univ (So. Korea)	**52 (69) Putra University (Malaysia)**
		57 (42) UniversityScience (Malaysia)

[14] **THES Methodology:** THES asked institutions to rank universities according to the following categories: Peer review (reputation); Int'l faculty; Int'l students; Student/faculty; Citations/faculty. "The five indicators have been chosen to reflect strength in teaching, research and international reputation, with the greatest influence exerted by those in the best position to judge: the academics." (THES, 5 November 2004, p. 2)

[15] **Shanghai Jiao Tong University Methodology**: Universities are ranked by several indicators of academic or research performance, including alumni and staff winning Nobel Prizes and Fields Medals, highly cited researchers, articles published in Nature and Science, articles indexed in major citation indices, and the per capita academic performance of an institution. Attempt to minimize subjectivity of reputation rankings by focusing on output.

[16] **Asia Week's Methodology**: Each university was asked to rate its peers. Thirty Asian corporations and 11 foreign universities also gave ratings. The schools were each evaluated on Academic Reputation, with regard to student selectivity, faculty resources, research, and financial resources. This listing combines two separate Asia week rankings—mutli-disciplinary and science & technology Institutions—with specific country rankings highlighted in the table. Shared rankings indicated the same rank on the separate league tables between a multi-disciplinary institution and a science & technology institution.

In contrast, the methodology used by Shanghai-based Jiao Tong University in China to develop its own World University Rankings relies exclusively on seemingly objective indicators, such as the academic and research performance of faculty, alumni, and staff. The measures evaluated include publications, citations, and international awards, such as Nobel prizes and Fields medals. Shanghai's 2004 and 2005 rankings of the top 500 universities around the world do not include any Malaysian institutions; as a matter of fact no Asian universities appear in the top 100. Among the top Asian universities included in these rankings are Singapore's National University (101-152), South Korea's Seoul National University (101-152), and China's Tsing Hua University (153-202) and Beijing University (201-300).

A third ranking, this one regional, contextualizes the stature of Malaysian higher education in comparison to its neighboring countries. Asia Week's 2000 rankings included 77 multi-disciplinary and 39 technical universities in Australia, Bangladesh, China, Hong Kong, India, Indonesia, Japan, Malaysia, New Zealand, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, and Thailand. The methodology for this ranking is similar to that of the THES, with subjective criteria, such as peer perspectives regarding academic reputation, coupled with more objective data like student selectivity, faculty resources, research, and financial resources in developing the rankings. In 2000, Technological University (30th) was the highest ranked Malaysian universities, followed by University of Malaya (47th), Putra University (52nd), and University Science Malaysia (57). By comparison, Indian technical institutes were ranked 3rd, 4th, 5th, 7th, and 8th, showing a broad dominance in science and technology education for India. Singapore had two universities listed in the top 10 (5 and 9), and South Korea showing excellence among its science and technology and multi-disciplinary university, with three in the top 10 (1st, 2nd, and 4th).

Benchmarking management education in Malaysian universities is also of relevance, considering the importance of developing an entrepreneurial culture among graduates. Part-time and full-time MBA programs are offered at nine Malaysian institutions, public and private.[17] Of these nine programs, only three—Faculty of Business and Accountancy, University of Malaya (32nd); Malaysian Graduate School of Management, Universiti Putra Malaysia (42nd); and University Science Malaysia School of Management (43rd)—were ranked in the top fifty of Asia Week's ,the most recently published Best Business Schools Ranking (2000). The Philippines and Korea also had three business schools in the top fifty; Pakistan and Singapore had two each; and China had one. Only two comparator countries had more than Malaysia: Thailand, with four (7th, 14th, 46th, 49th), and India, outdistancing all countries with eight institutions in the top fifty. However, a more recent survey by Asia Inc. does not list any Malaysian management programs in the top 25 in Asia.

Malaysia's commitment to management education seems clear from the quality programs being offered. There is little doubt, however, that regional competition among management programs

[17] Malaysian Graduate School of Management, Universiti Putra Malaysia; Lincolnshire and Humberside MBA, KDU Centre; Universiti Telekom (Unitele); UniversityScience Malaysia School of Management; Universiti Tenaga Nasional; Binary; School of Business and Law, INTI College Malaysia; Faculty of Business and Accountancy, University of Malaya; and International Business School, Universiti Teknologi Malaysia.
Source: www.careerdynamo.com/business_school/malaysia_mba_2.html

is keen. Given the government's commitment to promoting and supporting excellence in higher education to build upon Malaysia's economic development, a logical area of focus would be investing in and improving its institutions' management programs, particularly considering the quality foundation that already exists.

What Happens to University Graduates

Unemployment rates for individuals with tertiary education qualifications are highly telling about the strength of the local economy and its receptiveness to well-educated workers. The most recently available unemployment rates for Malaysia tertiary education graduates is around 1.4%, which is the lowest among comparative nations sharing in this study. The unemployment rate for young graduates, however, is considerably higher – over 12% – and this fact and the growing numbers of graduates among the ranks of the unemployed is getting attention from the media and from policymakers in Malaysia.

Table 2.2 Unemployment Rates

Countries	Unemployment Rates Tertiary Ed. % 2000
Malaysia	**1.4**
China	n/a
Finland	3.1 [a]
India	n/a
Ireland	1.5 [a]
Korea, Rep. of	1.9 [a]
Philippines	n/a
Singapore	n/a
Thailand	1.6 [a]
OECD Mean	3.0[a]

Concerns about graduate unemployment and what role governments should play in addressing this issue, are not unique to Malaysia. Graduate unemployment rates are high in many other developing and high-income countries such as Thailand, India, Chile and Turkey, at least in the initial school-to-work transition, and they exhibit much higher rates of youth unemployment than in Malaysia. This phenomenon is also not unique to university graduates; other less-educated groups experience this job search process as well, though often without the same public scrutiny. In Malaysia, this job search process and attendant unemployment among young graduates has been exacerbated by the recent massive expansion in supply of graduates from both public and private tertiary institutions. Most have been absorbed by growth in the economy. That tertiary education graduates are able to find employment indicates some real strength in the Malaysian economy, which has been able to create jobs for these new workers and even use their presence to their advantage.

Gender differences constitute another important dimension of labor market outcomes worth examining. The World Economic Forum (WEF) developed a study and ranking of 58 countries

to assess each nation's existing gender gap, as defined through an analysis of five areas: "economic participation, economic opportunity, political empowerment, educational attainment, and health and well-being" (WEF, 2005a, p. 1). This report, *Women's empowerment: Measuring the global gender gap*, recognizes the importance of education in particular by noting, "Educational attainment is, without doubt, the most fundamental prerequisite for empowering women in all spheres of society, for without education of comparable quality and context to that given to boys and men, and relevant to existing knowledge and real needs, women are unable to access well-paid, formal sector jobs, advance within them, participate in, and be represented in government and gain political influence" (WEF, 2005a, p. 5). In comparing the global gender gap rankings with the Global Competitiveness Index, the WEF notes a strong correlation between the improved status and opportunities for women and the higher competitivene scores for countries.

Table 2.3 Gender Gap in the Labor Force

Countries	Global Gender Gap Rankings (out of 58 countries) 2005
Malaysia	**40**
China	33
Finland	5
India	53
Ireland	16
Korea, Rep. of	54
Philippines	n.a.
Singapore	n.a.
Thailand	44

Source: WEF (2004) Global Competitiveness Index and Business Competitive Index. Retrieved September 5, 2005 from http://www.weforum.org

These comparative data show that Malaysia (in 40th place out of 58 countries) does not rank near the top of the list of nations in this regard. This problem of low participation of women is shared with the other Asian countries, including Thailand, Korea, India, or China. Regardless of enrollment rate success, for Malaysia to achieve lasting and significant economic growth, women must be able to take their education into the workforce and develop professional careers that contribute to the local economy. Many of them do, and employment prospects for women, especially those with tertiary education, have improved over time. The low ranking of Malaysia in these international comparisons of the gender gap may not accurately reflect the real progress being made by recent cohorts of female graduates entering the labor market. The evidence suggests that the employment prospects of young women with tertiary education have not only improved since 1995 as compared to earlier entry cohorts of women, but that they may have actually improved their employment position relative to their male counterparts.

The Challenge: Excellence, Reputation and Competitiveness

Notwithstanding the impressive attainments documented in the previous section, the low ranking of Malaysian universities in international league tables and the perceived rise of graduate unemployment at the same time as the productive sectors complain of shortages of qualified labor with appropriate skills explain why the national authorities want to give high priority to improving the quality and relevance of higher education institutions and programs.

In what ways are Malaysian universities different from the top Asian, European, and North American universities, and how do the differences hinder further advancement? Universities are complex organizations. Their successful performance is dependent on multiple factors. In a recent survey report, The Economist[18] referred to the higher education system in the United States as "the best in the world" and associated this success not only to its wealth but to its complete independence from the state, the competitive spirit that encompasses every aspect of it, and its ability to make academic work and product relevant and useful to society. The elite league of universities are those whose faculty and students are highly successful in intensely competitive arenas. Among other things, their environments foster competitiveness, unrestrained scientific inquiry, critical thinking, innovativeness, and creativity. Moreover, because they have complete autonomy, their structures are not inhibited by various bureaucracies but are flexible enough to quickly respond to the demands of a rapidly changing global market.

Compared with this vision of world class universities, Malaysian universities have:

- Weaker governance and financing arrangements, including insufficient autonomy and accountability mechanisms. They also operate in a more diffuse framework, with separate standards for the private and public sectors.

- Room to improve quality, due especially to insufficient number of faculty with highest credentials and a disjointed quality assurance system.

- Concerns about possible growing graduate unemployment.

- Challenges in the integration of research and innovation system, with insufficient research funding and weak university-industry linkages.

Each one of these dimensions is discussed in more detail in subsequent chapters.

[18] Source: *Secrets of success*. The Economist, London: September 10, 2005, Vol. 376, Issue 8443, p. 6.,

Chapter 3. Governance and Financing

Main Findings

- *Despite the high level of public financing for higher education, the present centralized governance system is faced with considerable constraints that hinder public universities to exploit their potential to the fullest and to be classified as "world class".*

- *Public and private higher education institutions operate under different regulatory and financing rules, resulting in the absence of a unified higher education system.*

- *In the absence of any performance-based budget allocation mechanism, there are no particular managerial and financial incentives to engender competition among universities or to encourage them to manage their performance differently.*

- *The student loan scheme is in danger of decapitalization due to the low level of repayment.*

Governance

Reflecting the importance that the Malaysian government gives to the higher education sub-sector and the critical need to modernize and improve its operation, the Ministry of Higher Education (MOHE) was recently established with the responsibility of providing strategic direction and overseeing the development of the sub-sector. The other key component of the overall system governance structure is the National Council of Higher Education, established in 1996 to plan and coordinate both the public and private sectors of higher education. The Council, which is chaired by the Minister of Higher Education, determines policies in relation to staff salaries in public institutions, fees, student selection, funding, courses of study and other matters.

To date, MOHE and the Council have performed their functions along a model of centralized governance and management system that has granted some degree of autonomy to the public universities but not the authority to manage key aspects of their operation. The current system is restrictive, in particular, with respect to three critical decision-making capacities that are paramount before universities can compete at a "world-class" level, namely the ability to enroll the most qualified students, the ability to employ the most competent professors and researchers, and the quality of the university's leadership. Universities would be more competitive if they had the:

- **ability to select their students on their own terms**. Instead, students are allocated to universities centrally, based on their cumulated grade point average (CGPAs) obtained in different pre-university programs.[19]

[19] This aspect is discussed in greater detail in the section on student selection in Chapter 9.

- **possibility to offer competitive compensation packages** both to keep their brightest faculty members and to attract the best internationally. Faculty are civil servants and as such, their salary scale is fixed so public universities are not capable of offering salaries outside the norm. Nor are they able to offer other incentive packages to attract faculty of their choice locally or internationally.

- **authority to appoint highly qualified university leaders** based on an open search process led by the University Board. Instead, vice-chancellors and deans are appointed by the Government.

The observations of the World Bank team are consistent with the results of a 1998 survey of 20 countries, including Malaysia, commissioned by the Australian government.[20] The survey found that the countries could be grouped into three categories: an Anglo-American group with the highest degree of university autonomy, a European group occupying a middle position and an Asian group where government influence is the highest. Malaysia and Indonesia came out as the countries with the least university autonomy. Notable exceptions among the countries surveyed were France which showed a level of government influence comparable to the Asian group, New Zealand which was in the middle of the European group and Singapore which came out at the border between the Anglo-American and the European groups.

Comparing the situation in Malaysia with the results of a 2003 OECD study clearly shows that the Malaysian public universities have much less management autonomy than universities in the countries included in the tables.

Table 3.1 Extent of University Autonomy in OECD Countries and Malaysia

Category	Countries							
	NL	AU	IE	GB	DK	SE	FI	MY
Own buildings and equipment	X	X	X	X				
Borrow funds	X				X			
Spend budgets to achieve objectives	X	X	X	X	X	X	X	X
Set academic structure and courses		X	X	X		X	X	
Employ and dismiss staff	X	X	X	X	X	X	X	X
Set salaries	X	X		X		X	X	
Decide size of student enrolment	X		X		X			

Note: X means that the university has the power to perform this function autonomously
Source: These responses come from a survey undertaken in 2003 by members of the OECD's Institutional Management in Higher Education Programme. Reported in OECD (2003) Education Policy Analysis. The information for Malaysia is based on interviews conducted during the World Bank team visit in September 2005.

Furthermore, as will be discussed in greater detail in a later section, the funding of public universities does not take into account institutional, and by extension, individual performance

[20] Anderson, D. and R. Johnson. 1998. "University Autonomy in Twenty Countries". Canberra: Australian Department of Employment, Education, Training and Youth Affairs.

and productivity. Universities receive funding whether they perform well or not in terms of quality and employability of the graduates, and efficient use of available resources. At the level of the individual faculty member, other than intrinsic motivation and perhaps a strong sense of responsibility in nation building, there are few incentives for academics to improve their performance in research and teaching. As civil servants, their positions are secure. Their tenure dossiers do not necessarily undergo the scrutiny of international peer reviewers. Their success is hardly bound to their competitive capacity and the impact of their scholarship and research. Although there are individuals across the system whose performance can be considered "world-class", the context does little to prepare the majority for competing at international levels.

Is there a unified higher education system? For the first four decades after independence, the basis of the higher education sector has been the public universities of which there are now 17, some of which include a wide range of fields of study while others have concentrated on a narrower range of disciplines. These institutions have produced most of the graduates at the bachelor degree level and will continue to do so.

In the mid-1990s the GOM facilitated the expansion of the private sector in higher education, making provision for private institutions to offer degree programs either on their own or in conjunction with established foreign universities. This policy development has been very successful, leading to the establishment of 27 degree-granting private Malaysian institutions and the presence of five foreign universities which together account for over a third of the first degree graduates. Five of these private institutions have close links to the public sector either through their ownership by a consortium of public universities or because they are closely connected to large public organizations (National Electricity Corporation, Petronas, Telecom, and the Public Works Department) that provided the capital funds necessary for their establishment. Notwithstanding their links to public sector organizations, these five universities operate outside the public university regulatory framework.

In contrast to the public universities, the private universities in Malaysia have, to some extent, been able to exploit their independence to their advantage primarily because their survival and growth is completely dependent on their reputation and ability to compete for the student market share. The growth of this nascent private system in a relatively short period of time is not just due to great demand. It also has something to do with the reputation that some of the private institutions have been able to build. The performance of CosmoPoint College of Technology is a case in point. It was established in October 1991 with one school and one program in IT training. Today it has 8,000 students, offers 150 training programs on 16 campuses, and is the only school that has a presence in every major city. Its reputation has led the Ministry of Human Resources to provide it with grants to retrain unemployed university graduates in high-end IT skills. The success in placing 99% of this initial cohort comprising 118 students has led to a second grant, this time to support the retraining of 400 students.

The environment in which the public and private institutions operate is very different. The most obvious difference relates to the recurrent funding which only the public institutions receive but there are other significant differences in important areas such as the control of student admissions, staff appointments, salary levels, quality assurance rules, tuition fees, accountability, and governance. The public and private institutions report to different parts of MOHE and to

different quality assurance bodies. In some cases the private institutions have more freedom, for example in the ability to recruit professors internationally and attract a larger number of foreign students. In the area of quality assurance, however, the public institutions can act with greater independence from the government. Applying the less restrictive rules of each of the sub-sectors to the entire higher education system might increase the overall effectiveness of Malaysian universities.

Financing of Universities

*Resource mobilization***.** Over the past two decades, the priority given by the GOM to human resource development and the vision of the importance of higher education have translated into significant investment to develop the sector. According to the Eighth Malaysia Plan, education in general accounts for 20% of total government expenditure. Nearly 47% of the total development allocation for education was set aside for tertiary education, or RM 8.9 billion out of RM 18.7 billion.

The Mid-Term Review of the Eighth Malaysia Plan, however, shows revised numbers with an increase in the share of education as a percentage of total investment to 25% and a decrease in the share of higher education to 32% of the total allocation (RM 11.3 billion out of RM 35.0 billion). Tertiary education commands the largest share of the education budget of all the sub-sectors in both reports, but the RM 2.4 billion rise from the original to the revised Eighth Malaysia Plan is outpaced by increases at other levels: allocation of funds for pre-primary, primary and secondary levels doubled, while the budget for teacher education and other educational support programs more than tripled.

Compared to the financial effort of other countries on behalf of tertiary education, the Malaysian government is among the most generous contributors in the world. As Table 3.2 below shows, at about 2.7% of its Gross Domestic Product (GDP), Malaysia compares well with the top OECD performers, and invests a much higher proportion than Thailand (1.0%) and even the OECD average (1.3%).

Table 3.2 Public Expenditures on Tertiary Education

Countries	Expenditures on Tertiary Education as % of GDP
China	0.8
Denmark	2.7
Finland	1.7
Germany	1.2
India	0.7
Ireland	1.2
Korea, Rep. of	2.4
Malaysia	**2.7**
OECD Average	1.3
Philippines	0.7
Singapore	n/a
Sweden	2.2
Thailand	1.0
United Kingdom	1.1
USA	1.4

Source: OECD. (2005). Education at a Glance 2005
UNESCO (2005) from Global Education Digest 2005. Comparing Education Statistics across the World. Montreal: UNESCO-UIS.

One of the determinants of this high level of expenditures is the fact that the cost of tuition in public universities is heavily subsidized, as is the cost of accommodation which is typically provided on campus for a large majority of students.

Resource allocation mechanisms. Like many countries in the developing world, Malaysia still relies on a traditional historical/negotiated allocation approach to distribute the budget among public universities. Every year, each university submits a budget proposal based on the enrollment intake numbers decided by the Ministry of Higher Education. The Ministry of Finance then makes the final allocation which usually reflects the previous year's allocation plus a small increase depending on the overall availability of public resources.

To improve accountability and transparency, the Government introduced in 1997 the Modified Budgeting System (MBS) which was supposed to operate as an output-oriented budget allocation mechanism and bring the universities in line with all other statutory bodies in Malaysia. In practice, however, the final budget allocation has continued to be determined through negotiation without reliance on output measures. Funds are still distributed on the basis of an incremental cost approach linked to inputs.

The main drawback of the present system is that negotiated budgets do not link in any way the amount of resources allocated to the cost structure and performance of the recipient universities. They provide no incentives for universities to manage their resources efficiently and achieve better labor market results. Table 3.3 below illustrates the wide range of unit costs that can be observed in the various public universities, which do not appear to correspond to any deliberate

policy decision. For example, there is a large differential between University of Malaya and University Science Malaysia even though the two universities have almost the same proportion of graduate students in their overall enrollment (27% and 25% of Ph.Ds and M.A. students respectively in 2005).

Table 3.3 Unit Costs in Malaysian Public Universities (2005)

University	Recurrent Budget	Enrollment[a]	Per Student Expenditure
UM	326,500,000	25,716	12,696
UKM	315,640,300	31,080	10,155
USM	477,022,190	24,113	19,782
UPM	390,186,000	26,942	14,482
UTM	303,968,100	25,280	12,024
UUM	132,011,400	19,554	6,751
UIAM	275,509,500	15,544	17,724
UNIMAS	115,803,000	5,692	20,344
UMS	162,389,300	14,683	11,059
UPSI	92,004,800	14,347	6,412
UITM	973,335,800	82,510	11,796
KUIM	26,165,400	2,004	13,056
KUITTHO	170,279,800	5,695	29,899
KUSTEM	53,200,000	4,997	10,646
KUTKM	82,090,400	4,687	17,514
KUKUM	91,593,500	2,125	43,102
KUKTEM	78,940,100	2,764	28,560
Average	**270,889,070**	**18,102**	**15,799**

Source: *Ministry of Higher Education*

[a]=includes enrollment in doctorate, master, postgraduate diploma, bachelor and diploma programs

Finally, universities express reservations about the cumbersome and lengthy budget preparation process (two-year budgeting cycle) and the fact that the final allocation by the Ministries of Finance and Higher Education does not closely relate to the budget submission.

Student Support Mechanisms. In 1997, the GOM created the National Higher Education Fund Corporation (NHEFC) as a semi-autonomous body under the authority of the MOHE with the purpose of offering subsidized loans to help students meet the high tuition fees charged by the newly established private higher education institutions. Eligibility for these loans was extended a few years later to students in public universities, despite the prevailing level of subsidy provided to these students. NHEFC management has been very effective in expanding the program and in running the agency in an efficient manner. Between 1997 and 2005, about RM 15.1 billion was committed to almost 800,000 students, as per Table 3.4.

Table 3.4 Allocation of the National Higher Education Fund

Year	Public Universities	Private Universities	Total No. of Students	Proportion of Students from Private Institutions	Amount of Loans (RM Million)
1997	11,905	179	12,084	1.5%	219.5
1998	17,564	718	18,282	3.9%	365.6
1999	76,389	6,769	83,158	8.1%	1,683.6
2000	85,764	8,286	94,050	8.8%	1,849.6
2001	84,306	26,338	110,644	23.8%	2,134.1
2002	86,186	19,591	105,077	18.5%	1,981.2
2003	86,057	26,564	112,621	23.6%	1,863.4
2004	88,282	30,829	119,111	25.9%	2,268.4
2005	**98,755**	**45,704**	**144,459**	**31.6**	**2,762.9**
TOTAL	**635,208**	**164,978**	**800,186**	**20.6%**	**15,138.3**

Source: MOHE

However, despite being well managed by NHEFC, the student loan program appears in need of adjustments for a number of reasons. The first concern has to do with eligibility. Since there is no family income condition of eligibility, a significant proportion of the loans granted may have benefited students from wealthy families who take advantage of the 3% concessional interest rate to support expenditures not directly linked to their studies. This would imply that the eligibility conditions are too wide. Second, the schedule of loan amounts by type of studies indicates a built-in bias in favor of university students. As a result, the amount of the loan that diploma students can obtain is not sufficient to cover the cost of their studies. In a lifelong learning framework, all eligible students should be entitled to receive financial aid regardless of the level of post-secondary studies. Third, there is an issue of inappropriate targeting in terms of balance between public university and private university students. According to the data shown in Table 3.4, only 21% of loan beneficiaries since the establishment of the loan scheme have been students attending private higher education institutions. Considering the fact that public universities charge low tuition fees, one could have expected a majority of loan beneficiaries enrolled in private colleges and universities. The situation has improved in recent years, but private sector beneficiaries still represent only 32% of total beneficiaries. Fourth, the repayment schedule provides for equal monthly payments for the entire 10 or 20 years of duration of the repayment period. This has the major drawback of translating into relatively high payments at the beginning of a graduate's professional career and relatively smaller payments as the income of the graduate increases over the years. Fifth, at 350 employees, NHFEC seems to have more employees than student loan agencies with an equivalent portfolio in North and South America. There may be room for improving management efficiency, especially on the loan recovery side, provided a more efficient information system can be put in place.

The last but perhaps most worrisome feature of NHFEC's present performance is the apparent lack of financial sustainability of the student loan scheme. Payment compliance is reported to be on the low side. While precise data on the proportion of beneficiaries who are late on their payments or who default are not available, Table 3.5 below clearly shows the large imbalance between new loans and loan repayments, even taking into consideration the normal lag corresponding to the duration of studies for new loan beneficiaries. NHFEC management estimates that it recovers only 25% of the total amount it should be receiving. A complicating factor is the fact that Treasury has drastically cut down its budget transfers to NHFEC in the past two years, forcing the Student Loan Agency to borrow money at high interest rates. This situation means that NHFEC is in danger of rapid decapitalization unless measures are taken to improve repayments, reduce default and guarantee a more stable cash flow through regular budget contributions.

Table 3.5 Financial Performance of the National Education Fund

Year	No. of Loan Beneficiaries	No. of Graduates Making Payments	Borrowed Amounts (RM million)	Amounts Repaid (RM million)
1997	12,084	_	222.4	_
1998	18,282	13	398.6	_
1999	83,158	2,661	1,836.6	0.05
2000	94,050	9,059	2,248.2	0.3
2001	110,644	17,634	2,042.8	6.8
2002	105,077	43,343	1,759.0	7.3
2003	112,621	79,338	1,964.4	34.6
2004	119,111	61,011	2,406.6	44
2005	**144,459**	**N/A**	**N/A**	**N/A**
TOTAL	**800,186**	**N/A**	**N/A**	**N/A**

Source: MOHE and NHEFC

Chapter 4. Quality and its Determinants

Main Findings

- *The primary aim in a centralized review process is to ensure that academic standards are respected across institutions and programs, and that new programs are approved only if the demand exists and corresponding resources are available. However, despite the process, duplication in programs exits, mainly stemming from the desire to enable similar development path for all universities.*

- *The centralized process has the additional disadvantage of being complicated which in turn results in delays in processing every type of request from course and program approval to educational visits to organizations in the community, thus limiting academic freedom and discouraging innovations to improve the quality of teaching and learning.*

- *While there are pockets of innovation in some departments, overall the most prevalent approach to teaching is didactic lectures with limited opportunities for the students to interact with the teachers. The heavy workload in terms of teaching assignments deters individuals from developing and practicing innovative teaching methods.*

- *Senior researchers and academics do not seem to be involved much in the teaching of undergraduate students, which prevents Malaysian universities from integrating research and undergraduate education sufficiently.*

- *In thinking through the various academic dimensions that can contribute to the transformation of the Malaysian universities into world-class institutions, it is particularly important that: (a) a common standard of entry tests evolves to help ensure the identification of the more academically able students; (b) student course ratings have impact on faculty tenure and promotion considerations; (c) faculty academic success is linked to the impact of teaching, scholarship and research, based on a set of criteria and judged as appropriate by external and international peers; and (d) the quality assurance bodies are autonomous, with inclusive mandate to cover both private and public universities; have technical capacity, involve international peer reviewers, and produce transparent and public reports.*

This chapter focuses on the main pedagogical and organizational factors that impinge on the quality of education with an emphasis on academic programs, teaching, learning, faculty, and the quality assurance and accreditation processes. It provides insight into indicators that are used to assess the quality of universities internationally and conditions that enable universities to offer quality education to their students.

Academic programs, teaching, and student learning

Academic programs

Academic programs in public universities are established with permission from the Minister of Higher Education through the office of the Director General of Higher Education. This is also the mechanism that directs the development of public universities in niche areas. Academic programs in private universities are accredited by the Lembaga Akreditasi Negara (LAN).[21] In the public system, approval at the course level is done internally. Where changes to curriculum are less than 30%, no authorization is required from the MOHE - departmental committees and the university senate authorize proposed changes. In the private system, the LAN has to accredit a new course before it is offered to students.

The primary aim in a centralized review process is to ensure that academic standards are upheld across institutions and programs and that new programs are approved only if the demand exists and corresponding resources are available.

However, interview data suggest that despite the centralized process in Malaysia, there is duplication in programs stemming more from the desire to enable universities to develop in an equitable fashion and not to fall behind sister institutions, rather than because of demand or to realize a particular vision.

The centralized process has the additional disadvantage of delaying the processing of every type of request from course and program approval to educational visits. This kind of orientation to micro-management no doubt limits academic freedom. More importantly, it is likely to be very discouraging to advancing innovative ideas that may require radical changes to the current practice in order to improve the quality of teaching and learning.

The logistics of registration in courses and program delivery appear to be a concern. Students have experienced difficulties in obtaining accurate information about when classes start and end, class location, course add and drop regulations, and permission for course change. The more recent move to implement management information systems has begun to address these concerns.

Language of instruction

Whether the language of instruction should be Malay or English is a topic under debate across all levels of education in Malaysia. In the public universities, the tendency of the majority is to use Malay although some programs such as medicine are exceptions. Another exception is UIT MARA, a public university whose primary mission is to provide quality education to the Bumiputra. In this institution, English is the language of instruction. The medium of instruction in all private universities is English, and this perhaps is one of the key factors that attract students to the private system. In contrast, in the most research-intensive universities, including University of Malaya and University Science Malaysia, the language of instruction is Malay.

[21] Lembaga Akreditasi Negara (LAN) is discussed in detail later in this chapter.

In a study carried out by the Institut Penyelidikan Pendidikan Tinggi Negara (National Higher Education Research Institute) in 2005, employers' views were solicited on various attributes and qualifications of local graduates. While 97.5% of responding firms (N=241) felt that it was important for graduates to converse fluently in English and 96.3% felt it was important for graduates to be able to write effectively in English, 36.9% said that they found graduates 'somewhat competent' or 'not competent at all' in terms of their ability to speak languages other than Malay.[22]

English language competency is particularly important at the graduate level because faculty as well as graduate students need to be able to both consume and contribute to the scientific literature in English as members of the global scientific community. The 2004 Times Higher Education Supplement World University Rankings report asserted that a high ranking on the "peer review" indicator was almost exclusive to "institutions in the US and, … other English-speaking countries"[23] because citation indices such as Thompson's Scientific database are less likely to take into account national publications which are usually in the language of the country.

Teaching

Teaching quality and methods of delivery

Information about teaching quality in Malaysian universities was gathered during interviews with administrators, faculty, and students without the opportunity to make classroom observations. The general sense is that, while there are pockets of innovation in some departments, overall the most prevalent approach to teaching is didactic lectures with limited opportunities for the students to interact with the teachers. In the social sciences, humanities, and arts, classes are larger and the use of technologies in teaching is reported to be infrequent. In the sciences, some laboratories are reported to require modernization.

The heavy workload in terms of teaching assignments deters individuals from developing and experimenting with innovative teaching methods. This is particularly the case in universities where small classes are more prevalent and thus where there is a greater need for deeper involvement of faculty in teaching. The range of normal teaching hours (contact hours) in the public system ranges between 6-18 hours per week. For any teaching assignment beyond 18 hours per week, faculty can receive additional remuneration. In the private system, teaching load is anywhere between 16-20 hours per week. In international research-intensive universities, teaching load is around 6-8 hours per week of contact time only, but faculty also have a heavy load of graduate supervision and extensive research involvement.

By and large, senior researchers and academics do not seem to be involved much in the teaching of undergraduate students, which disadvantages Malaysian students to get exposed to research at the undergraduate level. Only a few engineering programs use problem-solving as their main pedagogical approach. Multi-disciplinary academic programs are at an early stage of development, mostly prevalent in only one institution, namely University Science Malaysia.

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[22] Source: Pandian, A., & Ghani, A. (Ed.) (2005). *University curriculum: An evaluation on preparing graduates for employment*. Monograph. Pulau Pinanag: National Higher Education Research Institute.
[23] Source: The Times Higher Education Supplement, November 5, 2004, page 6.

Evaluation of teaching

The most common form of teaching evaluation used across the board internationally is student course ratings. While Malaysian universities typically use student course ratings, it is not apparent what the consequence of the ratings is and to what extent they inform improvement or administrative decisions. Interviews with students suggest that even those professors who receive negative evaluations year after year never make any changes to their teaching. The nature of the ratings does not seem to have any impact on tenure and promotion considerations. As a result, students tend to be skeptical about the true value of this policy and its impact on teaching improvement. Unlike many institutions in the United Kingdom or North America where annual salary increases are primarily based on merit (quality of teaching, research, and service relative to international benchmarks and departmental performance), in the Malaysian context teaching performance has little bearing on tenure, promotion, or salary increase.

Students and student learning

Student preparation at primary and secondary levels

A successful primary and secondary education system can bolster the development of high quality universities and provide competent workers for a competitive labor force. Many issues at the tertiary level often have their genesis at the primary and secondary levels. A critical look at the interplay of outcomes at the primary, secondary and tertiary levels is crucial to understanding the process of developing world class universities in Malaysia. This section examines the key structural linkages between education levels and the flow of a dynamic education system from primary to tertiary.

(a) Quality and Access. While only 9.8% of secondary school students attended private institutions in 2003 differences in quality and access between types of schools at this level often persist at the universities.[24] A breakdown of secondary enrollment data by ethnic origin shows that the majority of students enrolled in private schools are Chinese (79%), followed by Malay (8%), Indian (7%) and other groups. This pattern of ethnic distribution in private schools extends beyond the secondary level to universities. Non-Bumiputras make up the majority of students enrolled in private tertiary institutions.

A ***gender*** breakdown shows that there are more female than male students enrolled at the secondary level and that this distribution pattern is reflected in enrollment in government schools. However, males make up to 63% of those enrolled in private institutions. This gender dynamic in private and public secondary school enrollment may reflect the tendency for households to invest more in their sons by sending them to private institutions. [25]

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[24] **OECD's Education Database at**
http://www.oecd.org/document/23/0,2340,en_2649_37455_35379735_1_1_1_37455,00.html.

[25] The private vs. government school distinction is salient because private schools tend to have more modern buildings, facilities and services, as well as lower teacher-pupil ratios than their counterparts. Students in private schools performed significantly better than those in government schools on the lower secondary assessment (PMR) of 1995, in all subjects except Bahasa Malaysia (Loke, et al. 1999).

Studies have shown the significant relationship between ***parental income*** and type of school attended by students. The majority of students (61%) who attend government schools come from households with parents in the lowest income quintile and only 26% of students from this income quintile attend private institutions. Given that public universities charge relatively low tuition fees, there is a risk of a growing gap between those who can pay and enter into the private system and those who cannot, due to lack of resources.

Quality and access ***gaps between rural and urban*** communities are serious impediments to developing an equitable education system in Malaysia. In 2000, there were a total of 2,235 under-enrolled primary schools, most of which are located in rural and remote areas and with buildings that do not meet the requirements of basic facilities. More funding is necessary to improve quality of physical facilities, equipment, teachers, staff and an environment conducive for teaching and learning. The problem is even greater at the secondary level because it is more expensive to deliver and most rural families are unable to contribute much towards their children's education. Finally, academic performance of students is much lower in rural areas. This applies to all subjects: comprehension and writing in Bahasa Malaysia, English language, mathematics, and science.

(b) Pedagogical Approaches and Teacher Quality The "chalk and talk" approach continues to prevail at the primary and secondary levels, with little opportunity for the students to think critically or imaginatively. Teachers surveyed about the new curriculum indicated that they were not convinced of the appropriateness of the suggested pedagogical strategies. Without teacher buy-in, it is possible that a gap will continue to exist between the intended and enacted curriculum at the primary and secondary levels. Given the tendency for teachers to rely on the rote learning approach, this shows that needed skills are still not addressed despite the nation-wide curricular reform. The consequences are serious, particularly with respect to improvements in the areas of science and mathematics.

(c) Shortage of qualified teachers still exists, especially in rural primary schools. In 2003, shortage of teachers was experienced in critical subjects, such as English (19%), mathematics (20%) and science (25%). Given the difficulty of placing teachers in rural areas, as well as the high turnover rate of teachers in remote locations, Malaysia is in urgent need of additional teachers, and improving the qualifications of these teachers.

(d) Language of Instruction. The Education Act of 1961 prescribed the use of Bahasa Malaysia as the main medium of instruction at all levels, from primary to higher education. In 2003, the government introduced a policy to teach mathematics and science in English, in stages beginning with Years 1, 7 and 12. So far, the results are mixed. A major difficulty is that the focus on Bahasa Malaysia as the medium of instruction at all levels means that a number of teachers with English Language proficiency is insufficient.

(e) Science and Mathematics Achievement. In recent years, Malaysia has undertaken several initiatives to improve science and mathematics achievement. While laudable progress has been made, several challenges remain. The first one is the lack of qualified teachers, especially in science and mathematics. The bottleneck problem is clear: with a shortage of qualified math and

science teachers coming out of universities, primary and secondary school students will not achieve at their potential in these subjects. In return, if students are not encouraged to pursue the science and technical streams, they will not pursue these areas at universities, feeding into the shortage of teachers and scientists in the labor market.

Second, the government introduced the "60:40 policy", which targets a 60 to 40 ratio of students in the Science/Technical versus Arts streams at the secondary level by 2020. The ratio of Science and Arts students in government and government-assisted schools improved from 29: 71 in 2001 to 36:61 in 2004.[26] According to the same study, urban schools were able to meet the 60:40 enrollment ratio in Forms IV and V. However, they also find that problems are concentrated in the rural areas, where schools continue to lag behind their urban counterparts in improving the enrollment ratio.

Another critical issue is the lack of a professional community for science and mathematics teachers. Science and math teachers, in addition to being in short supply, rarely engage in professional activities in their field.[27] While informal discussions about their field with other teachers in the same school take place, they lack a broader community into which they can tap for support and resources.

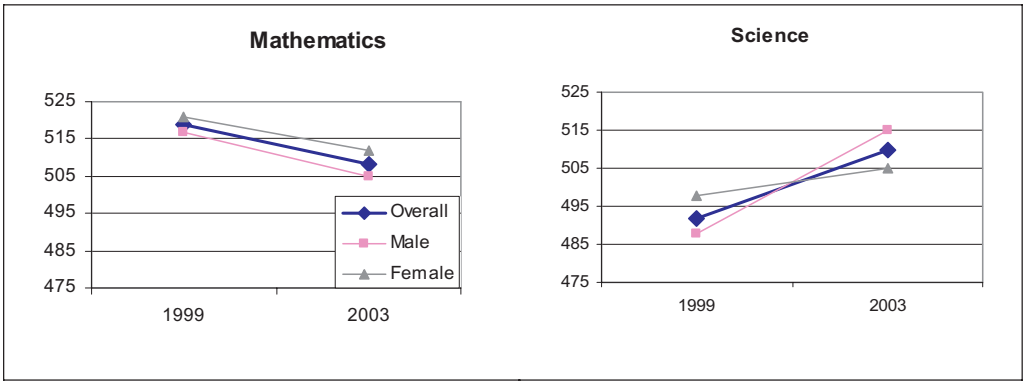
How does Malaysia compare internationally in mathematics and science achievement? Malaysia participated in the eighth-grade assessment of the Trends in International Mathematics and Science Study (TIMSS), allowing for comparison with 28 countries (1999) or 44 countries (2003). Malaysia's ranking in performance by overall average score improved from 1999 to 2003 in both subjects, moving from 16th to 10th place in mathematics and 22nd to 20th place in science. In both subjects, Malaysia's average scale score in 2003 is significantly higher than the international average.

However, international comparisons mask important internal dynamics in TIMSS mathematics and science achievement in Malaysia. Figure 4.1 shows overall average scale scores for mathematics and science in 1999 and 2003, as well as a comparison by gender. Despite improvements relative to other countries, performance in mathematics dropped overall from 1999 to 2003 for both sexes. Females scored higher than their male counterparts in both years. The trend in science achievement shifted from 1999 to 2003. While overall performance improved, as well as for both sexes, male students made a much larger gain than their female counterparts. What accounts for the gender disparity in science achievement is unclear, but poses a possible area of follow-up for the government.

[26] Loke, Siow Heng, Chang Lee Hoon, Lee Siew Eng, and Chien Lee Shing. 2005. "A Study on Expanding and Improving Secondary Education: A Case Study on Alignment of Malaysian Education Policies." Kuala Lumpur: University of Malaya

[27] Loke, Siow Heng, Chang Lee Hoon, Lee Siew Eng, and Chien Lee Shing. 2005. "A Study on Expanding and Improving Secondary Education: A Case Study on Alignment of Malaysian Education Policies." Kuala Lumpur: University of Malaya

Figure 4.1 Average Scale Score of Mathematics and Science, 1999 and 2003



Paths of Entry to University

In the present Malaysian public system, allocation of students to the universities occurs centrally even though universities are free to determine their minimum Cumulative Grade Point Average (CGPA) requirement for entry into specific programs. Students select and rank eight programs and universities of their choices. The MOHE is in charge of assigning students to universities.

Currently, there are 5 different paths of entry into the university system.[28] These include: Matriculation, Sijil Tinggi Pelajaran Malaysia (STPM), University pre-foundation studies, "A" level, and Higher Religious Certification. The first is a year-long program and is the pathway of entry for the Bumiputra. It was put in place as a measure to increase the chance of access to this ethnic segment that accounts for 70% of the total population. The second and third are the paths chosen primarily by minority ethnic groups. The latter two are used by very few applicants.

Regardless of path of entry, the obtained CGPA is taken as evidence of eligibility for university access even though no clear procedures have been applied to establish equivalency in CGPA acquired in these different programs, leading to at least two negative consequences. The first is a *perception* among some that inequitable standards are being applied to different ethnic groups. The *perception* that the matriculation program is "sub-standard" appears to be widespread despite insistence from authorities that it is not. The second is perceived segregation on the basis of ethnicity rather than reinforcement of racial harmony as expressed in the country's education philosophy.

In addition to the fact that the same CGPA obtained from different pre-university programs may actually represent different levels of achievement, universities themselves have varying CGPA requirements for entry into the same program. This, once again favors graduates of the matriculation program. A review of the prospectus of a public and a private university suggest that the practice is common in both sectors. For example, in one Civil Engineering program, the CGPA requirement for STPM is 2.67 while the CGPA requirement from a Matriculation

[28] There are universities that cater primarily to one ethnic group. UiTM was established to serve the Bumiputra which comprise more than 98% of its student population. The two private universities UTAR and INTI serve primarily the Chinese community.

program is 2.50. In the absence of a formal system that establishes equivalencies, applying differential standards may be strengthening existing perceptions that the system is unfair. More importantly, because of limited space, it may restrict the chances of developing world class universities due to difficulties in ranking the most academically qualified students and matching them the highest quality programs.

Student progress and retention

Time to program completion is one of the indicators that good universities and most ranking exercises use to monitor progress and the internal efficiency of the system. A strong benchmark in this regard is that 95% of students complete their program within the specified time period.

What can be discerned from available global enrollment and output data on students at doctoral, master's and bachelor levels[29] suggest that timely completion could be an issue in the Malaysian system. Rough comparisons of entry and exit figures are based on what is considered to be average duration of degree programs: 4 years for a doctoral degree, 2 years for master's degree, and 4 years for bachelor's degree. Table 4.1 concerning doctoral level graduates suggests that between 1/3 and 1/5 of students graduate within 4 years. Similarly, Table 4.2 concerning master's level programs suggests a slightly better completion record of about one third graduating within two years. Finally, Table 4.3 suggests that completion rates at the bachelor level in Arts and Science programs also hover around one third completing studies within 4 years.

[29] Source: Statistics 2005. Department of Higher Education, Malaysia.
No indication is provided as to whether these data are limited to the public system or they include the private system.

Table 4.1 Enrollment and Output of Graduate Students at the Doctoral Level, 1997-2005

Field	Enrollment/Output								
	1997	1998	1999	2000	2001	2002	2003	2004	2005
Arts	858/57	870/65	1450/117	1637/176	1898/199	1975/242	2514/279	3242/263	3981/310
Science	531/51	539/42	1037/61	1158/114	1331/159	1468/136	2034/193	2082/134	2398/207
Technical	261/5	299/11	525/15	564/113	627/128	439/140	520/144	898/51	1260/64
TOTAL	1650/113	1708/118	3012/193	3359/403	3856/486	3882/518	5068/616	6222/448	7639/581

Table 4.2 Enrollment and Output of Graduate Students at the Master's Level, 1997-2005

Field	Enrollment/Output								
	1997	1998	1999	2000	2001	2002	2003	2004	2005
Arts	5948/983	6416/2073	11529/2322	13836/2941	14005/3921	14142/4577	15496/4442	18415/3252	12988/3639
Science	2911/488	2853/658	5722/751	7039/891	7678/1174	8064/1236	8986/3552	9034/1952	11223/2376
Technical	962/121	1323/374	2713/382	3132/488	3201/560	3321/698	2834/452	3262/870	4666/1157
TOTAL	9821/1592	10592/3105	19964/3455	24007/4320	24884/5655	25527/6511	27316/8446	30711/6074	28877/7172

Table 4.3 Enrollment and Output of Students at the Bachelor's Level, 1997-2005

Field	Enrollment/Output								
	1997	1998	1999	2000	2001	2002	2003	2004	2005
Arts	59967/11120	68829/15908	71083/19747	81914/18360	87482/17729	84311/21752	90925/29372	91477/23832	95686/26206
Science	27100/4373	35292/5114	40202/8214	49575/7826	58029/8706	65617/10944	65235/16699	63813/12589	69218/16645
Technical	19995/2237	25720/2949	32686/6202	39305/4546	37138/4598	34262/4106	36128/4178	39180/7405	44244/8920
TOTAL	107062/17730	129841/23966	143971/34163	170794/30732	182649/31033	184190/36802	192288/50249	194470/43826	209148/51771

In order to get an accurate picture of whether student progress is in line with international standards, systematically compiled time-series data from different cohorts will be necessary. Moreover, in an ethnically diverse system such as Malaysia, in addition to overall data, it would be useful to have data on different ethnic groups as well as international students to discern any variances that may exist between groups.

Another measure that universities use to follow student progress is first to second year retention rates. From interview data, it appears that retention is not a major problem in Malaysian universities. Nonetheless, a close examination of trends is still warranted as it could reveal particular patterns in program areas and this could alert the responsible entities to redress the situation in a timely manner before it adversely influences student experiences.

Student learning experiences

Providing greater access to students inevitably opens doors to a more heterogeneous population of learners with diverse abilities and motivation. A quality education is responsive to this diversity and has built-in structures to ensure success of all students and not just the brightest. Malaysian universities, however, do not typically have specific programs for first year students to orient them in the university culture and to prepare them to take responsibility of their own learning.

Informal discussions with Malaysian students point to areas, which in their view could be improved to enhance their learning experiences. For improved quality, they even express a willingness to pay higher tuition fees. Although limitation in time did not allow the verification of these comments across all universities, they nonetheless are listed below as they provide insight into student perceptions as well as potential areas of improvement.

In interviews, students expressed the following concerns:

- Finding that teaching approaches mostly didactic, especially in the social sciences.
- No evidence that student ratings of teaching mean anything and have any consequences since the performance of instructors remains the same year after year!
- Not knowing of any specific programs to support students with diverse needs and disabilities in order to help them develop to their fullest potential.
- Not believing that academic programs foster skills that are required in the workplace.
- Feeling that professors do not express themselves freely and infer that they also cannot discuss their ideas openly and honestly.

- Feeling that there is considerable racial polarization, most evident in patterns of membership in extra-curricular clubs.
- Finding very limited opportunities to participate in research activities, conferences, and scholarly gatherings as undergraduates.

- Observing considerable inequities across the public system and across disciplines with respect to facilities and infrastructure, library holdings, computer and science laboratories. Individuals in the social sciences are concerned about class sizes, library holdings, and computer laboratories. Individuals in the sciences are concerned about the state of science laboratories.

- Finding insufficient number of individuals that provide technical support for equipment.

- Feeling that IT culture has not penetrated in the system in particular in the social sciences.

- Confronted with complicated bureaucracy in almost anything they do: to change courses; to obtain permission from MOHE to participate in a conference when representing the institution; to plan educational visits to various organizations, etc.

- Having no choice in language of instruction; prefer English as this is the most common academic language.

- Not seeing any follow-up and response to student complaints.

- Having very limited opportunities, in particular at the undergraduate level, to interact with international students at home or in a host country through student exchange programs.

Academic staff

This section looks at academic staff and the contribution they make to the overall standing of the university as they directly and in a significant way impact the quality of student learning and graduate training. The elaboration below addresses the size of the professorial corps, their qualifications and distribution by rank, recruitment, faculty development, and tenure and promotion policies and procedures.

Faculty numbers. In the absence of robust and current data on faculty numbers and student enrollments by institution *and* discipline, it is difficult to establish whether faculty student ratios are within international norms across the board. Looking at the 2004 THES rankings, one can discern that the score on this indicator for the two Malaysian universities that were ranked among the top 200 (Universiti Malaya and Sains Malaysia) was 15 out of a maximum score of 100. The score on the same indicator for Tokyo University (ranked 12th) and Oxford (ranked 5th) was 30, for Melbourne (ranked 22nd) 12, for National University of Singapore (ranked 18th) 10, and for the Indian

Institute of Technology (ranked 41st) 13. Similarly, in the 2006 THES rankings, the universities of Kebangsaan Malaysia and Malaya University, which ranked 185 and 192 respectively, received higher ratings in the faculty student ratio indicator category than Berkeley (ranked 8th), most Australian universities including Sydney and Monash (ranked 35th and 38th respectively), and Nanyang Technological University of Singapore (ranked 61 th). If the ratios of these two universities are representative of other Malaysian universities, it is likely that faculty student ratios are within international norms.

However, there is reason to believe that at least in some disciplines, these ratios are below the accepted norms. For instance, the Faculty of Engineering of Malaya University claims that it may not be accredited by the Engineering Accreditation Council (EAC) because of unacceptable faculty/student ratios. Moreover, in interviews conducted at various universities, a consistent message was that service courses had very large enrollments (around 200 students) and ratios in these courses were nowhere near those that were reported officially. One potential threat that could deteriorate current ratios is the anticipated 40% growth in enrollments in the next five years. To maintain the current faculty/student ratios, the system would need to carefully consider its faculty needs in light of projected student enrollments and plan for recruitment accordingly.

Faculty qualifications

The proportion of academics with a doctorate degree, especially in universities that are research intensive or aspire to be one is often used as an indicator in international rankings. In Canada, for instance, the range of percentage of faculty with Ph.D degrees in the top universities was as follows (as reported by the national weekly news magazine, Maclean's, which computes rankings for the three categories of universities):

Table 4.4 Proportion of Faculty with a Ph.D among Top Rated Canadian Universities

University classification	% with PhD degree in ranks 1-10
Primarily undergraduate	94.7 - 85.3
Comprehensive	98.1 - 86.5
Medical doctoral	98.9 - 94.3

Source: McLean's Magazine, November 15, 2004 issue.

From the limited data available on the Malaysian system, it can be deduced that universities do not fare well on this indicator. The promotional booklet of the *Department of Higher Education Statistic 2003* depicts an incomplete though telling picture. Even though data pertain to the public system only and it is not apparent whether the numbers reported are head counts or full-time equivalents (FTE), they do show that only 5.3% of faculty are ranked as full professor. One can say with confidence that these individuals are the ones who are most likely to hold a Ph.D. degree. The 17.4% who are ranked as associate professor may have either a master's or Ph.D. degree although anecdotal evidence suggests that the majority is more likely to be holders of a master's degree.

The important point is that the vast majority, 77.1%, of whom 60.6% are lecturers, 12.8% language teachers, and 3.7% tutors, are unlikely to have anything more advanced than a master's degree. The distribution may be different in different in each university. For instance, based on interview data, in the University Science Malaysia, there are 122 full professors, 321 associate, and 872 lecturers and senior lecturers, and 186 tutors. In UiTM, about 30-40% have Ph.D. degrees, most of whom have received their degrees abroad and very few who do not have a master's degree. As a comparison, in Canada the distribution of faculty by rank in the year 2002 was as follows: of the 34,500 full-time faculty, 40% were full professors, one third were associate professors, and only a quarter were assistant professors.[30] The most important negative implication of this skewed distribution in Malaysian public universities is that the majority of faculty do not have adequate research training to produce cutting edge scientific research. This situation suggests the need for an active faculty recruitment and training program as a matter of urgent priority.

Table 4.5 Comparison of Distribution of Faculty by Rank in Malaysian and Canadian Public Universities

Distribution by rank	Full Professor	Associate Professor	Assistant Professor/Lecturer	Other (Tutor, Language teacher)
Malaysian universities (public) (2003-2004)31	951 (5.32%)	3115 (17.42%)	10854 (60.68%)	**2966 (16.38%)**
Canadian universities (2002)	13,835 (39.61%)	11,624 (33.28)%	7,830 (22.42%)	**1,637 (4.63%)**

Tenure and promotion

In systems where academics are civil servants, tenure is deemed more as a right than a privilege. This is the case in Malaysia. The criteria for granting tenure and promotion are reported to be research publications and teaching quality. The fact that most faculty do not have Ph.D. degrees but are nonetheless tenured raises questions about the meaning of the tenure exercise as a whole.

Information gleaned during interviews suggests that there are several standards against which promotions are made in public universities and apparently the MOHE is trying to sort out existing inconsistencies. For instance, it appears that for promotion in rank (associate to full), the process involves external reviewers though reviewers are not necessarily drawn from an international pool. For promotion from senior lecturer to associate, the process appears to be internal. Having a Ph.D. is not the *sine quo non* for promotion in rank although most who are promoted to full professor rank do have a Ph.D. degree.

[30] Source: Association of Universities and Colleges of Canada (2002). *Trends in higher education*. Ottawa, ON, Canada: AUCC.
[31] Source: Statistics 2005: Department of Higher Education.

Tenure is granted after three years and salary increases happen automatically, leaving the impression that there are no meaningful consequences for poor academic performance. In other words, academic success is hardly bound to the impact of teaching, scholarship and research and the extent to which individuals are productive in these areas relative to a set of criteria and judged as appropriate by external and international peers. Dismissals happen but they are based primarily on disciplinary grounds rather than due to poor academic performance.

Thus, it could be said that in Malaysian universities, the tenure process appears to be a hybrid of different policies and procedures. As is the case in western European countries, Malaysian academics are civil servants. Like Japan and China, full-time appointments turn into permanent positions. And similar to North America, there is a formal tenure process in place that results in promotion in rank. This system, however, leaves little incentive for individuals to change their patterns of academic performance because job security is practically guaranteed at the time of appointment. It has been asserted that in some Asian countries such as South Korea and India, there is a presumption of lifetime employment for academics in full-time positions, but only limited procedural guarantees. Few individuals are terminated, even when academic institutions face difficult circumstances" (Altbach[32], 2002, p. 169).

Overall, although there might be individuals who thrive in the present system because of intrinsic motivation, the productivity of the system, particularly in research, is not comparable to strong international universities despite the intention to base tenure and promotion on academic performance.

Quality Assurance Practices

Significant steps have been taken to create a unified quality assurance framework that will review performance of all Malaysian higher education institutions. To this end, the Government has already agreed to a process to set up the Malaysian Qualifications Agency which will in turn be responsible to implement the Malaysian Qualifications Framework. The draft Act has been finalized by the Attorney General's Chambers and is expected to become operational by the middle of 2007.

The current operation of the Lembaga Akreditasi Negara (LAN), which focuses on private institutions, and that of the Quality Assurance Division (QAD), which directs its operations toward the public universities, have been moved under one roof but they continue to be distinct for the time being.

Quality Assurance

Under the aegis of the MOHE, two separate bodies are mandated to address quality issues in academic programs and courses in private and public universities. The older of the two, the Lembaga Akreditasi Negara (LAN), addresses accreditation of courses and

[32] Altbach, P. (2002). How are faculty faring in other countries? In R. Chait (Ed.) *The questions of tenure* (pp. 160-181). Cambridge, MA: Harvard University

programs in the private system. The Quality Assurance Division (QAD) concerns itself with QA activities in the public system. In addition to activities related to either QA or accreditation, almost all institutions are involved in some form of ISO related certification pertaining to almost all aspects of institutional life including academic programs, libraries, administration, and management systems. These activities are mainly coordinated by the Quality Management Units of institutions. Outside the jurisdiction of the MOHE, there also exist professional accreditation bodies such as the Malaysia Medical Council (MMC), the Public Services Department (PSD), and the Engineering Accreditation Council (EAC). Among other things, these bodies are concerned with standards for licensure and professional practice. They also deal with academic programs and the extent to which they meet required specifications in terms of faculty/student ratios, program content, and facilities.

Accreditation - Lembaga Akreditasi Negara (LAN)

The Accreditation Body, LAN was created by an Act of Parliament in 1997 as a mechanism for the formal recognition of the certificates, diplomas and degrees awarded by private higher education providers with the status of University or University College.[33] The mandate of the LAN includes: (a) formulating policies on the standard and quality control of courses and programs; (b) monitoring and overseeing implementation of standards of quality in courses and programs; (c) determining the level of competency of students in the private system with respect to national language and subject matter as specified in the 1996 Private Higher Educational Institutions Act; and (d) making recommendations and advising the Minister for approving programs and courses based on suitability of educational facilities and course content.

The LAN reports to the Minister, who may, from time to time, provide directions to the LAN within the context of the LAN Act and in relation to any matter that might have implications on the National Education Policy or the implementation of national policies formulated by the National Council on Higher Education.

The membership of LAN comprises a Chair who is appointed on advice from the Minister of Higher Education, and between 6-10 other members who are also appointed by the Minister. These appointments are for limited terms and may be renewed. LAN can, in turn, appoint sub-committees for any purpose arising from or connected to its functions. The LAN is self-financing. LAN committee members receive remuneration and allowance for their services based on the Minister's recommendation and following approval from the Minister of Finance.

LAN's full time staff include the Director, senior managers, appointed officers, and clerical and support staff. The senior managers engage in new policy development and evaluate accreditation reports. The officers coordinate site visits, assess documents received from universities, accompany assessment teams, address complaints from the public, and facilitate training of assessors. For carrying out actual assessment for accreditation, LAN draws from a pool of 1,000 assessors, 50% of whom are currently

[33] These are institutions that partner with foreign universities and offer the degree of the partner institution.

active. The assessors consist of academics, the majority of whom are from the public universities, as well as from the professional community. To prepare them for their assessment duty, they receive one full day of training

A typical panel of assessors will consist of 1 senior academic, 1 practicing professional, 1 person who is a practicing professional with past academic experience. The exception is the medical panel of assessors that consists of 6 professionals, 2 academics and 1 faculty member representing a private medical college.

The LAN provides two types of accreditation. The first applies to courses (as opposed to programs). This is considered to be the minimum standard and is compulsory across the board. About 20% of courses fail to receive approval for accreditation in the first round. The second type is accreditation at the program level. This is a voluntary process though desirable by private institutions because of the stamp of approval and positive publicity it generates. Accreditation is conferred to the site where the program is being offered rather than to the institution. That is, if a private university or university college offers the same program in several of its campuses, each program has to be accredited independently. The reason for this is that one aspect of the accreditation involves the assessment of educational facilities and these facilities may vary from one campus to the next.

Course and program accreditation is valid for a 5-year period. This does not, however, preclude the possibility of revoking the certificate of accreditation if an institution fails to maintain required standards of quality or if any conditions attached to the certificate of accreditation are not met. If the certification of accreditation is revoked, the institution concerned has the option to appeal in writing within a limited period of time.

The LAN coordinates some of its activities with the QAD. Specifically, the two bodies have cooperated on the development of disciplinary standards. The LAN has also established links with international accreditation bodies. It is a full member of the International Network for Quality Assurance Agencies in Higher Education (INQAAHE). This body was established in 1991 and its main purpose is to collect and disseminate information on theory and practice in the assessment, improvement and maintenance of quality in higher education. As such, this is not a regulatory body but primarily a source that disseminates information and promotes interaction and sharing amongst its members.

The LAN itself is not accredited by an international body and the current system does not provide for oversight or formal performance review of the unit.[34]

[34] In contrast, the National Commission for Evaluation and Accreditation of Argentina Comisión Nacional de Evaluación y Acreditación Universitaria - CONEAU), and the National Commission of Accreditation of Chile (Comisión Nacional de acreditación de pregrado, have introduced external review mechanisms for their respective systems. In the case of the latter, this has been carried out with support from the World Bank within the Higher Education Reform Program. The latter has involved the INQAAHE in the process of carrying out an external assessment of the agency.

The significant contribution that the LAN has made to date toward monitoring performance of private institutions and upholding them to specific standards is undeniable. The proliferation of local and international service providers has warranted systematic monitoring and control and the LAN has been able to play that role with a considerable degree of success. In all likelihood, the private system will continue to grow, partly in response to the dependence of the Malaysian higher education system on the private sector to train and prepare a skilled workforce and partly because of demand. This will require continued monitoring with a consistent, credible, and transparent process.

However, under its current structure, LAN faces a number of limitations. First and foremost is that it operates separately from the Quality Assurance Division (QAD). This is a major weakness of the way the quality assurance system has been conceptualized as a whole rather than the LAN *per se* but it has had negative implications on the systematic application of policies and practices across the private system and between the private and public systems. Second, while acknowledging the positive impact the LAN has had on regulating standards, private universities report that the present accreditation process is slow, time-consuming, and costly. There is the **perception** that it is not fully confident in newly established institutions and biased because its assessors are mostly from the public system and expect to encounter operations that are similar to their own academic milieu and tradition. Because of the particular perspective of its assessors, it is deemed as not being supportive of innovations. Finally, LAN itself is not accredited by an international body and the current system does not provide for oversight or formal performance review of the unit.

Quality Assurance Division (QAD)

Established under the aegis of the Government and the Ministry of Higher Education (previously, the Department of Higher Education of the MOE) in April 2002, QAD manages and coordinates the quality assurance system for public universities. The activities of QAD are directed primarily at the program level. Its mandate includes:

- Developing standards and criteria for academic programs at both undergraduate and graduate levels.
- Developing procedures for Quality Assurance and conducting academic reviews.
- Providing reports of academic reviews including analytical and benchmarking outcomes.
- Disseminating good practices and monitoring quality enhancement activities, and conducting training programs in quality assurance.
- Developing a National Qualifications Framework.

This unit is funded entirely by the MoHE. Its Director is appointed by and reports

directly to the Minister of Higher Education. In addition to the Director, the unit has academic and non-academic members, and support and clerical staff. Audit committees, which carry out the external review process, consist of members from the academic community as well as experts outside academia appointed in consultation with the unit being assessed.

Since its inception, the QAD has made considerable progress towards realizing its mandate. It has developed a manual of procedure, entitled "Quality Assurance Code of Practice in Public Universities of Malaysia" to guide institutions in carrying out the QA exercise which includes a self-study, followed by an external review. It has developed standards and criteria, geared toward student learning outcomes for all academic disciplines. It has successfully led all ICT Faculties in all public universities through the audit process and by February 2006 it was scheduled to have completed the review of programs in Business, Accounting, and Economics.

The manual of procedure for conducting self-studies and external peer reviews prescribed by QAD has been inspired by QA models of the Netherlands, New Zealand, and the UK and on face value, it appears to be quite similar to any of these models. The first step of the QA activity comprises a self-study of the academic program. The study addresses issues regarding quality of staff, students, funding, development and management/organization of teaching/learning process, quality of the educational activities, research policy and organization, quality of research, community services, internal quality assurance mechanisms, realization of mission and achieving goals, stakeholder satisfaction, and financial aspects. Particular emphasis is placed on student learning outcomes, the design and evaluation of educational programs, available infrastructure and resources including student support, and academic leadership. The self-study report of the unit is then validated by an external (though not international) audit panel which is formed by the QAD in consultation with the unit itself. This panel, in turn, produces a QA Assessment Report of the unit. The unit is then given the opportunity to respond to this report before the report is finalized and submitted to the Minister and the Vice Chancellor of the University.

There are, however, some fundamental differences between the QAD and the models that have informed its inception. The most salient dimensions are: (a) autonomy and independence; (b) inclusive mandate to cover both private and public with the exception of New Zealand which has state-funded universities; (c) efficiency and technical capacity; (d) in the case of New Zealand and the Netherlands, involvement of international peer reviewers; (e) transparent and public nature of reports; and (f) lack of involvement in ranking activities. A short profile of the three systems that QAD claims to be modeled after is provided below for comparison purposes.

The New Zealand Quality Assurance Agency (NZQUAA) is set up by the Vice Chancellors' Committee (NZVCC) which also provides its operating budget, but it is completely independent of the NZVCC from an operational viewpoint. It has an independent board that appoints the director. Universities pay a fee for being audited and this covers actual audit related expenses. The NZQUAA does not make decisions about institutions and neither does it rank them although it does make recommendations for

improvement. Copies of its reports are distributed widely to the press, government, and institutions, and the public can purchase reports for a nominal fee. In the last completed year, it used a mixed group of academics, business people, and QA specialists are peer reviewers and 20% came from other countries. It has one full-time and one part-time staff and in 2004, it used five peer reviewers who reviewed one university. It charges universities which it audits. All seven universities of the country are state funded and this restricts the NZQUAA's mandate to the public sector only.

In the UK, the Quality Assurance Agency for Higher Education (QAA) is a not for profit company whose members are Universities UK, Universities Scotland, Higher Education Wales and the Standing Conference of Principals. The chair is always an independent member. Thirty-five percent of its funding is generated from subscription fees of higher education institutions and 65% from various government sources. Its mandate covers both private and public universities. It does not judge the performance of universities neither does it rank them. It does make recommendations for improvement. Its reviews are published on the QAA website and are available in hard copy. It draws primarily on academics from within the country to conduct peer reviews. It has 125 full-time and 600 part-time paid staff. The scope of its activity in one year was 45 institutions and 120 programs/subjects. It is subject to both its own internal quality control review and external audit by funding councils, higher education organizations, and government bodies.

Quality assurance of both public and private universities in the Netherlands is carried out by Quality Assurance Netherlands Universities (QANU) which is a private and independent organization. QANU generates its revenue from the institutions that commission it to carry out the assessment. It does not rank institutions but benchmarks performance with other programs within the same domain and make recommendations for improvement. Assessment reports are available in hard copy as well as on the QANU website. QANU has 10 full-time and 4 part-time paid staff. It draws from a pool of 75 peers, 15%-20% of whom are non-academics. Students, government, and industry comprise the non-academic members of the review panel. About 20% of the reviewers comprise international peers. In 2004, QANU reviewed 14 institutes, about 250 programs. QANU reviews its own practices.

These comparisons highlight the following differences between the QAD and the models that have informed its inception.

- The first is the autonomy and independence of the QA unit of the above international models. The QAD is an extension of the MOHE and as such, it is not an independent unit.

- The second is the nature of QAD and its mandate that does not include a formative orientation. Quality assurance assessment reports offer very little in terms of concrete steps for improvement. Rather, they point to weak areas. The initiation of the self-study exercise was seen as a means of raising awareness about quality in the entire community. The perception of a number of individuals

interviewed was that success in this regard has been limited because only a small percentage of the individuals are engaged in the process.

- The third is the composition of review panels in QAD and in the international models. At this time, QAD review panels do not include any external members from the international community. Given the small number of full professors in the system, the QAD's capacity to strike expert committees with local experts would appear to be limited unless it draws on other ranks to serve as its assessors. Either practice (not including international peer reviewers and drawing on less senior faculty) sets it apart from first-rate international QA systems that systematically include senior international experts on their review panels.

- The fourth is the meaningfulness of the QA activity itself and its face validity. A number of directives in its manual of procedures for conducting self-studies are almost impossible to implement within the present structure. For instance, recommendations concerning student intake, student transfers, academic staff, and recruitment policy are examples of guidelines which have limited potential of being implemented and followed in the present context. Moreover, self-studies and external reviews appear to be an end in and of themselves rather than a means of improvement. The completion of a QA cycle currently does not appear to have any bearings on strategic planning, on resources allocation or reallocation, and on the expansion or reduction of programs and facilities. QAD's most recent initiative is to rate universities and it is not very clear what is to be gained from this exercise when it is to be carried out by an arm of the MOHE. This again is very different from what its international counterparts do.

- The fifth is the degree of confidentiality of external reports. QAD's complete assessment reports are confidential. Summaries that are supposed to be available from the website do not seem to be accessible. In contrast, international quality assurance systems are completely transparent in what they do and make the reports publicly available to anyone, mainly through websites.

- The sixth is the absence of an oversight body and a mechanism for the evaluation of the unit itself. Even though QAD is a member of an international Quality Assurance Agency, as an organization, it is not accredited by agency and it has not, as yet, initiated any systematic self-review of its operations and activities.

Table 4.6 presents a general comparison of the Quality Assurance systems discussed above with the QAD and highlights differences on a selected number of distinguishing characteristics.

Table 4.6 A Comparison of Malaysia's QAD with QA Systems in New Zealand, the UK, and the Netherlands.

Distinguishing Characteristics of QA systems	Malaysian QAD	New Zealand's NZQUAA	UK's QAA	The Netherland's QANU
Complete Autonomy and Independence of Agency	SOMEWHAT	YES	YES	YES
Unified System (for Public and Private)	NO	YES	YES	YES
Transparency and Public Reporting of QA Reports	NO	YES	YES	YES
Mandate: Formative	YES	YES	YES	YES
Mandate: Ranking Institutions	YES	NO	NO	NO
International Peer Review	NO	YES	NO	YES
System Subject to Review and Accreditation	NO	YES	YES	YES

Chapter 5. Graduate Employment and Unemployment

Main Findings

- *The growing number of unemployed graduates since 2000 has raised policy concerns about the capacity of the economy to absorb the expanded output of graduates, the quality of tertiary education and skill mismatch, and elicited numerous policy responses to improve graduate employability.*

- *The historical evidence indicates that the economy has the capacity to absorb the recent expanded supply of tertiary graduates. Furthermore, in the high-growth early 1990s employers were supply constrained in hiring graduates while post-2000, they employed more graduates than might be predicted by slower rates of economic growth.*

- *The growing number of unemployed graduates since 2000 is partly driven by the expanded output from public and private tertiary institutions. However, unemployment rates of graduates are initially high but fall with time in the labor market because of job search. Their unemployment profiles, as well as job search duration, have been largely unchanged over time, and should improve as the economy recovers.*

- *Concerns about the workplace relevance of tertiary education remain. Tracer studies, commissioned research and employers point to the need for tertiary education institutions, public universities in particular, to better build into their curricula soft skills – language, team work, and problem solving – workplace exposure through attachments, and better career counseling.*

This chapter turns to the issue of "educational relevance", how well tertiary education prepares diploma and degree graduates for the world of work. The issue of relevance arises because of growing numbers of unemployed graduates since 2000. There are numerous concerns about the capacity of the economy to absorb the expanded output of graduates, about the quality of tertiary education, about mismatch between what higher education institutions are producing and the skills demanded by employers, and what these imply for the government's higher education policy and knowledge economy strategy. To address these different hypotheses, time-series data from the Labor Force Survey (LFS)[35] and other secondary data sources are used to gain insights into the factors shaping graduate employment and unemployment, and their implications for the work-place relevance of tertiary education.

[35] The research team was provided with access to time-series LFS surveys from 1990 to 2004. The LFS is typical of similar surveys used in other countries to measure labor force status, with one exception – it does not collect information on income or earnings. The Household Income Survey, which has such income and wage information, was not made available for this study.

Background

The growing number of unemployed graduates from the higher education system since 2000 has drawn considerable media attention and expressions of concern from the Government of Malaysia. The numbers of unemployed holding a tertiary education credential nearly doubled from 2000 to 2004. According to the Labor Force Survey (LFS), there were an estimated 42,500 unemployed persons with tertiary-level qualifications in 2000; subsequently, these numbers continued rising to 68,000 in 2003 and to 74,182 by 2004. The share of tertiary-educated unemployed in total unemployment also rose, from levels of about 9% prevailing in the 1990s to 15.3% by 2000, and to 21.1% by 2004.

This rising unemployment trend among recent graduates raises several policy questions for the government's goal of raising the proportion of the labor force with tertiary education to developed country levels by 2010. Is this unemployment trend among graduates a problem? Is it being driven by the inability of the economy to absorb the expanding supply of tertiary-educated workers, which might suggest a structural problem? Or would more rapid growth rates of the economy reverse this trend? To what extent does it reflect a skills mismatch between what higher education institutions are supplying the market and the skills that employers demand? How much of the observed unemployment among graduates is voluntary, as graduates search to find a good job match, and is therefore temporary in nature? And are recent experiences with high unemployment likely to have enduring, longer-term negative consequences for future labor market outcomes? And, if graduate unemployment is a problem, what can the government do to address this issue?

The Government of Malaysia has responded to this growing unemployment trend among tertiary graduates by putting in place several measures to increase their employability. In November 2001, the government implemented the Training and Attachment Program (SSL) for unemployed graduates, placing them in both public- and private-sector agencies to gain work experience and to receive training in areas such as ICT and the English language. Another related program under the Ministry of Human Resources (GRS) was implemented to retrain unemployed graduates and provide them with new skills in high-demand and specialized fields. The Government of Malaysia also moved on the demand-side to encourage firms to hire and retrain unemployed graduates. It enacted a three-year double-deduction tax incentive (2004 to 2006) for employers that hired graduates participating in the SSL and GRS programs, and who remained unemployed after completing the attachment and training programs. It is also considering legislation that would allow employers to use their levy contributions to the Human Resource Development Fund to finance pre-employment training for newly-hired university graduates.

Graduate Unemployment: An Assessment

Unemployment, especially among new graduates of tertiary education institutions, is the outcome of the interplay between several sets of factors:

- **The supply and demand for graduates**. The number of unemployed is simply the difference between the number of persons seeking employment and the number of jobs created in the economy to employ them. It is clear that a part of the recent unemployment phenomenon in Malaysia is due to a numerical excess supply of graduates relative to the jobs available for them. On one hand, there has been a vast expansion in the supply of graduates from both public and private sector tertiary education institutions since the 1996 Private Higher Education Act. Between 2001 and 2003, the combined public and private sector output of graduates expanded in excess of 60% in just 3 years. On the other hand, the economy has grown more slowly since 2000 as compared to the previous decade because of several macroeconomic shocks, creating fewer jobs than had been forecast in the 8th Malaysia Plan. While the economy is recovering, GDP growth rates in 2004 and 2005 remain at or below 7%.

- **The job search process**. For graduates, as well as for other educational groups, the school to work transition can be a time-consuming process, in which new labor entrants search for a good job match. They look for employment opportunities that would fully utilize their training and meet both their career aspirations and income expectations. How long and intensively they search depends upon many factors – some, such as a rapidly growing economy where employment opportunities are plentiful would shorten the time of search; other factors, such as an inefficient employment service or availability of family income support, might lengthen search time by making it more difficult to access relevant job information or by making it economical to continue job search. Individual (and family) preferences also matter: graduates may voluntarily remain unemployed searching for white-collar employment while many industrial jobs go unfilled, or they may queue for high-status positions in the public sector.

- **Skills mismatch**. Graduate unemployment rates may also be the result of a mismatch between the specific skills demanded by the labor market, and the quality of education or the training provided by tertiary education institutions. Skills mismatch has many dimensions: in the supply-demand balance between fields of study (such as humanities, science and engineering), in the balance between technical and generic ("soft") skills, and in the balance between the theory and practice-orientation of education and training received. Part of this skills mismatch is the outcome of individual career choices in terms of field of study and preferences regarding employment. But skills mismatch can also arise from shortcomings in the tertiary education institutions – in the "quality" of education, faculty and pedagogy, in the degree to which instruction is tailored to market needs, and in whether career counseling is provided for students – some of which have been discussed in previous chapters.

The following sections examine these three sets of factors in greater detail, using information from the LFS and other secondary data sources. This will use some labor market terms, defined as follows:[36] The LFS includes in the labor force all persons between the ages of 15 and 64 years who were either employed or unemployed. A person is "employed" if that person worked at least one hour for pay, profit or family gain during the reference week (of the LFS). Also considered employed are persons who did not work but had a job, farm or family enterprise to return to. A person is considered "unemployed" if he/she did not work during the reference week, but was available for work and actively looking.[37] Finally, all persons not falling into the employed or unemployed categories - including housewives, students, the retired and disabled – are defined as being out of the labor force.

The Demand-Supply Balance for Graduates

We assess the contribution of relative demand and supply of university graduates to observed graduate unemployment using simple methods. A more rigorous analysis is beyond the scope of this study, and would require access to different types of data.[38] Instead, the assessment of relative demand and supply relies on a simple concept commonly used for manpower planning – the employment elasticity of output – which is the percentage gain in employment from a one percent increase in GDP growth. This postulated relationship is used to gain insights into the employment impact of slower rates of economic growth since 2000, as compared to the 1990s, and whether this translated into higher graduate unemployment.

Figure 5.1 shows annual growth rates of GDP, growth rates in employment of young university graduates age 29 or less, and numbers of employed young graduates by gender. The analysis focuses on young graduates since this is the group on which most policy attention has focused. GDP growth rates are published figures, while the numbers and growth rates in the employment of young graduates are estimated from the 1990 to 2004 LFS.[39] The left panel of the figure – which plots growth rates in the number of employed young graduates against GDP growth rates – shows that both series tend to move together. When GDP growth slumped in 1998/99 because of the Asian financial crisis, and again in 2001 because of SARS, the growth in the employment of young graduates also dipped, as might be expected.

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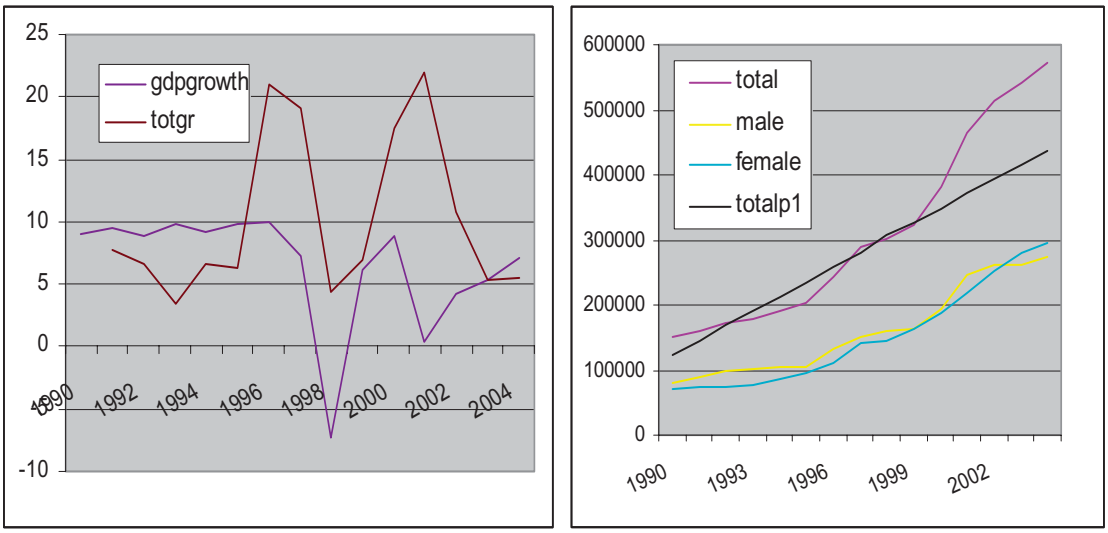
[36] For further details, see the Labor Force Survey Report published by the Department of Statistics.

[37] Malaysia includes among the unemployed those not actively looking because of lack of qualifications, bad weather or illness, awaiting answers to job applications, or having engaged in job search prior to the reference period.

[38] That analysis would involve econometric estimation of labor demand models, and (in addition to macroeconomic variables) take into account not only the availability of other educational groups (for whom graduates may be substitutes) but also their relative pay (since cost-minimizing employers would tend to hire more of the less expensive labor group). The Household Income Survey (HIS) collects information on wages (not available in the LFS), but the study team did not have access to the HIS.

[39] The LFS was not fielded in 1991 or 1994, and the estimates for those two years are interpolated from adjoining years' figures. The estimated figures combine degree and diploma graduates.

Figure 5.1 GDP and Graduate Employment 1990-2004:
Annual Growth Rates and Employment by Gender



Looking beyond these swings in growth rates, there is an apparent break in trend employment growth beginning in the mid-1990s continuing into the slower growth period from 2000 to 2004. This is confirmed by the right panel, which shows the employment of young graduates (in total and separately by gender) over time. The graduate employment trend rises over time, but accelerates after the mid-1990s. In fact, a simple linear regression model would under-predict the employment gains among young graduates in the post-2000 slower growth period.[40] The projected graduate employment numbers – depicted in the right panel by the black line – are consistently below actual graduate employment (the pink line) after the year 2000, meaning more jobs were generated than would have been predicted with a constant employment output elasticity.

This simple analysis suggests that the economy has considerable capacity to absorb the expanded supply of university graduates. If anything, it indicates that employers were supply-constrained in hiring university graduates in the early 1990s despite high demand associated with GDP growth rates averaging 10% per annum. Even in 2003, as GDP growth slowed and graduate supply expanded, employers continued to rank availability of educated and skilled workers as the single most important investment climate constraint.[41] Finally, the trends since the mid-1990s suggest that employers were able to rapidly upgrade the quality of their workforce from the expanded graduate supply, raising the employment share of university graduates from 5.7% in 1990 to almost 15% by 2004.

[40] The projections are based on a simple linear regression of graduate employment on GDP growth and a time trend. Other model specifications in logarithms, or with quadratic time trends, also yielded similar under-predictions of post-2000 employment gains among young graduates.

[41] See World Bank (2004), "Malaysia: Firm Competitiveness, Investment Climate, and Growth", Washington DC.

This is consistent with a response to rising international competition and to the greater skill requirements of technological change.[42]

Table 5.1 illustrates this trend for several selected sectors, reporting the numbers of university graduates (not just youth) employed in that sector, and their share of total employment (in italics). As an example, graduate employment in manufacturing increased by 44,000 in the five years between 1990 and 1995, by 78,000 in the next five, and by 62,000 in the four years between 2000 and 2004. This expansion translates into a rising share of university graduates in total employment, from 3% of the manufacturing workforce in 1990 to 11% by 2004. The manufacturing sector experience is replicated in the services sectors – in wholesale and retail trade, in the financial and business services, and in education. Public administration and defense also saw their share of graduates in total employment rise over this period – from 8% to over 17%.

Table 5.1 Number and Employment Share of University Graduates Selected Sectors from 1990 to 2004

Sector	1990	1995	2000	2004
Manufacturing	36,017	80,647	158,774	221,067
	3.0	*4.6*	*7.5*	*11.0*
Wholesale, retail trades	22,411	43,723	93,370	160,658
	3.0	*4.7*	*7.7*	*10.1*
Financial intermediation	22,691	42,847	66,118	98,818
	17.9	*21.4*	*29.6*	*42.7*
Real estate, renting, business services	25,956	39,456	90,827	169,769
	10.2	*12.2*	*20.4*	*37.5*
Public administration, defense	35,029	46,304	75,456	117,361
	7.7	*8.8*	*12.9*	*17.4*
Education	183,441	179,590	289,416	390,686
	48.8	*42.7*	*55.9*	*64.3*
TOTAL	377,230	531,066	962,311	1,467,642
	5.7	*7.0*	*10.4*	*14.8*

Notes: Figures in italics are university graduates as a percent of total employment in the sector. The sectors follow the 2000 SIC classification that was implemented beginning in 2002.

The employment trends by sector for young graduates under 30 years of age are reported in Table 5.2, separately by gender. Disaggregating by gender reveals that among the recent cohorts of university graduates, women have not only kept pace with their male counterparts but have actually improved their relative employment position. Overall across sectors, the numbers of young women graduates employed rose from 95,000 to 296,000 between 1995 and 2004, as compared to 105,000 and 275,000 for males. While gains in employment are seen by both groups in all sectors, male graduates are more likely to find employment in the agricultural, mining, manufacturing and construction sectors, while female graduates favor white-collar employment in financial

[42] See Hong Tan, "The Skills Challenge of New Technology: Evidence from Malaysian Manufacturing in the 1990s", World Bank Institute book, report for Economic Planning Unit, Washington DC, 2005.

intermediation, real estate and business services, public administration, health and social work, and education.

Table 5.2 Employment of Young University Graduates Age 20-29 Years by Sector, Year and Gender ('000)

Sector	Males		Females	
	1995	2004	1995	2004
Agriculture, forestry, fishing	1,279	4,874	252	1,101
Mining, quarrying	1,020	1,560	675	184
Manufacturing	27,990	66,494	11,980	45,572
Electricity, gas and water supply	637	2,880	356	1,161
Construction	6,636	20,919	4,458	11,950
Wholesale, retail trades	12,763	40,906	7,660	37,711
Hotels, restaurants	2,290	13,293	744	10,835
Transport, storage, communications	4,265	14,830	1,840	12,035
Financial intermediation	10,081	15,593	10,069	24,134
Real estate, business services	9,057	34,893	7,952	38,251
Public administration, defense	6,749	17,198	4,211	20,954
Education	20,230	31,838	40,150	68,199
Health, social work	965	4,807	2,228	16,263
Other community, social services	1,209	4,591	2,094	6,876
Private households with employees	0	322	775	520
Extra-territorial organizations	145	332	0	90
TOTAL	105,316	275,330	95,444	295,836
% of total employment by gender	*5.6*	*13.2*	*8.3*	*21.4*

Source: LFS (various years)
Notes: The sectors follow the 2000 SIC classification implemented beginning in 2002.

Job Search and Graduate Unemployment

The economy's capacity to create employment for graduates is not inconsistent with the observation of growing numbers of unemployed graduates, and a rising share of graduates in total unemployment. The number of unemployed graduates has grown, but so has the total number of graduates entering the labor market who are at risk of unemployment. Similarly, a rising share of graduates in total unemployment may simply be compositional, reflecting the labor market entry of more graduates relative to other educational groups. The more policy-relevant measure is the **unemployment rate** within each educational group which has in fact changed little over the years. Whether or not there is a graduate unemployment "problem", and what the appropriate policy response might be, will depend upon whether unemployment rates for graduates have risen over time, stayed constant or declined. This question is addressed below.

Graduate unemployment may be most usefully framed as a school-to-work transition issue, in which graduates engage in a probabilistic time-dependent search process for a good job match. In each time period, new graduates sample from among available employment opportunities; some proportion of them will accept a job offer if it meets their career and wage expectations, while others remain in the unemployment queue and

continue job search. With time in the labor market, the remaining graduates gain new information, revise expectations, and either enter employment or continue search. Such a probabilistic search process generates a distribution of unemployment rates with time in the labor market, with unemployment rates being high initially but declining over time as graduates find a job match and leave unemployment.

This job search process appears to characterize the school-to-work transition of new labor market entrants in most countries. Table 5.3 compares the unemployment rates by education and age for Malaysia and for several developing countries – Thailand, India, Turkey and Chile. The table considers three broad education groups – primary, secondary and tertiary education – and several age intervals that implicitly measure time in the labor market (age minus age of school completion).

Table 5.3 International Comparisons
Unemployment Rates by Education Attainment and Age Interval

Country	Age intervals						
Education	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-49**	**50-59**
Malaysia (2000)							
Primary	9.8	3.9	1.7	0.9	1.1	1.0	1.3
Secondary	14.5	6.0	2.4	1.2	1.2	1.0	1.1
Tertiary	--	12.7	2.9	0.4	1.6	0.3	0.8
Thailand (2002)							
Primary	12.7	4.9	1.9	1.0	0.7	0.8	2.3
Secondary	18.2	9.5	4.1	1.5	1.6	2.7	2.4
Tertiary	--	17.6	5.3	1.7	1.3	0.8	1.1
India (2000)							
Primary	7.2	4.7	1.4	0.6	0.3	0.2	0.4
Secondary	16.8	13.5	7.0	2.9	1.3	0.6	0.3
Tertiary	--	41.8	21.8	6.5	2.1	0.8	0.1
Turkey (2002)							
Primary	19.7	18.0	9.7	5.2	5.0	6.5	5.1
Secondary	32.8	28.8	11.6	9.0	5.9	4.3	7.8
Tertiary	--	38.9	15.3	5.0	4.7	2.2	1.1
Chile (2003)							
Primary	20.9	15.8	10.0	8.3	6.2	7.0	6.4
Secondary	29.9	19.7	11.6	8.7	7.3	6.0	5.7
Tertiary	--	17.7	11.8	6.8	5.3	3.9	3.2

Source: Malaysia LFS (2000), Thailand LFS (2002), India National Socio-Economic Survey (NSS 2000), Turkey LFS (2002), Chile LFS (2003).

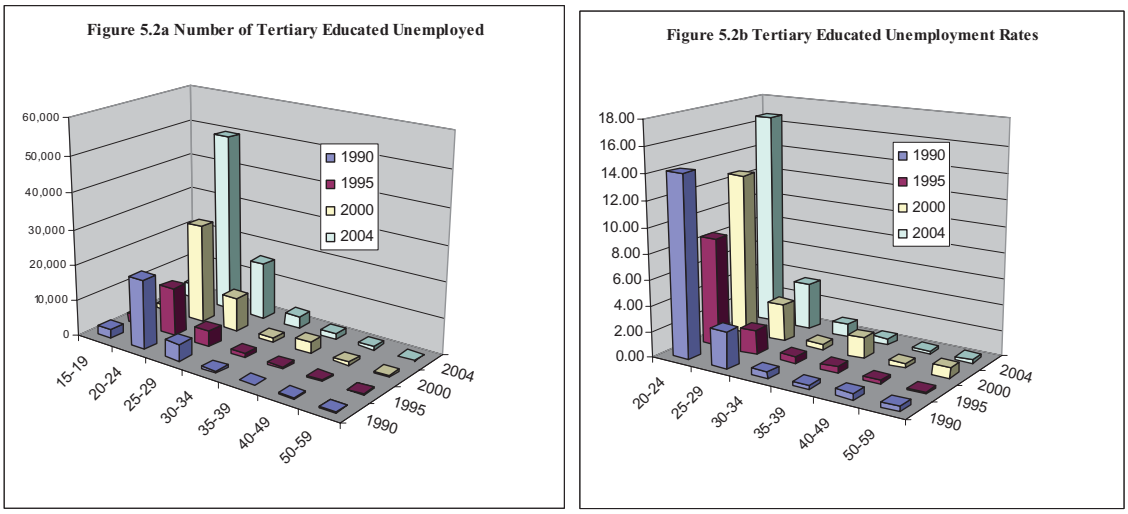
It is evident from Table 5.3 that Malaysia is not unique. Unemployment rates in all five countries and for all education groups are relatively high for recent labor market entrants (15-19 years old in the case of secondary school graduates, and 20-24 years old for tertiary graduates) and they decline dramatically with age.[43] In Malaysia, the

[43] In fact, the global evidence for both developing and high-income countries indicates that youth unemployment rates tend to be between two and six times higher than unemployment rates for adults. See

unemployment rate for 20-24 year old tertiary graduates[44] (with about 2-3 years in the labor market) is 12.7%; this falls to under 3% for those 25-29 years old, and to the 0.5 to 1.5% range after age 30 years. For secondary school graduates, the unemployment profile is similar, starting at 14.5% for recent labor market entrants age 15-19 years, falling subsequently to an unemployment rate of between 2.4 and 1% after age 25 years. The unemployment rate profiles in Malaysia resemble those in other countries with one important difference: unemployment rates everywhere are lower in Malaysia than for comparator countries at all education levels and time in the labor market, attesting to tight labor market conditions in the country.

Figure 5.2a graphs the numbers of unemployed tertiary graduates by age interval, and how they have changed over the 1990 to 2004 period. The numbers of unemployed tertiary graduates age 20-24 years fell between 1990 and 1995, from 19,000 to 13,000, but subsequently rose, tripling in magnitude between 1995 and 2004 to over 50,000. A similar, but less pronounced, rising trend over time can be observed for the next age interval of 25-29 years. These then are the numbers widely reported as pointing to a growing graduate unemployment problem in the country.

Figure 5.2. Unemployed Tertiary Graduates



However, Figure 5.2b suggests that concerns over the growing graduate unemployment problem are probably overstated. The second panel presents the same unemployment numbers as in Figure 5.2a, but in terms of unemployment rates to reflect the trend towards increasingly larger entry cohorts of tertiary graduates. Apart from a slight upward trend in entry-level unemployment rates for those age 20-24 years, unemployment rate profiles by age are largely unchanged over time. The new and larger cohorts of tertiary graduates entering the labor market after the year 2000 are continuing

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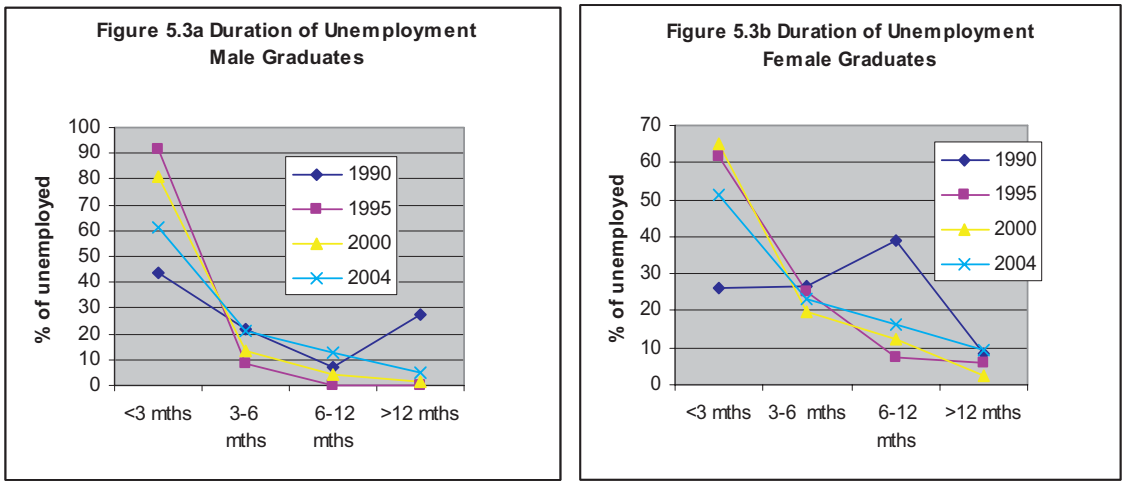
Martin Godfrey (2003), "Youth Employment Policy in Developing and Transition Countries – Prevention as well as Cure", paper presented at Youth Employment Workshop, The World Bank.

[44] In this table, those with "tertiary" education include not only university diploma and degree graduates but also STPM, Higher School Certificate and Sijil Tinggi Agama.

to find employment at rates not too different from earlier cohorts – and at levels considerably better than other comparator developing countries – after an initial period of job search. While unemployment rates during this initial period of job search have risen in recent years, the situation should improve as economic growth recovers.

The recent cohorts of tertiary graduates are also not spending significantly more time in unemployment. Figures 5.3a and 5.3b graph the distribution of unemployment duration for male and female university graduates (both degree and diploma) age 20 to 24 years, for several points in time over the 1990 to 2004 period. The LFS asks the unemployed how long they have been looking for work according to 5 unemployment duration categories – less than 3 months, 3-6 months, 6-12 months, 1-3 years, and greater than 3 years.[45] Compared to 1990, more university graduates – both male and female – entering the labor market in 1995, 2000 and 2004 report unemployment spells of less than 3 months. However, compared to 1995, a high-growth year, fewer university graduates in the post-2000 slower growth period report spells of less than 3 months, and more of them report unemployment spells of 3-6 months.

Figure 5.3 Unemployed Tertiary Graduates



Employment conditions for female university graduates also appear to have improved over time. In 1990, almost 40% of female graduates reported looking for work for 6-12 months (see Figure 5.3b), unlike 10% of their male counterparts. By 1995, and every year since then, their unemployment duration profiles more closely resemble those of males, and most female graduates now find employment within 3 months.

Nonetheless, it must be recognized that there unemployment rates for young graduates, as well as their waiting time for employment, have inched up since 2000. Different labor

[45] Only the first four categories are relevant since virtually no graduates reported being unemployed longer than 3 years. To account for the possibility that this 5th category is precluded by the 20-24 age restriction, similar tabulations were made for university graduates 20-29 years of age. The distributions were virtually the same, with few graduates reporting unemployment duration in excess of 3 years.

market interventions, such as career counseling, job information and retraining are ways of facilitating their job search and employment, and will be the focus of Chapter 10.

Skills Mismatch

The final set of factors to be considered is the possible mismatch between skills supplied by higher education institutions and what are demanded in the labor market. While skills mismatch is most often linked to graduate unemployment by the media, by private sector leaders, or in speeches by policymakers[46], the preceding analysis suggests that it did not "cause" the phenomenon; instead, the supply-demand imbalance of expanding graduate output and slower growth, coupled with the usual job search that accompanies labor market entry were the principal drivers of the recent growing graduate unemployment phenomenon. Nonetheless, skills mismatch may still be important in affecting the incidence and duration of unemployment among different groups of graduates, by institution attended, ethnicity, field of study, or locality.

Skills mismatch include several considerations – the "quality" or workplace relevance of education received, the skills demanded by employers, and individual preferences and career choices. Disentangling the possible contributions of each to the skills mismatch explanation will require different kinds of information than are available in the LFS, and are beyond the scope of this report.[47] As such, the following necessarily brief assessment of skill mismatch is largely qualitative in nature, drawing upon and summarizing the results of published reports, secondary data sources and interviews with employers.

Tracer Studies of Public University Graduates

The data most suited to addressing the skills mismatch issue are found in tracer studies of graduates conducted by the Ministry of Higher Education. Each year since 2002, public institutions of higher learning have fielded a questionnaire to their degree and diploma graduates at convocation some 3 to 6 months after taking their final examinations. In addition to demographic information, data are elicited on field of study, employment status, unemployment and job search methods, and if working, information about the employer, starting pay and whether the job matched the training received.

Unfortunately, only summary data and simple tables are available from the tracer studies, which severely limits their potential use in looking at skills mismatch.[48] Each institution processes its own data into excel summary sheets using a common template, and

[46] For example, see the paper presented by Datuk Fong, Minister of Human Resources at the Bali Summit, "Combating Unemployment: The Malaysian Experience", Bali, December 8, 2003.

[47] Specifically, individual data are required from graduates on the higher education institution attended, field of study, career aspirations, job search and employment and wage outcomes, and whether the job requirements matched training received in universities. Employer perspectives can also provide insights, into the changing quality (if any) of new graduate cohorts, whether graduates are adequately prepared for the productive employment, and have realistic expectations about work and pay.

[48] The summary data were not made available to the research team. EPU and MOHE should consider periodic studies to assemble and fully analyze the wealth of individual-level information collected for the tracer studies by all participating universities,

forwards them to MOHE which, in turn, assembles information from all public institutions and produces a final report. The tracer studies only pertain to graduates of public universities; private institutions of higher learning do not contribute any data to this report, so no comparisons can be made of placement rates by public and private institutions of higher learning.[49]

Placement rates – the percent finding employment upon graduation – is one indicator of the "quality" of tertiary education, and indirectly of whether higher institutions of learning are providing skills relevant to the workplace. Table 5.4 reports the placement rates of graduates from public higher education institutions for the years 2002 to 2004. It distinguishes between degree and diploma graduates, and broad fields of study: arts and social sciences, science, technical fields, and information and technology.[50] The table indicates that public universities place between 40 and 60% of their degree and diploma graduates within 3-6 months of graduation. Furthermore, at least for degree graduates, there is a rising trend in placement rates between 2002 and 2004; the trend is mixed for diploma graduates. There is no field of study that stands out as having consistently high placement rates, at least not at this broad level of aggregation. More disaggregated tables suggest that placement rates tend to be higher in fields such as science and technology, finance and business, medicine and health, and education – the kinds of skills in high demand in those sectors that exhibited large employment gains of university graduates since 2000.[51]

In the absence of data from private universities, we can only speculate about what the placement rates of private universities might be. One possible solution is to back out an estimate of private universities' placement rates from the participation of their students in government attachment and retraining programs for unemployed graduates, namely the SSL and GRS schemes described earlier. If public and private universities produce the same numbers of graduates each year – which is roughly correct[52] – and they are assumed to have identical placement rates, in principle the same proportion of their graduates should be unemployed and therefore eligible to participate in these government programs. Higher (lower) representation of graduates from private universities among participants in these programs would imply lower (higher) placement rates relative to public universities, unless entry requirements into programs differentiate between the two groups of unemployed graduates.

[49] In interviews, private universities say they also conduct similar tracer studies of their graduates, though none have provided the research team with their findings. It is unclear why private universities do not also furnish MOHE with comparable data, and whether in fact they are required to do so.
[50] The categorization of fields of study changes in 2004.
[51] See chapter five, Table 5.1 based on LFS data.
[52] Between 2001 and 2003, the output of public universities for degree and diploma graduates combined was 48, 50 and 66 thousand respectively; the comparable figures for private university graduates were 38, 72 and 75 thousand in those three years. Source: mimeo, Human Resource Section, EPU.

Table 5.4 Percent of Graduates Employed 3-6 Months after Graduation
Tracer Studies of Graduates of Public Universities, 2002-2004

Field of Study	2002		2003		2004	
Degree graduates	**Total**	**% Employed**	**Total**	**% Employed**	**Total**	**% Employed**
Arts and social sciences	26,111	52.2	24,828	55.4	25,381	62.8
Science	2,170	67.6	3,987	50.2	12,047	52.1
Technical fields	8,004	49.1	2,730	44.5	5,410	53.8
Information technology	7,566	42.4	6,343	50.6	--	--
TOTAL	43,851	50.7	37,888	53.3	42,838	58.6
Diploma graduates						
Arts and social sciences	6,925	36.7	7,995	60.7	7,904	53.2
Science	289	57.8	1,659	58.2	2,684	39.7
Technical fields	3,248	38.6	2,880	53.7	3,623	46.1
Information technology	2,137	27.1	1,415	72.7	--	--
TOTAL	12,599	36.1	13,949	60.2	14,211	48.8

Source: Mimeo, Human Resource Section, Economic Planning Unit.

This hypothesis can be crudely tested using unpublished data on the composition of SSL and GRS participants that includes information on type of university attended. In fact, private university graduates represent only 10% of the cumulative total of all graduates registered in the SSL and GRS programs as of August 2005. Graduates of public universities account for 85 percent of program participants, and the balance graduates from foreign universities. This suggests that the job placement rates of private universities are higher than those of public universities. Such an interpretation might not be surprising if the survival and growth of private universities depend on their ability to respond to workplace skill requirements, and to successfully place their graduates in jobs.[53] This conclusion remains to be confirmed with comparable placement data from public and private universities.

Some findings of the 2003 Tracer Study of Graduates from Public Universities are worth reproducing,[54] as a check on the LFS analysis and for insights into the career preferences of graduates.[55] First, male graduates have a slightly higher probability of finding employment (57 %) within 3-6 months of graduation as compared to female graduates

[53] This result is consistent with what private universities and employers say in interviews, and with the example (cited in Chapter 7) of CosmoPoint's success in retraining unemployed graduates in IT skills and placing 99% of them in jobs.

[54] Ministry of Higher Education, Laporan Kajian Pengesanan Graduan Institusi Pengajian Tingi Awam (IPTA) 2003, (Tracer Study of Graduates from Public Institutions of Higher Learning), August 2005.

[55] For the graduating class of 2003, some 59,000 graduates provided responses with an overall response rate of 70 percent. The sample comprised 76% Malays, 17% Chinese, 3% Indians, and over 3% indigenous Malays from East Malaysia. Women made up 65% of graduates, and males 35%.

(55%). Second, about 73% of graduates find employment in less than 3 months, while another 21% do so within 3-5 months. These figures are virtually the same as the distributions of unemployment duration reported earlier based on LFS data. Third, over 44% of degree graduates found employment in government (primarily in education), 41% in the private sector, and about 9% in self-employment, suggesting a strong preference of graduates for public sector careers.

The 2003 Tracer Study also elicited information on the match between field of study and the skill requirements of the current job. For those in their first job, 57% of degree graduates responded positively to a match between field of study in university and job requirements. This skills match rises slightly to 61% for those in a job different from their first job, and suggests that in this initial period of intensive, search some graduates may change jobs to find an improved match between their training and workplace requirements. For diploma graduates, the skills match is considerably lower, between 39 and 43%. Looking at skills match by field of study, the match is highest in the technical fields (80%), followed by arts and social sciences (62%), and the sciences (56%). However, the middle ranking of arts and sciences is driven largely by the education sector, the destination of many graduates.

Graduates were also probed on ten dimensions of the preparation for work in the current job, including such items as adequacy of their specific course training, generic (soft) skills, team work, communication skills and facility using computers. They ranked each item on a scale of 1 (inadequate) to 5 (excellent). Their self-assessments highlighted strengths in Bahasa (4.4), team work, ability to work independently and communicate (4.0), and relative weakness in specific course training, speaking and writing English (3.5) and a third language (2.8). Other studies using focus groups and interviews with employers paint a somewhat less rosy picture of their preparation in the soft skills that employers want, including communication, English language, team-work, problem-solving and ICT skills. Some of these issues will be taken up in Chapter 10.

Chapter 6. Contribution of the Universities to the National Innovation System

Main Findings

- *The Ninth Malaysia Plan sets an ambitious target for Malaysia: ensuring that S&T activities contribute at least one-third of Malaysia's annual economic growth. To achieve this goal, the Ninth Plan calls for optimizing the application of new and improved technology, increasing local innovation capability, providing an improved enabling environment for technology development, accelerating technology commercialization, and boosting private sector spending on R&D.*

- *The comparative data provided by MASTIC on innovation activities in Malaysia vis-à-vis OECD countries are not a reliable means of benchmarking innovation in Malaysian firms. In particular, the claim that innovation activities in Malaysian manufacturing firms should be more or less on par with innovation activities in Finnish companies stands in stark contrast to much of the benchmarking data presented in Chapter 1. To highlight just one key indicator, business expenditure on R&D as a percent of GDP was between four and six times higher in Belgium (1.63%) and Finland (2.41%) than in Malaysia (0.45%).*

- *More importantly, this aggregate expenditure data says little about whether the innovations that are taking place will help to generate internationally competitive goods and services for sale on international markets. For example, between 90 and 95% of innovative firms in Malaysia spend less than RM 100,000 on innovation. This suggests that only a small share of Malaysian firms undertake innovation targeted at global markets, and more generally that innovation in Malaysian manufacturing firms is unlikely to lead to the introduction of new, globally competitive products. This does not augur well for Malaysia's prospects for becoming an innovative, knowledge-based economy.*

- *Malaysia is facing a dual competitiveness problem: companies that export, conduct primarily low-value added, assembly type operations – precisely the activities that are facing increasing competition from lower wage economies. At the same time, Malaysian companies that innovate actively are typically not doing so in ways that are likely to produce high value added, globally competitive goods and services for international markets.*

- *Existing Malaysian S&T programs are not well suited to addressing these problems. Chapter 11 contains options for improving the policy mix. The remainder of this chapter discusses some of the weaknesses with existing policies.*

- *Fiscal incentive was the main instrument used by the GOM in promoting skills- and technology upgrading and in promoting R&D and innovation. But whereas such incentives had worked very well in attracting FDI, the incentive instrument did not work in promoting skills-upgrading and R&D. GOM made the (understandable) mistake of believing that the instrument that worked* so well in attracting FDI would also be successful in these other areas (innovation*, R&D, skills- and technology upgrading). An important lesson to take from this experience is that in the future much more emphasis should be put on pro-actively engaging in the building of networks and institutions for training, innovation and R&D.*

- *The incentive approach was compounded by a redundancy problem: when firms already enjoy generous tax exemptions, further tax incentives are likely to be ineffective in promoting skills- and technology upgrading, R&D etc.*

- *When the GOM introduced grants for training (HRDF) and for R&D (IRPA, TAF, etc), these important initiatives failed to stimulate skills-upgrading, technology acquisition and R&D to the extent expected. As an innovation promotion instrument, grants share a key limitation with the incentive instrument: Grants are only effective to the extent that firms already know how to innovate – without innovation know-how firms will not be able to make quality proposals for grants. The GOM should develop policies that target those firms in Malaysia that do not already have innovation capabilities – for these firms, incentives and grants are ineffective instruments. This is all the more important given that the large majority of Malaysian firms belong to this category.*

- *As the Investment Climate Assessment reports in greater detail*[56]*, lack of skilled personnel is a key constraining factor for Malaysia's future innovation capability and international competitiveness. The Sapura Berhad case study well illustrates this. Despite impressive strides in innovation and R&D, Sapura never managed to become internationally competitive, due to shortages of skilled personnel. If Malaysia in the future is to reap sustainable benefits from achievements such as Sapura's impressive growth over two decades, international competitiveness must be achieved – and for that end, large-scale upgrading of the skills of the work force is a sine qua non.*

- *Malaysia's industrialization policies have to a large extent been based on tax exemptions and preferential treatment to attract FDI. This approach is a big part of the dual economy problem that Malaysia faces today. It will be crucial that Malaysia in the future aims at building institutions and framework conditions that foster technological learning and innovation across the entire economy.*

- *The GOM could endeavour to engage foreign MNCs much more actively in local technology upgrading, joint R&D activities with local research institutions, and technical training of Malaysian workers. If the GOM decides to sustain tax*

[56] World Bank, "Firm Competitiveness, Investment Climate and Growth," June 2005.

incentive schemes such as the PS, FTZ or ITA to attract FDI, it is of paramount importance that these are made contingent on the active participation of MNCs in the Malaysian economy.

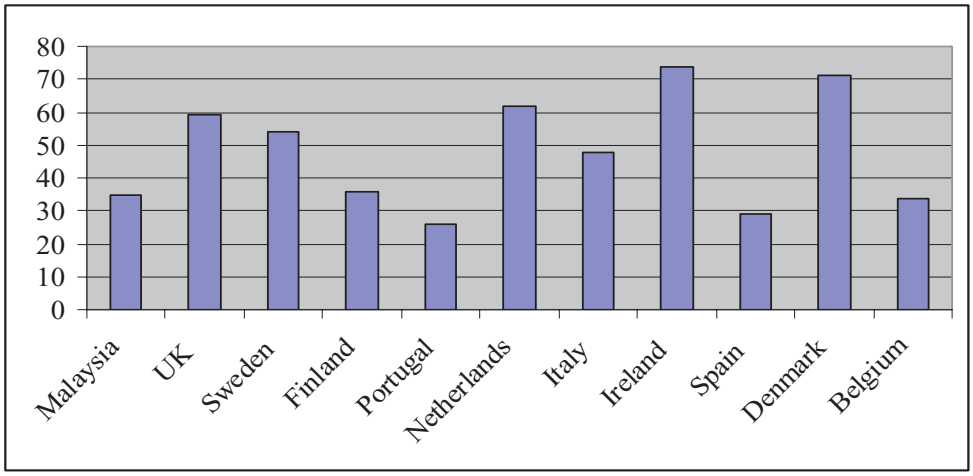
The Ninth Malaysia Plan sets an ambitious target for Malaysia: ensuring that S&T activities contribute at least one-third of Malaysia's annual economic growth. To achieve this goal, the Eighth Plan calls for optimizing the application of new and improved technology, increasing local innovation capability, providing an improved enabling environment for technology development, accelerating technology commercialization, and boosting private sector spending on R&D. These lofty goals are well worth pursuing. But they raise several critical questions: how much innovation is currently taking place in Malaysia? how effective have previous policies been in boosting innovation and R&D? and, if they had not been as effective as policy makers wished, how can their effectiveness be enhanced? This chapter will examine the first set of questions. Options for enhancing policy effectiveness will be discussed in Chapter 11.

General observations

The Malaysian Science and Technology Information Centre (MASTIC), a Division under the Ministry of Science, Technology and Innovation conducts bi-annual surveys of R&D and publishes regular reports on Malaysian Science and Technology. The 2004 S&T indicator report has a chapter on innovation in the manufacturing sector (Chapter 6), which draws upon the most recent R&D survey. In addition, the chapter on International Comparisons (Chapter 11) contains a subsection on innovation. The latter concludes that "innovation in the manufacturing sector was slightly lower than that observed in developed countries...[but] exceeded that of Portugal and Spain…[while] countries with comparable levels of innovation included Finland and Belgium" (MASTIC 2004: 176).[57] These statements refer to a graph displaying the percentage of innovative firms in the manufacturing sectors of selected OECD economies:

[57] MASTIC 2004 (P. 88) defines innovation activities as product or process innovation. Product Innovation takes place when a good or service is either new or significantly improved with respect to its fundamental characteristics, technical specifications, incorporated software or other immaterial components, intended uses, or user friendliness. Process Innovation includes new and significantly improved production technology, new and significantly improved methods of delivering products.

Figure 6.1 MASTIC Comparative Data on Innovation in Manufacturing Firms (% of Firms)

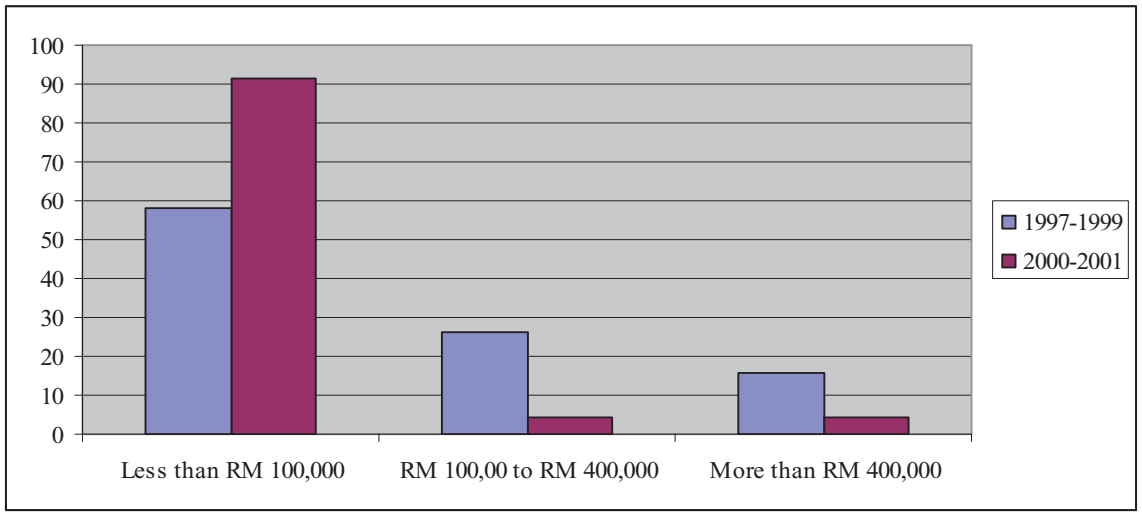


Source: MASTIC 2004: 176.

Unfortunately, the data do not provide a reliable means of benchmarking the innovation activities in Malaysia vis-à-vis OECD countries. In particular, the claim that innovation activities in Malaysian manufacturing firms should be more or less on par with innovation activities in Finnish companies stands in stark contrast to much of the benchmarking data presented in Chapter 1, above. To highlight just one key indicator, business expenditure on R&D as a percent of GDP was between four and six times higher in Belgium (1.63%) and Finland (2.41%) than in Malaysia (0.45%).

Though aggregate expenditure data are clearly an important element in benchmarking Malaysia's innovation capability and competitiveness, another critical issue is the quality and type of innovation. This includes the crucial issue of whether the innovations help to generate internationally competitive goods and services for sale on international markets. The MASTIC innovation surveys unfortunately do not provide direct data on the extent to which innovation in Malaysia is for local markets or global markets (MASTIC 2003). However, some inferences can be drawn from data on innovation expenditures. The vast majority of Malaysian firms spend less than RM 100,000 ($27,000) for innovation activities. More specifically between 90 and 95% of innovative firms in Malaysia spend less than RM 100,000 (MASTIC 2003: figure 4.18, p25). It seems reasonable to use the share of firms spending above RM 100,000 on innovation, as a rough indicator of the share of innovation that is targeted at global markets. To the extent that this is a reasonable assumption, the data would suggest that although Malaysian firms are increasingly involved in innovative activities, they mainly perform simpler innovative activities that are unlikely to lead to the introduction of new, globally competitive products. This, in turn, does not augur well for Malaysia's prospects for becoming an innovative, knowledge-based economy.

Figure 6.2 In-house R&D Spending by Innovating Firms



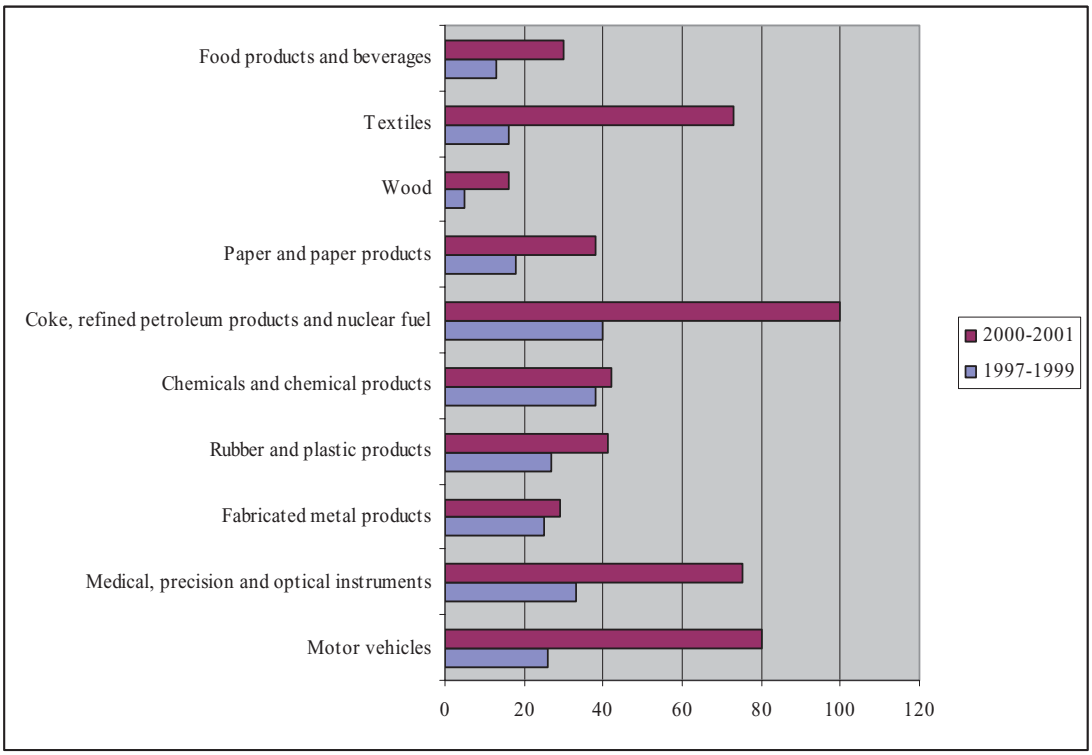
Malaysia appears to be facing a dual competitiveness problem: companies that export conduct primarily low-value added, assembly type operations – precisely the activities that are facing increasing competition from lower wage economies.

Objectives, sources and types of innovation in Malaysian firms

The bulk of Malaysian private sector R&D takes place in the manufacturing sector (MASTIC 2004: 70). There are, needless to say, significant variations in innovation across the different manufacturing industries. However, across all manufacturing industries, the trend is the same; the percentage of firms that report innovation activities increased between the 1997-1999 survey and the 2000-2001 survey.[58] The following table gives an overview of these increases for selected industries:

[58] The only exception to this pattern is furniture manufacturing, where the share of innovating firms fell from 34 percent in the 1997-1999 survey to 28 percent in the 2000-2001 survey.

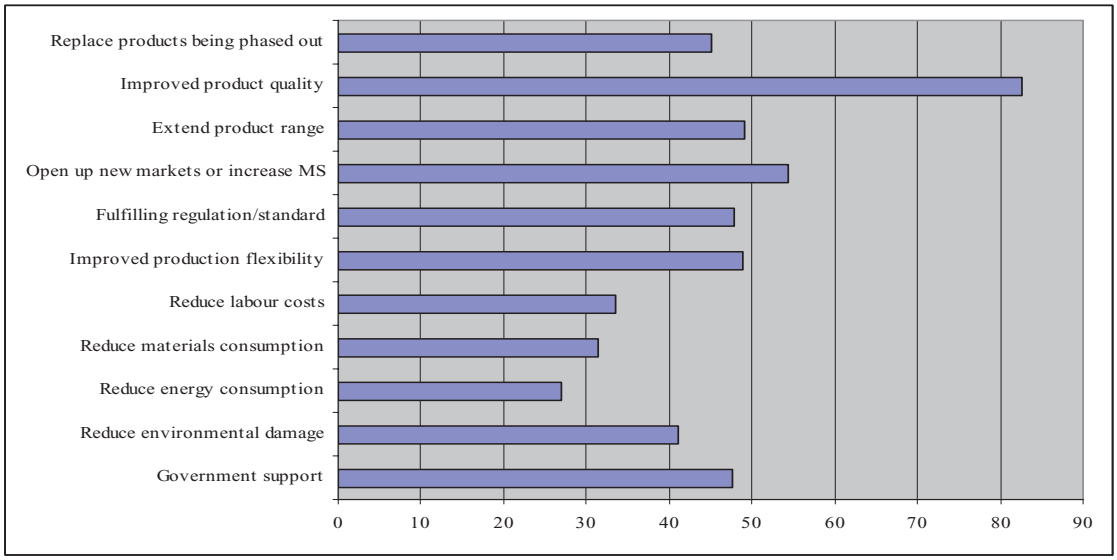
Figure 6.3 Innovation Activities across Industries (% of Firms Innovating)



Source: MASTIC 2004: 84

The MASTIC innovation survey also reports on the primary motive for engaging in innovation. The most significant finding is that 'improved product quality' was the main reason that manufacturing firms engage in innovation.

Figure 6.4 Objectives for Innovation (% Indicating 'High Importance')



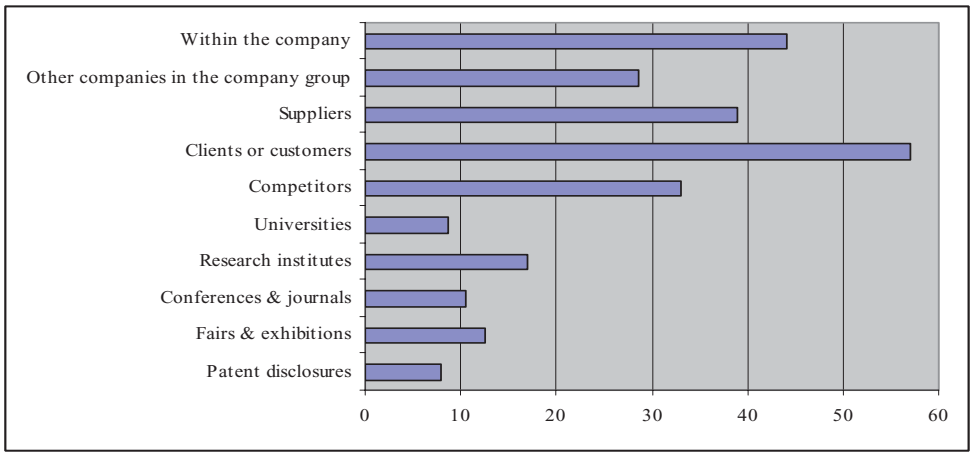
Source: MASTIC 2004: 90

Most innovating firms reported that clients or customers were the most important sources of information about potential innovations. This finding highlights the importance of demanding, high quality customers that require innovation from their suppliers. This seems to be in short supply in Malaysia. Most firms produce primarily for the local market or for developing country markets. Buyers in these countries typically do not demand cutting edge products or produced with cutting edge production processes. At the same time, there are few supply chain linkages between local Malaysian firms and foreign investors doing business in Malaysia. Thus, even though foreign investors would generally be expected to be the sort of demanding, sophisticated customer that Malaysian firms need if they are to become more innovative, local firms have few relationships to these firms. Nor are they breaking into new markets, where profit margins are higher. As noted in Chapter 1, this is a direct, albeit inadvertent, by-product of Malaysia's passive FDI economic development strategy.

At the same time, few Malaysian firms relied on universities and research institutes for information about potential innovation opportunities. By itself, this should not be seen as a condemnation of Malaysian universities and research institutes. Innovation surveys in OECD countries show the same low reliance of local firms on universities and research institutes. Simply stated, most information about innovation opportunities comes from the market via customers and suppliers. Universities and research institutes, by comparison, help firms implement various innovations, but they are not the primary source of innovation information. This would seem to imply that looking to universities and research institutes to boost innovation will not be successful unless these institutions are encouraged to improve the quality and relevance of their technology services and these policies are accompanied by efforts to help local firms build supply chain linkages with foreign investors and demanding foreign customers. Many of the policy options discussed in Chapter 11 are designed to help Malaysian firms generate these linkages and to help universities and research institutes boost the quality and relevance of their services. The remainder of this chapter will show how Malaysia's economic development strategy inadvertently discouraged the formation of these linkages. Malaysia's quest to become a sophisticated knowledge-based economy is likely to be frustrated unless those policies are further refined.

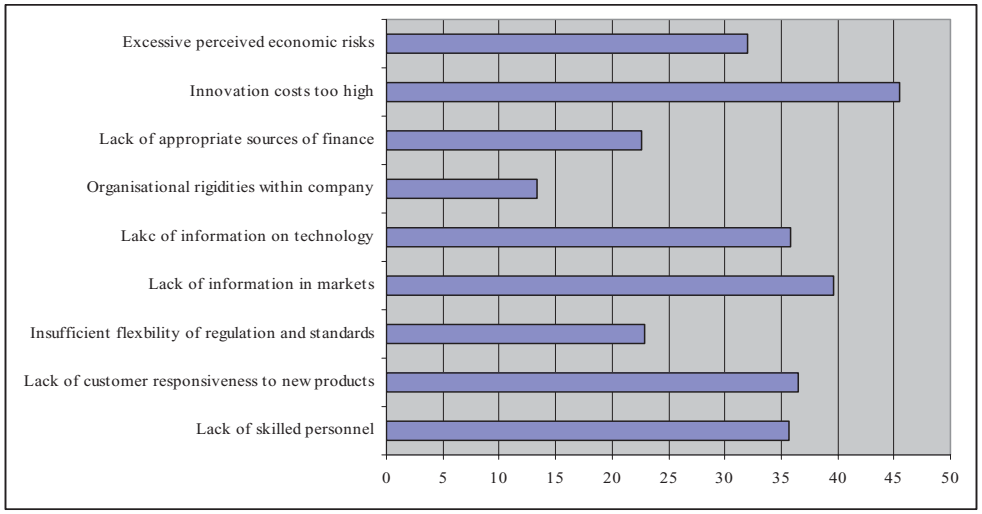
Malaysian firms indicate that the factors hampering innovation are high costs of innovation activities, lack of skilled personnel, and lack of market and technology information. More than one third of respondents to the MASTIC survey indicate that lack of skilled personnel and lack of information on technology is an innovation-hampering factor of high importance. In addition to the human capital constraint apparent in the data, it is important to stress that lack of information in markets is the factor rated as the second most hampering in the survey.

Figure 6.5 Sources of Information for Innovation (% Indicating 'High Importance')



Source: MASTIC 2004: 91.

Figure 6.6 Factors Hampering Innovation (% Indicating 'High Importance')



Source: MASTIC 2004: 93.

Malaysia's Rapid Industrialization

Industrial development in Malaysia from the mid-1960s to the mid-1990s constitutes one of the most rapid industrialization episodes the world has ever seen (World Development Report: 1995). Compared to Korea and Taiwan, Malaysia is a very resource rich country. However, in the early 1960s, Malaysia was considerably behind Korea and Taiwan in terms of industrialization. In 1965, for example, Malaysia's manufacturing share of GDP was only half of Korea's and less than half of Taiwan's. But by 1994, Malaysia had not only caught up with both Korea and Taiwan in terms of manufacturing shares, it had

surpassed Korea and Taiwan in terms of the share of GDP originating in manufacturing. Moreover, the share of manufactured exports in Malaysia's total merchandise exports increased from 32.7% to 60.4%, over the course of just five years, from 1985 to 1990.

In the 1970s, resource-based sectors such as wood and rubber drove Malaysia's industrialization. In the 1980s, with the introduction of the 'Look East' policy, the Malaysian government emulated industrialization efforts in Korea by strongly promoting the heavy and chemical industries. However, Malaysia's strategy differed from Korea's in two ways. First, the Malaysian government took a more direct role in the ownership and management of public enterprises, including establishment of the Heavy Industries Corporation of Malaysia (HICOM), which invested in iron and steel, machinery, petrochemicals and car industry on a large-scale. Second, the Malaysian government promoted joint ventures with foreign investors as part of their general strategy of attracting FDI to the country. Foreign investors were offered lucrative incentive schemes through 'pioneer status' arrangements, free-trade zones, and various investment promotion acts (Rasiah 1995). In addition, the Malaysian government provided 'one-stop FDI administration services' through the Malaysian Industrial Development Agency (MIDA). These programs achieved their goals. For example, Malaysia accounted for 25% of the total FDI inflows to East Asia during the decade from 1984 to 1994. Moreover, during this period cumulative FDI into Malaysia was 4.5 times that of Korea, and 3.5 times that of Taiwan (APEC 2004). These FDI inflows helped to boost economic growth and manufacturing exports. However, as an unintended side effect, the FDI policy created a duality in the Malaysian economy. The MNCs created few linkages with local firms, which lacked capacity to absorb outside technology, modify it for local use, and use it to produce a new round of sophisticated, more knowledge intensive goods and services. These problems will be described in more detail by means of an in-depth case study of the development of the electronics sector in Malaysia.

Case Study: The Malaysian Electronics Sector

Introduction

This section examines the growth of the Malaysian electronics sector.[59] The goal is to identify both the factors underlying this success, as well as the reasons why local firms cannot seem to move to higher value added, more knowledge intensive niches in the global value chain. Much of the assessment will focus on barriers that have impeded industrial upgrading, including the dominance of foreign affiliates in production and exports, the initial specialization in low value added assembly and test activities, and the paucity of strong links with high tech research and technology diffusion institutions.

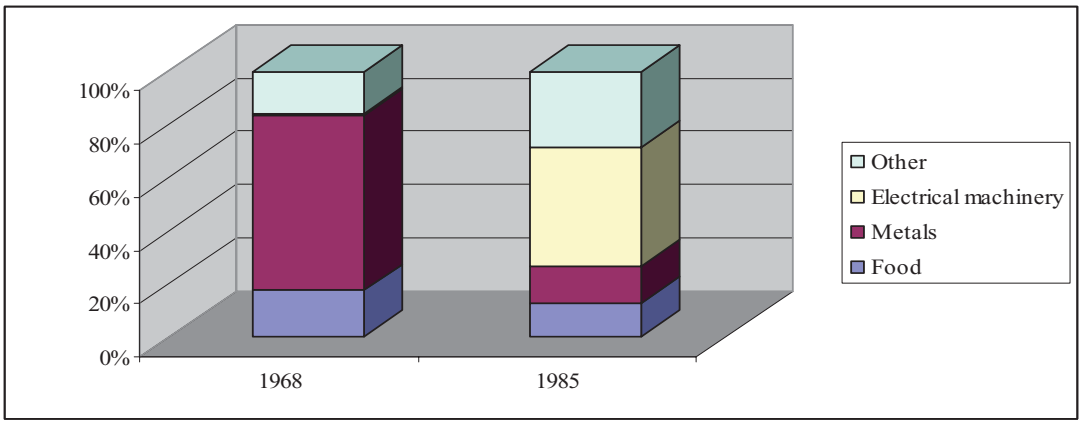
[59] This section draws upon research by Rajah Raisah, on the electronics sector in Malaysia and other East Asian economies, including both published (Rasiah 2002, 2003, 2004a, 2004b) and unpublished materail (Rasiah 2005).

Growth of the electronics sector in Malaysia

Since 1987, the electronics industry has been the leading export sector in Malaysia, contributing to a quarter of employment, a third of manufacturing value added, and almost one third of GDP (32.4 %) in 2000. Growth in the electronics sector came in two major waves. The first wave began in 1972 following the opening of free-trade zones (FTZs), and the second big wave after 1986, following the introduction of Malaysia's first Industrial Master Plan, and the renewal of the generous tax incentives first introduced with the FTZs.

The first phase was dominated by foreign firms. Local firms played virtually no role. From contributing as little as 0.7% of manufacturing exports in 1968, the electronics industry grew to contributing 44.6% by 1985.

Figure 6.7 Composition of Malaysia's Manufacturing Exports – 1968 vs 1985



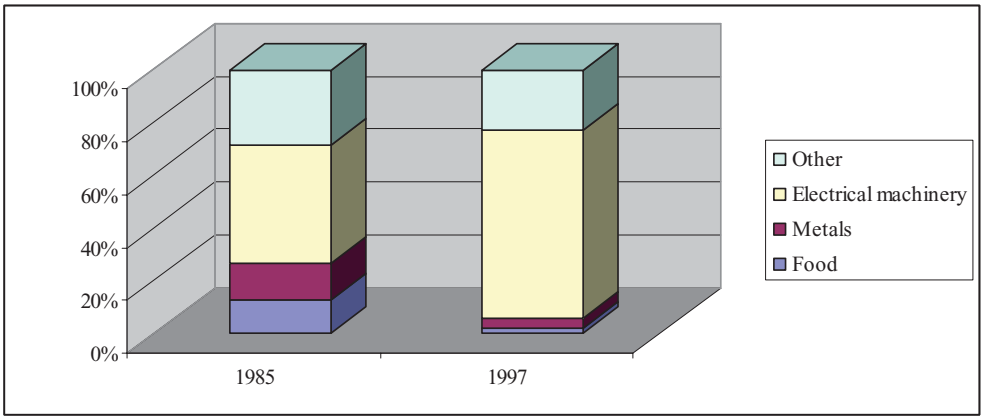
Source: Rasiah 2005

The beginning of the 1980's saw a slow-down in the growth of the electronics industry in Malaysia. Growth soon resumed as a second big wave of electronics firms relocated operations in Malaysia in the years following the launching of the Industrial Master Plan in 1986. MNCs relocated from Japan, Korea, Taiwan and Singapore due to rising costs in these economies – and in response to the re-introduction of generous tax incentives in Malaysia. At this point, Malaysia could offer MNCs the advantage of a trained labour force that had become familiar with electronics assembly. Firms relocating in this period included giant consumer electronic firms like Hitachi, Sony, Toshiba and Samsung, as well as disk drive and computer companies relocating from Singapore.60 From 1985 to 1997, the share of electronics exports in Malaysia's total manufacturing exports increased from 44.6% to 71%.

[60] Many of these disk drive companies relocated to China and Thailand, by the late 1990s.

Although initiatives were pursued to increase linkages and technological deepening, as will be described more in details in the sections below, the focus on strengthening linkages remained weak until the 1990s.

Figure 6.8 Composition of Malaysia's Manufacturing Exports – 1985 vs. 1997



Source: Rasiah 2005

Policy overview

From 1958 to present, the Government pursued four distinct industrial development strategies (Rasiah 2005). In two periods, Import Substitution policies dominated, and in two periods Export-Oriented policies dominated. The four periods can be schematically summarised as follows.

Table 6.1 Overview of Industrial Policy Strategies in Malaysia

Industrial policy strategy	Period of dominance	Main policy instruments
IS I	1958-1972	Pioneer Industries Ordinance, PIO (1958)
EO I	1972-1980	Investment Incentives Act, IIA (1968) Free Trade Zones Act, FTZ (1971)
IS II	1981-1986	Heavy Industries Corporation of Malaysia, HICOM (1980)
EO II	1986-2000	Industrial Master Plan I, IMP1 (1986) Promotion of Investment Act (1986) Action Plan for Industrial Technology Development, APITD (1990) Industrial Master Plan II, IMP2 (1996)

Source: Rasiah 2005

It is noteworthy that the two major waves of FDI inflows and expansion of electronics exports depicted above coincide with the shifts from import substitution (IS) to export oriented (EO) policies.

In order to assess the problems facing Malaysia today, in promoting its transition to a knowledge-based economy, it is crucial to understand in more detail its industrial policy strategies in the past. The following depiction of policy initiatives is divided in two periods – policies before 1986, and policies from 1986 onwards.

First period: 1958-1985

Active industrial promotion in Malaysia began when the GOM launched the Pioneer Industry Ordinance in 1958 to encourage Import Substitution (IS) industrialization. Incentives to promote export expansion were introduced for the first time with the Investment Incentives Act in 1968. However, the first wave of export-oriented electronics firms only relocated after the opening of FTZs in 1972, and the subsequent launching of License Manufacturing Warehouses, which offered the same incentives in sites where FTZs were neither feasible nor desirable.

Observers agree that these incentive instruments were absolutely critical in attracting foreign MNCs to start assembly and test operations in Malaysia. In 1975, the Industry Coordinated Act (ICA) was introduced with the objective of coordinating the application of the New Economic Policy (NEP), introduced four years earlier. The aim of NEP was to reduce poverty and eliminate 'identification of economic function by ethnicity'. More specifically, the GOM aimed at raising corporate equity ownership by Bumiputras from 2½% in 1971 to 30% by 1990. The ICA was administered carefully, however, to avoid negative implications on FDI. Thus, firms specializing in exports were exempted from local equity requirements. In practice, all firms located in FTZs were exempted.

Thus, whereas the general trend in ownership in Malaysian manufacturing in the period from the 1960s to 1985 was toward a decreasing share of foreign ownership, this trend did not apply to the highly export-oriented electronics sector. Average foreign ownership in manufacturing fell from 61% in 1968 to 33% in 1985, whereas in electronics foreign ownership remained high and in fact increased from 70% to 73% (Rasiah 2005: 13).

The first initiatives to promote domestic industrial capacity building were launched in 1981, with Malaysia's strategic initiative to promote heavy industries, notably through the creation of HICOM. A few years later, in 1985, another key initiative was launched: the establishment of the Malaysian Institute of Microelectronic Systems (MIMOS). MIMOS was established under the auspices of the Prime Minister's office, with the strategic purpose of stimulating microelectronic R&D activities in small firms. However, public service governance rules impeded MIMOS's performance and activities. The salary structure of public service employees discouraged attempts by MIMOS to attract innovative employees from private firms and partly in consequence, MIMOS lacked experienced corporate personnel to coordinate its strategies. Thus, though HICOM and MIMOS certainly were important initiatives, technological upgrading and domestic capacity building remained weak.

With the benefit of hindsight, one can question the strategy of focusing NEP implementation on local equity requirements. It might have been more beneficial to promote the use of local suppliers as Taiwan and Korea have done at the same stages.

This was in fact attempted by the GOM, with the Subcontract Exchange Program. However, the effectiveness of this program was limited due to a problem of redundant incentives: the bulk of foreign MNCs already enjoyed generous fiscal incentives, and thus had little reason to pursue further incentive schemes. The point remains, however, that an effective implementation of 'use of local suppliers' schemes would not only have promoted the NEP agenda, but could also have contributed to avoiding the unfortunate situation of isolating the most dynamic, growth oriented firms in special zones (FTZs) where they were essentially developed separately from the rest of the Malaysian economy.

Table 6.2 Overview of Policy Initiatives – 1958 to 1985

Year	Policy/Act
1958	Pioneer Industries Ordinance (PIO)
1968	Investment Incentives Act (IIA)
1968	Investment Tax Allowance (ITA)
1971	New Economic Policy (NEP)
1971	Free Trade Zones (FTZs) Act
1975	Technology Transfer Unit (TTU)
1975	Industrial Coordination Act (ICA)
1980	Heavy Industry Corporation of Malaysia (HICOM)
1980	Subcontracting Exchange Program (SEP)
1985	The Malaysian Institute of Microelectronic Systems (MIMOS)

Sources: Rasiah 2005, Ritchie 2001, Ritchie 2004.

Second period: 1986-present

General incentives and incentives for R&D

With the prospect of several large MNCs leaving Malaysia as financial incentives that were due to expire in the mid-1980s, the Industrial Master Plan (IMP1) was launched in 1986. It included generous incentives for exporting firms to retain FDI in Malaysia. The IMP1 renewed pioneer status, investment tax allowance and a number of allowances for stimulating training and R&D. Further, the IMP1 renewed the policy of exempting export-oriented firms from local equity requirements, by specifying that firms exporting more than 80% of their output were not required to have local equity.

High-tech activities were promoted by means of tax incentives when the following criteria were met: (a) R&D expenditure of Malaysian operations exceeding 1% of gross sales; and (b) the share of science and technical graduates exceeding 7% of the workforce. In addition, investment classified as 'strategic' also qualified for total tax exemption under the PS and ITA. There were five criteria determining whether

investments could qualify as strategic: the investment should: (a) exceed RM 100 million; (b) involve integrated manufacturing activities; (c) stimulate backward and forward linkages; (d) involve high-tech products; and (e) involve improvement of R&D facilities.

In addition to these schemes, there was a tax incentive for R&D spending in the form of a double deduction on R&D expenditures. It is important to stress, however, that for a firm spending more than 1% of its gross sales on R&D, the double deduction scheme gave no incentive for increasing R&D spending, since the firm already enjoyed tax exemption as a result of its high-tech status. Similarly, for a firm that undertook investments in a manner qualifying as 'strategic', the double deduction scheme was redundant, and thus an ineffective incentive for increasing R&D spending in firms. It is likely to have been much more effective had the GOM made the various tax exemption schemes contingent on a requirement to spend as much on R&D as innovative companies in OECD countries. In addition, efforts to promote R&D spending in firms would most probably have been more effective had they been based less on tax incentives and more on: (a) a grant-based carrot; and (b) investments in the building of networks and institutions for training, innovation and R&D.

A further problem that must be stressed at this point is the heavy emphasis on high-tech products and industries in Malaysian policy-making. Technology acquisition and diffusion in non-high tech industries will often generate at least as much value added and technology upgrading as promotion of high-tech industries. Further, as Malaysia's undisputed success in the palm oil sector demonstrates, such "low tech" but knowledge-intensive activities as adding value to natural resources might actually have contributed more to reaching NEP goals than targeting high tech industries alone.

Public funds for technology upgrading and commercialization

Though there was a strong reliance on incentive schemes, this second period did see the introduction of a number of new public funding schemes, designed to promote technology acquisition, adaptation and commercialization. More specifically, the following main schemes were introduced: The Technology Acquisition Fund (TAF) to help Malaysian firms seek strategic technology from foreign sources; the Industry R&D Grant Scheme (IGS) to encourage firms to adapt and create new technologies; the Commercialization of R&D Fund (CRDF) to promote the commercialization of R&D results; and the Intensification of Research in Priority Areas (IRPA) to fund R&D in Malaysian R&D institutions. These schemes all suffered from a similar set of weaknesses:

- Little involvement of relevant private sector representatives.
- Criteria for evaluation of projects did not reach an acceptable standard because of lack of mechanism to train evaluators.

- Lack of MNC participation, which would insure that the scheme would be relevant to the needs of global markets and foreign investors.

- Lack of ex post appraisal of projects excluded possibility of improvements of approval mechanism.

- Grants only applied to successful local firms – not to foreign MNCs and not to individual innovators/start-up companies.

Policies to promote training and skills-upgrading

The GOM gradually increased its focus on stimulating training and skills-upgrading, and initiatives included making training expenses liable to a double deduction tax incentive. The scheme was considered largely redundant by the larger firms that enjoyed access to the more lucrative PS and ITA allowances. Though the scheme was considered important to stimulate interest in training activities in smaller firms, virtually no small firms availed themselves of the incentive. A key problem was that though MIMOS had been introduced in 1985 to compensate for the lack of training institutions to service the electronics industry, this had not in itself closed the supply-gap in training for the electronics industry. As some of the policy options outlined in Chapter 11 will suggest, GOM may want to rely less on tax incentives and more on grants and the pro-active building of training institutions tailored to the needs of SMEs.

Efforts to diversify production activities and increase training and R&D activities and seek greater market penetration into higher value added activities were strengthened with the APITD in 1990. (See Table 6.3) Soon after followed the enactment of the Human Resource Development Act in 1992, the formation of the Malaysian Technology Development Corporation (MTDC) and the Malaysia Industry Government High Technology council (MIGHT) in 1993. The HRD Act led to the creation of the HRD Fund (HRDF) and the HRD council, under the HR Ministry. The HRDF was implemented in 1993 and manufacturing firms with an employment size of 50 or more were required to pay one percent of their payroll to the HRD council, which they could then reclaim for approved training expenses.

Manufacturing firms with less than 50 employees still enjoyed the double deduction tax incentive on training expense. Further incentives to encourage training included:

- Deduction of contributions made to non-profit technical or vocational training institutions.

- Exemption from import duties etc for machinery, equipment and materials used for training personnel.

- ITA for new investment to upgrade training equipment or expansion of training capacities.

Reviews of the HRDF by electronics firms showed that this was an excellent instrument to encourage smaller firms and firms in inward-oriented industries to train. However, its implementation faced two major problems: (a) the supply-side training institutions were either absent or not-equipped to handle state of the art training; and (b) inter-firm network were not sufficiently cohesive to coordinate demand-supply effectively. Hence, while foreign electronics MNCs enjoyed cutting-edge training practices even before the introduction of the HRDF (e.g., in-house training centres), local firms did not get similar training support.[61]

Policies to promote linkages and cluster synergies

The Subcontracting Exchange Program (SEP), launched to match MNCs with local firms by means of fiscal incentives in return for 50% domestic content of supplies, has already been mentioned (as has the problems in its implementation). With the Second Industrial Master Plan (IMP2), launched in 1996, the GOM managed to shift focus towards higher value added activities, including efforts to promote and support industrial clusters. However, two major constraints prevented the appropriation of cluster synergies: (a) lack of human capital to drive technological deepening; and (b) lack of network cohesion.

The MSC and MDC were launched with sophisticated infrastructure. However, as with the IMP2 efforts to deepen high tech activities, the MSC has suffered from serious HR and network constraints. In addition, the provision of incentives to only IT firms went against the very definition of clustering as the differentiation and division of labour required obvious extension into a multiplicity of complementary industries.

Dynamic clustering, which is reflected by the capacity as well as the strength of connections and coordination between economic agents (institutions and firms), constitutes the anchor for driving learning, innovation and performance of embedding firms in particular locations. The Penang cluster has enjoyed far stronger network cohesion than the other regions in Malaysia. Strong relationships between the intermediary organization of Penang Development Corporation (PDC), state government and firms (both MNCs and local firms) helped forge strong systemic coordination in the Penang cluster. The state economic development corporations (SEDC) of other regions in Malaysia (Selangor, Melaka, Johor etc) have limited their support activities to the provision of land. These contrasting roles – the pro-active but intermediary role of PDC in Penang and the hands-off role of the other SEDCs, once firms obtain their operating licences, has produced contrasting systemic synergies in these regions. The lack of systemic coordination in other regions than Penang has restricted intra- and inter-industry linkages in these regions. In spite of dynamic clustering features achieved in Penang, firms did not engage in new product development activities. A combination of severe deficits in human capital and ineffective support instruments has discouraged if not prevented firms from investing in new product development. Hence, the Penang cluster has not achieved R&D intensities comparable to Korea and Taiwan.

[61] Penang was the exception to this pattern. Inter-firm networks in Penang were good, and in 1989 contributed to the creation of the Penang Skills Development Centre (PSDC).

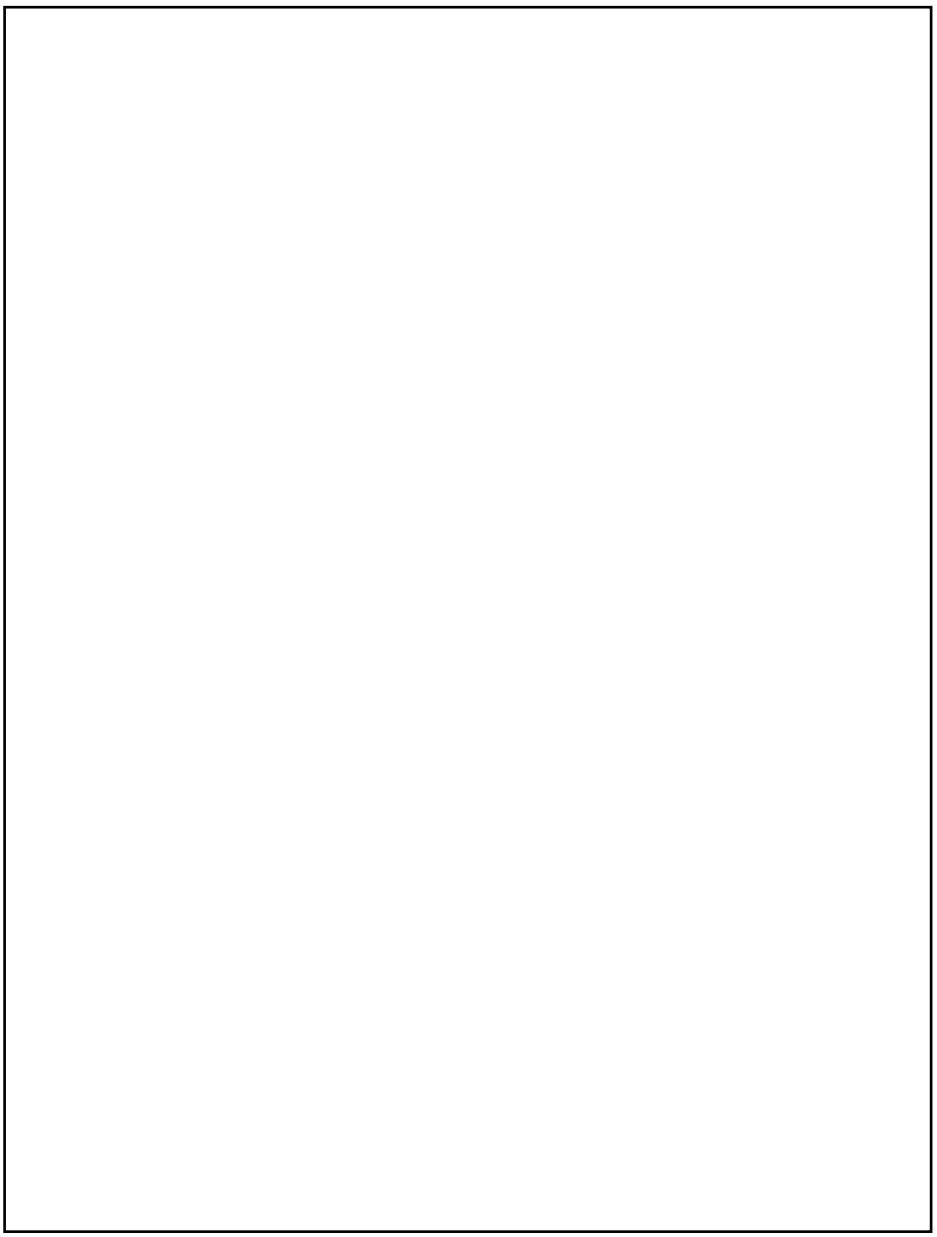
Table 6.3 Overview of Policy Initiatives – 1986 to 1997

Year	Policy/Act
1986	Industrial Master Plan 1 (IMP1)
1988	Double tax deduction for approved R&D expenditures
1990	Action Plan for Industrial Technology Development (APITD)
1992	Human Resource Development (HRD) Act
1992	Malaysian Technology Development Corporation (MTDC)
1993	Human Resource Development Fund (HRDF)
1993	Malaysian Industry Government Group for High Technology (MIGHT)
1993	Vendor Development Program (VDP)
1995	Small and Medium Industry Development Corporation (SMIDEC)
1996	Industrial Master Plan 2 (IMP2)
1997	Multimedia Super Corridor (MSC)
1997	Multimedia Development Corporation (MCD)

Sources: Rasiah 2005, Ritchie 2001, Ritchie 2004.

R&D- and skills-intensities in Malaysian firms

Malaysia has successfully managed to attract export-oriented electronics firms in assembly and test activities, and its success in this endeavour is arguably comparable with the world's best examples. Despite failing to stimulate successful start-ups, GOM incentives managed to spur expansion in the sector. However, in contrast to Singapore and Ireland, where FDI helped local firms learn how to participate in higher value added activities, Malaysia has yet to achieve similar success. Mechanisms for identifying potential entrepreneurs and innovators to support start ups – including attracting their participation in the policy process and establishing a legal framework to link with venture capitalists – were not developed. The implementation of R&D grants by-passed new start-ups and potential individual innovators. Furthermore, the provision of tax holidays on different criteria – e.g. investment and strategic classification – left the R&D incentives redundant for many firms. Furthermore, linkages between universities and electronics firms have been weak. Despite the initiation of IRPA, where RM1 billion grant was set aside to support R&D in HEI's, local universities' participation in industrial R&D has been minimal (Best & Rasiah 2003). All this helps to explain why electronics firms in Malaysia had lower R&D intensities than firms in Korea and Taiwan.



integrating exporting firms in the domestic economy, due to the redundant incentives problem (e.g., PS and ITA).

Taken together, Malaysia has a mixed experience with the electronics industry. Policy instruments and production experience has ensured that FDI continues to retain low value added activities in the country. GOMs efforts to stimulate upgrading to shift focus to higher value added activities have yet to gain much success. A combination of human capital deficits and ineffective promotional instruments to stimulate R&D activities has prevented firms from raising their R&D intensities to levels comparable to Taiwan and Korea.

Sapura Berhad – success and challenges

Closing this section, it is important to stress that Malaysia has a strong potential for entrepreneurship, innovation and further economic growth – a potential that is likely to be unleashed full-scale if the GOM implements the innovation and education policies discussed in this report. The following section describes how a local Malaysian electronics firm expanded enormously in the period from the mid-1970s to the mid-1990's, and yet never became internationally competitive, due to low availability of skilled personnel.

One of the main objectives of Malaysia's New Economic Policy, introduced in 1970, was to promote Bumiputera business involvement and ownership. When Sapura started operations in 1975, it was one of the fist companies to benefit from these policies. Sapura's first contract was with JTM. It was a RM2.3 million contract for laying cables for JTM. Despite good government contacts and contracts, Sapura had difficulties raising capital from domestic financial institutions. In 1983, a RM 70 million capital investment was needed for Sapura to be able to undertake assignments it had been contracted to do. Sapura's response to the reluctance of local financial institutions to give loans, was to bring in two Japanese corporations – Sumimoto and Marubeni – as joint venture partners, that guaranteed for the bank loans. Engaging in joint ventures with large MNCs has been a core element of Sapura's business strategy. Its strategic alliances with large MNCs include Macintosh, Fijitsu, Hewlett-Packard and Nokia. In the domestic market, Sapura's big customer was JTM. In addition to laying cables, Sapura was contracted to supply telephones and payphones to JTM. Over the period from the mid-1970s to the mid-1990s, Sapura expanded its operations from telecommunications into information technology, metals-based industries and the automotive parts sector. In 1995, telecommunications was still by far the core business of the company, accounting for more than 80% of earnings. Sales had increased enormously, from less than RM 10 million in 1978, to almost RM 800 million in 1995.

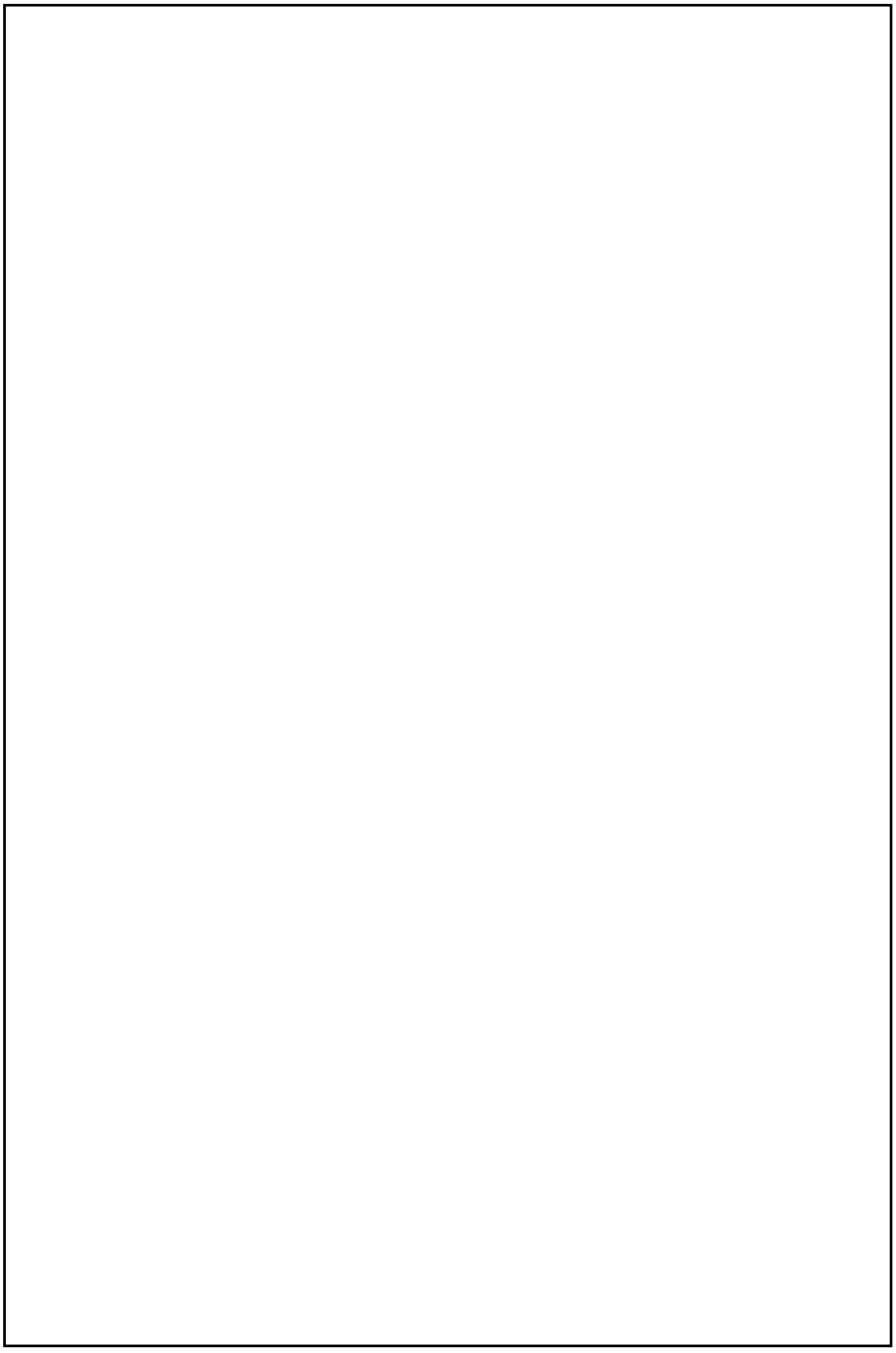
In its early years Sapura produced telephones under licence, and thus depended on expensive 'expert visits' from the parent company whenever modifications or improvements were to be made. Thus, in 1984, Sapura established its own R&D department, to be able to make its own telephone. A year later, the first home-grown Malaysian telephone, S2000A, was a reality, on the basis of RM 1 million development

funds. The second version of Sapura's telephone, S2000B, was displayed at the Telecom '87 Exhibition in Geneva and has been exported to Japan, the USA, Germany and other countries. In the following years, R&D expenses increased, to a level of about 10 per cent of telephone sales. Sapura's impressive R&D efforts did not, however, help production cost to fall. In 1989, for example, the price of Sapura's telephone set was more than 50% higher than the telephone set sold by the Taiwanese company, Formula Electronics. Moreover, technological advancement in Sapura seems to have been "incremental… [and] achievable through many small modifications, rather than being based on major breakthroughs" (Alavi 1999: 343). Sapura's officials have admitted that it has yet to become as competitive on the international market as Taiwanese and Korean firms.

One of the major reasons why the results of Sapura's R&D efforts have not been at par with its international competitors is due to lack of skilled and educated manpower. At its peak, in 1995, only 15% of employees at Sapura had university or technical institute training. This suggests, Alavi argues, that Sapura is "essentially an assembly-type production company that largely employs cheap and unskilled workers with low levels of education which in turn limits the capacity for rapid technological change". In terms of employment structure and education level of its employees, Sapura has been far behind the standard and quality achieved by its main East Asian competitors. While Sapura has produced and exported sophisticated top-of-the-line telephones (such as S2000HF and S3000) to countries such as Canada, France, Germany, Japan, these exports have been modest. By the mid-1990s, Sapura mainly sold simple push-button telephones to developing countries and to JTM, where cheap and easy-to-use models for the general public were preferred. Technological progress in electronics-based technologies is extremely rapid in the world market, which makes the catching-up process even more difficult for a company such as Sapura. On the basis hereof, Alavi found little reason to believe that Sapura would "ever be able to compete successfully with its competitors in the world market in terms of price and quality" (Alavi 1999: 345).

In the period from the mid-1970s to the mid-1990s, Sapura innovated, grew tremendously, developed an R&D subsidiary, and also engaged in significant exports. Exports were mainly to a few LDCs, however, and Sapura never became truly competitive in the global market. The main reason that Sapura – despite impressive growth and despite successful R&D efforts – never reached the level of international competitiveness was the lack of skilled personnel. When the telecom sector in Malaysia became more liberalized through the 1990s, Sapura's domestic market position weakened. In 1994, Sapura lost its monopoly in the domestic telephone sets market as well as its monopoly on operating payphones in urban areas. Sapura soon felt the heat. In the course of just one year, its profits from payphones operations fell from RM 51 million (1995) to RM 32 million (1996). In July 1996, Sapura sold 75 per cent of its cellular and payphone business. Following this, a major restructuring was undertaken in 1997 to gear the company to its new target sector; the lucrative, government-controlled, automotive industry.

From the perspective of the present report, the Sapura case pinpoints a lesson that is particularly important for future policy-making in Malaysia. As demonstrated in the



in promoting skills-upgrading and R&D. GOM made the (understandable) mistake of believing that the instrument that worked so well in attracting FDI would also be successful in these other areas (innovation, R&D, skills- and technology upgrading). An important lesson to take from this experience is that in the future much more emphasis must be put on pro-actively engaging in the building of networks and institutions for training, innovation and R&D.

The problem of 'redundant incentives'

The incentive approach was compounded by a redundancy problem, as mentioned several times in the preceding sections. Incentive schemes have their limits in and of themselves. But when firms already enjoy generous tax exemptions, this is bound to be an ineffective instrument to promote skills- and technology upgrading, R&D etc. In response to this problem, GOM made full tax exemptions contingent on requirements for technology content and sharing, and by 1995 a set of additional requirements (Ritchie 2005: 752) on minimum capital investment per employee (RM 55,000), and minimum R&D expenditures (1% of sales), and minimum share of employees with technical degrees (7%). As apparent from the preceding sections, this did not solve the problems of skills- and technology upgrading in the Malaysian electronics sector. What might have worked would have been to introduce requirements for active engagement in training and technology acquisition, in participation with the GOM, use of local suppliers, and engagement in joint R&D activities with local research institutions as new criteria for sustaining PS, FTZ or ITA incentive schemes.

Lack of skilled personnel

The Sapura case shows us how the lack of skilled personnel was a key constraining factor, for an otherwise highly successful Malaysian firm. Sapura innovated and exported. Sapuar even set up an R&D subsidiary, spending 10% of its gross telephone sector sales on R&D – more than 10 times the requirement for high-tech tax exemption. Despite these impressive strides and achievements, Sapura never managed to become internationally competitive, due to shortages of skilled personnel. As Sapura lost its privileged position in the domestic telecommunications market during the course of the 1990s, Sapura sold off its activities in this sector, to increase its activities in another protected sector; the automotive industry. If Malaysia in the future is to reap sustainable benefits from achievements such as Sapura's impressive growth over two decades, international competitiveness must be achieved – and for that end, large-scale upgrading of the skills of the work force is a sine qua non.

Preferential treatment policies

The Malaysian efforts at promoting industrialization seem to have been based, to a large extent on providing tax preferences to MNCs. This approach is largely responsible for the dual economy problem that Malaysia faces today. It will be crucial for Malaysia's future economic development that a different approach is adopted -- one that aims at building institutions and framework conditions that foster technological learning and

innovation across the entire economy. At the end of the day, the great danger of such exemptions and preferential treatment policies is that they divert attention from the real challenge: to build a well-functioning National Innovation System that spans the entire economy

PART II. OPTIONS FOR REFORMING THE MALAYSIAN UNIVERSITY SECTOR

Chapter 7. Steering the Future of Higher Education

Strategic Goal: Develop a clear vision to guide the transformation of the Malaysian universities into world-class institutions and put in place an appropriate governance framework

Summary of recommendations

- *Target programs/institutions that have the potential of achieving world-class status and reinforce their capacity accordingly.*
- *Increase autonomy and accountability of public universities (see Chapter 9).*
- *Remove the distinction in terms of quality assurance standards and research funding between public and private universities, in order to allow for greater competition and increased efficiency.*

Introduction

> *Education in Malaysia is an on-going effort towards further developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious, based on firm belief in devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards, and who are well responsible and capable of achieving high level of personal well being as well as being able to contribute to the harmony and betterment of the family, the society, and the nation at large.* [62]

The National Educational Philosophy statement above captures the aspirations of the GOM to achieve "a world class education system which will realize the full potential of the individual and fulfill the aspirations of the Malaysian nation." [63] The GOM recognizes that as catalysts of knowledge, research, and innovation, good universities make significant contributions to the individual and collective well-being of the people they serve. The wish to develop a vision and strategy that would realize the goal of

[62] *Source*: *Education in Malaysia*, MOE, June 2005, p. 6.
[63] *Source*: *Education in Malaysia*, MOE, June 2005, p. 5.

elevating the level of performance of the country's universities towards becoming world class emanates from this recognition and is a concrete manifestation of the National Education Philosophy.

The achievements of the higher education system to date indicate that with appropriate funding, dedication, and high caliber leadership, Malaysian universities can achieve global excellence in diverse fields and there is tremendous potential to achieve even greater success in the international arena.

Some of the anticipated goals by the GOM are that, by 2010, universities in Malaysia will collectively:

- Respond to a projected 44% increase in demand for enrolment to reach the goal of providing access to 40% of the age cohort.

- Ensure greater relevance of academic programs as measured by the rate of graduates' success in employment and entrepreneurial endeavors.

- Perform significantly more research as a result of the objective of the GOM to make Malaysia a significant contributor to the knowledge economy.

- Make Malaysia an educational hub and increase international student intake to reach 100,000, or about 10% of the total student population.

The successful attainment of these ambitious goals hinges in part on keeping a fine balance between two objectives that do not necessarily converge: expanding the system and improving quality. Since the attainment of either of these objectives requires adherence to a set of significantly different core values and priorities, the achievement of both objectives becomes at best extremely challenging and calls for careful strategic planning, as illustrated by the difficulties faced by China in developing its universities.

Box 7.1 Higher Education Reform in China

China's recent wave of higher education reform has focused on the rapid expansion and improvement of its university system to assist the country's economic and social development. Higher education institutions have grown very rapidly, with an increase from 598 in 1978 to 1,731 in 2004. Enrollment numbers grew from 0.86 million in 1978 to approximately 13.3 million in 2004, corresponding to a 19% gross enrollment rate. Even more impressive is the total enrollment for graduate students which rose from zero in 1978 to 1.02 million in 2004 (Ministry of Education P.R.C. 2004 & 2005).

The Chinese government has been eager to develop a higher education system of international stature and recent reform efforts reflect this goal. In 1993, the Government adopted the *Guidelines of China's Educational Reform and Development*, which called among other things to build up 100 key universities with high quality courses of specialized studies. In 1998, then President Jiang Zemin announced the goal of building world-class universities, with a clear focus on the advancement of science and technology. Since then, state financing for higher education has more than doubled, reaching $10.4 billion in 2003 or almost 1% of GDP. Several top universities received grants to improve institutional quality under the 985 Project, which reflects a conscious strategy to concentrate resources on a few institutions with the greatest potential for success at the international level (Mohrman 2005).

Chinese universities are currently spending millions of dollars to recruit internationally renown, foreign-trained Chinese and Chinese-American scholars and build state of the art research laboratories, particularly in science and technology (French 2005). The strategy is to surround their star faculty with the brightest students, give them academic leeway and provide competitive salary and additional non-salary incentives. With low labor costs, structural upgrades are achievable at a tenth of the cost in industrial countries. All this is happening in the context of a new regime of financial autonomy, significant cost sharing, and intense efforts to develop management expertise at all levels of university leadership.

There are, however, signs that China's plans to achieve world-class stature are meeting some obstacles. First, there is the concern that Chinese universities have expanded too quickly at the expense of maintaining quality. Second, the academic culture that demands quick results hampers innovative and long-term research efforts. While the "publish or perish" culture is strong in the United States, such pressures are often balanced with the recognition of the value of creativity and originality. Lack of undergraduate students with a strong foundation in science and technology is the third weakness. Without well-trained students entering the graduate programs, first-class faculty and laboratories will be underutilized. Fourthly, lack of academic freedom is a serious issue in China. Faculty and students are encouraged to question government policies or engage in debates on pressing issues in only a limited way, with some disincentive for creative thinking.

Finally, China's vision of world class universities focuses almost exclusively on factors such as increased publications in international journals, up-to-date laboratories, more buildings, star professors and additional funding (Mohrman 2003). Yet the vision is largely imitative rather than creative. Ruth Simmons (2003), president of Brown University, emphasizes the importance of other factors: "the bedrock of university quality in the United States is peer review, a system in which standards are set by leaders of the field and those leaders are themselves challenged and judged by this process". Simmons goes on to note that "universities promote the capacity of scholars to develop original work that is not immediately applicable or useful. Great universities are not only useful in their own time but in preparing for future times. What allows a great university to do that is as little interference from the state as possible. The role of the state is to provide resources and also to give wide latitude to universities' leaders to decide how scholarship is to advance." Their universities might do better to focus on building world-class departments, institutes or schools, rather than trying to excel on all accounts (Altbach 2003).

In order to deal with this fundamental challenge of reconciling quantitative expansion and quality upgrading, the GOM could therefore translate its vision of the role of the university sector into a strategic plan outlining the concrete policy reforms and measures needed to facilitate the transformation of the university system. While this chapter focuses on the core elements of a possible strategic framework, including appropriate governance options to implement the strategy, the rest of the report spells out needed changes in the areas of financing, quality, relevance, and science and technology for innovation and development.

The Strategic Vision: Towards Creating World-Class Universities

Implicit in the GOM's goal to elevate the quality of its institutions is the desire to build up elite universities that can be ranked among the best in the world without jeopardizing the academic standards of the remaining institutions that must also provide quality education to the majority of Malaysian students. This means that the GOM needs to create the conditions that would enable the universities to compete at an international level for reputation and awards, foreign students, research grants, and on a host of other indicators on which the quality and relevance of university education are assessed.

However, adopting the goal of building world-class universities does not imply that all universities in Malaysia can or should aspire to be of international standing. The purpose would rather be to set up an integrated system of teaching, research, and technology-oriented institutions. Even in the richest OECD countries, only a handful of institutions achieve the kind of concentration of top researchers, professors, students, facilities, and resources that world class universities enjoy as pre-conditions for excellence in scholarship. In the US, for example, no more than 30 universities are among the best in the world; in the UK less than 10 universities belong to this category; the approximate numbers are, respectively, 3-5 in Japan, 3-5 in Germany, 3-4 in Canada, 2-3 in Australia, 4-5 in France, and 2-4 in China.

The GOM needs therefore to make strategic decisions around two sets of critical questions:

- How many world class universities are desirable and affordable?

- Which ones should be selected for that purpose, and how should they be chosen?

While there is no magic rule to guide the decision on the number of such universities, it would certainly make sense to have more than one top university to encourage competition and emulation among the most reputable institutions in the country. Creating three to five world class universities could perhaps be a reasonable target in the medium-term (5 to 8 years), considering the financial resources required in the face of the continuously rising cost of research infrastructure.

Linked to the decision about the number of target universities is the question of the various strategic approaches that could be followed to select among existing universities.

The GOM needs to assess the degree to which it wants to manage the process in a centralized way or whether it wishes to steer the higher education system at a distance, relying on broad strategic orientations and financial incentives to entice the most dynamic universities to transform themselves. International experience suggests that the latter approach could be more effective in the long run.

Also, from a strategic perspective, it is important to note that the transformation of the university system cannot take place in isolation. On the contrary, the long term vision for creating world class universities, and its implementation, should be closely articulated with: (a) the country's overall economic and social development strategy; and (b) the ongoing changes and planned reforms at the lower levels of the education system.

Integrating higher education into the country's national innovation strategy. While higher education is central to enhancing Malaysia's capacity to become a leading knowledge-based economy, the universities can only play this role effectively when fully integrated into the country's economic and social development strategy and attuned to the evolving labor market. In the Eighth Plan and also in the Knowledge-Based Economy Master Plan,[64] Malaysia has outlined its strategy for becoming a knowledge-based economy. These documents set the overall context for the transformation of the higher education system. For example, the Knowledge-Based Economy Master Plan declares (Paragraph 3.01 and 3.04):

> *"The quality of human resources will be the single most important factor that will determine the pace and success of the transition toward the K-based economy. There are three ways in which the quality of human resources can be improved. The first, which is long-term and sustaining, is to upgrade the quality of education at the primary, secondary and tertiary levels, and to foster a culture and intellectual infrastructure to support life-long learning. The second, which is medium-term and flexible, is to foster training and re-training for managers and workers. The objective here is to upgrade knowledge and skills to cope with the new demands of technology and markets. In the initial stages, much of such training is likely to focus on the broad organizational changes demanded by the K-based economy, but in later stages the main focus will be on imparting specific industry and job-related skills. The third approach is recruiting foreign talent. This is an effective, rapid-response approach, which is useful in meeting urgent shortages of manpower, but cannot be relied on as a long-term solution… Education plays a crucial part in developing human capital and will play a critical role in shifting the economy towards a K-based economy. Education increases the skills and knowledge of individual workers, allowing them to accomplish particular tasks better and to adapt more easily to changing job requirements."*

As will be discussed in more detail in Chapter 11, global experience suggests that, in order to be effective contributors to knowledge-based economic growth, Malaysia will

[64] http://www.epu.jpm.my/New%20Folder/publication/knoweco.htm

need to focus on two critical tasks: (a) absorbing and adapting existing knowledge from around the world as well as producing and commercializing new cutting-edge inventions; and (b) supplying the skilled manpower with the requisite technical and managerial qualifications needed by a modern, innovative economy. Malaysian universities must play a leading role in achieving both objectives. From this perspective, Denmark is an exemplary illustration of a leading knowledge-driven economy that has fully integrated its universities into the national innovation system. In 2003, the government decided that all universities would operate as independent subsidiaries of the Ministry of Science, Technology and Innovation, rather than continuing to function under the Ministry of Education.

Articulating higher education with primary and secondary education. Higher education is a sub-sector of the whole education sector, and its development cannot take place in isolation from the other levels of education. One of the most important determinants of the quality of learning in universities is the degree of academic preparedness and motivation of incoming secondary schools graduates. It is therefore essential that the reforms envisaged by the Ministry of Higher Education be carefully coordinated with ongoing efforts by the Ministry of Education to improve the quality of secondary education, especially those that deal with issues of rote learning, science education, and language of instruction. Mainstreaming pedagogical practices that encourage creative habits critical thinking and strengthening the mastery of foreign languages, including English, will require mutually reinforcing measures at all levels of the education system.

To address these dimensions, several promising government initiatives have already been put in place:

- The *Kumpulan Wang Amanah Pelajar Miskin* program under the Eight Malaysia Plan provides financial assistance to children from poor households in order to lessen the financial burden on schooling.

- The textbook-on-loan, free tuition, nutritional and health programs, and additional financial assistance target students from poor households are being considered.

- Pre-service and in-service training for teachers are being improved in line with developments in education. At the secondary level, the Ministry of Education has set the goal of emplacing 100% graduate teachers by 2010. According to the Eighth Malaysia Plan, in 2003, only 70% of secondary school teachers were graduate teachers and only 0.6% at the primary level.

- The 1999 Smart Schools pilot project was initiated to integrate information and communication technology (ICT) in the education sector. ICT was used extensively to implement 87 Smart Schools as pilot projects at the end of the pilot period in 2002. The Smart School pilot project resulted in the creation of 1,494 courseware titles for Bahasa Malaysia, English Language, Science and Mathematics; computerized and integrated Smart School Management System; Help Desk and Data Centre for all the pilot schools; and trained administrators,

teachers and IT coordinators in all the Smart Schools. The government is planning to scale up the program and it has become one of Malaysia's flagship projects to improve technology in education.

- The introduction of science as a subject in Year 1 was started in 2003 to build a stronger foundation in the subject early in the education pipeline, as well as to inculcate scientific interest among students. At the same time, the government provided a voucher scheme for after-school tuition in rural areas to allow for supplementary science lessons.

- The introduction of the "60:40 policy", which targets a 60 to 40 ratio of students in the science/technical versus arts streams at the secondary level by 2020 is behind target. Only 36% of the student body is currently in the science and technical streams. Providing a stronger foundation for science and mathematics achievement, paired with initiatives that ensure an increase of teachers in the field, are both crucial elements to fulfilling the 60:40 target.

Implementing the Strategic Vision: Governance Implications

Reputation and competitiveness. Every university is perceived to have a certain kind of reputation by its various stakeholders: current and prospective students and parents, employers, and funding bodies. A solid reputation inevitably leads to greater opportunities in attracting resources, research grants, better-qualified students, and faculty. Even in the Malaysian context where the demand for university education is greater than the supply and allocation of new students is done centrally, the most reputable universities are able to attract more students who are accepted in their first choice program and university [65]. Based on available data, this seems to be the case for the University of Malaya, for example.

Institutional reputation serves as a valuable asset when universities are able to compete with each other for students and staff. "The world's brightest students – and particularly its brightest graduate students want to study at the world's best universities." [66] Similarly, the best faculty are attracted to the best universities because these institutions are more likely to have the resources to support their research and teaching. With constant replenishment of intellectual capital, performance is never static in the best universities. These institutions are not content with relying on past accomplishments but always aspire to be among the best in the world and, internally, they create an atmosphere of competitiveness that lets them do just that. All this is of course possible in contexts where the university is a completely autonomous and freestanding entity, operating in an environment that fosters competitiveness, unrestrained scientific inquiry, critical thinking, innovation, and creativity.

[65] Candidates are allowed to list 8 programs/universities in the order of their choice. They are then matched to slots in different universities by the MOHE.
[66] *Source*: *Wandering scholars*. The Economist, London: September 10, 2005, Vol. 376, Issue, 8443, p. 18.

Increased Autonomy. The recent transformation of the Ministry of Education's higher education department into a full-fledged Ministry of Higher Education marks the determination of the Malaysian government to provide effective guidance and oversight for this sector considered to be a key component of the country's knowledge development strategy. As the new Ministry gets fully established and defines its mission and functions, one of its priority tasks is to find an appropriate balance between its control and facilitation roles. Trends in governance patterns in OECD countries point to the fact that, in order to promote the development of increasingly complex and diversified tertiary education systems, governments can be more successful by steering from a distance rather than exercising too much of a direct supervisory role.[67] This governance mode can be achieved through a regulatory framework that encourages and facilitates, rather than controls, innovations in public universities and initiatives by the private sector.

Based on the analysis conducted in Chapter 3, the most critical elements that need to be revised are the rules of admission to be able to enroll the most qualified students, the capacity to offer a competitive remuneration package to attract and retain the best professors and researchers, and the ability to recruit leaders who can be at the forefront of the strategic move towards making the Malaysian universities into world-class institutions of research and learning. In addition, there is a need to relax the administrative and financial rules and controls to which public universities are required to conform in their daily management. Table 7.1 illustrates, through a comparison between Malaysia and a number of OECD countries as well as Singapore, the range of responsibilities that could be transferred to the universities in order to grant them greater autonomy.

[67] OECD (2004). On the Edge: Securing a Sustainable Future for Higher Education. Paris. Programme on Institutional Management in Higher Education.

Table 7.1 Comparison of Governance Characteristics (2005)

Category	Countries				
	NL	GB	DK	CA	MY
Appointment / dismissal of VC/President/Rector	X		X	X	
Appointment / dismissal of professors	X	X	X	X	
Academic tenure	X	X	X	X	X
Academic pay and conditions				X	
Students entry standards				X	
Selection of students				X	
Size of enrollments	X	X	X	X	
Quotas for special groups	X	X	X	X	
Language of instruction				X	
Introduction of new courses / elimination of old courses	X			X	X [1]
Selection of textbooks	X	X	X	X	X
Examination / graduation standards	X			X	X
Decision to teach courses at graduate level	X			X	X
Research priorities	X	X	X	X	
Approval of publications				X	X
Academic staff has freedom to make public statements	X	X	X	X	
Membership and control of governing council / board			X	X	
Management of university budget	X			X	
Level of tuition fees					
Approval of income generation ventures	X			X	
Own buildings and equipment	X	X		X	
Ability to borrow funds	X		X	X	

Note: X means that the university has the power to perform this function autonomously
Source: World Bank survey conducted in 2005
[1] For new programs, approval from MOHE is required

The recent higher education reform in Denmark provides a rich illustration of the types of changes that Malaysia could emulate.

Box 7.2 Higher Education Reform in Denmark: The University Act of 2003

Through reforms in four key areas—institutional autonomy, institutional leadership, quality assurance and internationalization--, Denmark is in the process of transforming its university system into an independent sector contributing to broad national success by answering more effectively to the evolving labor market that it serves.

Institutional autonomy: Increased independence for Denmark's universities. The University Act of 2003 sought to increase the deregulation of state rules and control of the educational content.

- As of 2003, all universities in Denmark are considered independent subsidiaries of the Ministry of Science, Technology, and Innovation.
- Funds are distributed based on established rates for research and on per student enrollments and completion, to establish more objective criteria for funding. Indirect costs are also subsidized, based on established rates.
- Institutions are allowed to use their complete subsidies as they deem necessary , may also seek outside sources of funding, to complement the state contributions, and may establish profit-making activities.
- Performance Contracts, first introduced in 1999, serve as a kind of contract between the government and individual institutions regarding how that institution will seek to maximize its individual strengths. These contracts allow institutions to set their own goals and determine the results that would establish whether those goals have been met, focusing on institutional excellence and results, instead of political pandering. Institutions work to their strengths, as defined by themselves, and seek successes at points where they are most competitive.

Institutional leadership. Leadership at every level is balanced within and outside:

- Governance of the institution is primarily in the purview of an external majority university Board, whose members are elected, not appointed, and include representatives from both within and outside the university, including academic and administrative staff and students.
- Each university's Rector serves at the will of the Board.
- Each campus also has at least one Academy Council, representing the academic interests of the campus staff
- Deans are hired and supervised by the Rector and in turn hire and supervise Department Heads
- Deans also establish Study Boards, composed of academic staff and students, to ensure the fair and proper "organization, realization, and development of educational and teaching activities…"

Source: Universities Act 2003, retrieved 12/14/05 from http://www.videnskabsministeriet.dk).

It is important to note that discussions on these kinds of changes are not new to Malaysia. In fact, as early as 1996, the GOM provided a legislative framework to promote greater autonomy for the public universities as part of the "corporatization" reform. The new arrangements allowed for each university to be established as a corporate body with its own constitution. This would have provided for a Board with extensive powers over the management of the university – subject in particular cases to the approval of the Minister. The Board would be responsible for financial management, the appointment of staff

including their conditions of employment, and the management of the property of the university. The Senate would have the authority over all academic matters. The Minister would be responsible for making appointments to the Board and for the appointment of the Vice-Chancellor and one or more Deputy Vice-Chancellors.

In practice the full extent of the autonomy foreshadowed by these arrangements has not been put into effect and, as discussed in Chapter 3, the GOM has retained considerable powers in relation to financial matters, staffing, tuition fees and some academic matters such as the approval of new courses. Whatever were the reasons for slower implementation of the planned path to autonomy, the GOM may want to consider the full implementation of the 1996 law in its search for the transformation of public universities into world-class institutions. It would in particular be appropriate to consider taking the 1996 law a step further to provide the Board with the authority to appoint the Vice-Chancellor and the deputies. This would bring the public universities into line with the practice in many leading universities around the world, as shown in Table 7.3. It would also allow the public universities the same managerial flexibility which exists in the private institutions.

Moving from a centrally-controlled governance mode to one that provides a facilitating framework is particularly important from the viewpoint of encouraging the universities to become more innovative and entrepreneurial and engage effectively in the kinds of partnerships with the productive sectors that are outlined in Chapter 11. A model of legal status that Malaysia could look at in this context is the British model where universities are neither public entities nor private institutions but operate as non-profit charities. This would allow the GOM to side-step the public/private dichotomy and protect the public universities from the detrimental restrictions linked to the present civil service status.

Box 7.3 Organizing Universities as Non-profit Corporate Organizations

Universities are organised in a manner that gives them a high degree of autonomy. Higher education institutions in UK share the characteristics of being: (a) legally independent corporate institutions; (b) bodies having charitable status; and (c) accountable through a governing body which carries ultimate responsibility for all aspects of the institution.
The legal status of charities gives UK universities an advantage over most other European universities with regard to university entrepreneurship and commercialisation of research. Being charities, universities are encouraged to generate funding from commercial activities, whether in the form of sales of products, consultancy, contract research, or other. A charity may generate a surplus, and retain it, but is required to use this surplus in accordance with its charitable status, which in the case of universities implies spending any surplus on research and education. Thus, in the UK, the legal framework encourages and accommodates commercialisation activities as an integral part of regular university operation, whereas in most other European countries such commercial activities are seen as problematic and is subject to considerable regulations and restrictions.

The advantage of the UK model is that universities are governed in a manner that supersedes the traditional private-public distinction. Universities are neither public, nor private, in conventional terms. They are private in the sense that they are free to generate funds from various commercial activities, but non-private in the sense that the surpluses they generate can never be paid to anyone as profits, but must always be spent on further research and education. They are non-public in the sense that they are private charities, but public in the sense that the overall aim of their activities is to serve public ends; namely research and education.

Source: Vestergaard 2005

Obviously, with greater autonomy goes greater accountability for the use of public funds. One way of ensuring accountability is through the quality assurance system that the MOHE has put in place, as will be discussed in Chapter 9. The other way is through adequate reporting on financial matters. Although it appears that this issue is adequately covered by the 1996 law, the GOM may wish to tighten some of the financial reporting requirements.

Steering from a Distance. Relinquishing control over those aspects of university operation suggested above does not mean that the role of the Ministry of Higher Education would be diminished in any way, but that it would focus on the most strategic dimensions of its mission. In particular, the MOHE has an imperative mandate to provide the overall vision for the future of the Malaysian higher education system along the lines outlined in the first section of this chapter, to establish an adequate regulatory framework that treats all higher education institutions in an evenhanded manner, and to stimulate their development through appropriate financial incentives. Table 7.2 shows the possible institutional location of key system management functions to help guide the GOM in the redefinition of responsibilities of the MOHE.

Table 7.2 Possible Institutional Locations of Key System Management Functions

Key Functions	Ministry	Buffer Body*	Specialized Agency**	Council of Rectors/ Presidents/ Vice Chancellors	Associations and lobby bodies (e.g. Unions)
Setting Vision and Goals	**X**				
Agreeing Size and Shape of System	**X**				
Licensing New Institutions	X	X	X	X	
Researching Policies and Objectives	X	X	X	X	
Setting Policies and Objectives	X			X	
Agreeing Strategic Plans	X	X			
Allocating Resources	X	X		X	
Allocating Resources for Special Programs	X	X			
Monitoring	X	X	X	X	X
Collecting Statistics	X	X	X	X	X
Assessing Quality of Teaching	X	X	X	X	X
Administering Common Entrance Exam / Tests	X	X	X	X	X
Financial Auditing	X	X			
Technical Assistance	X	X	X	X	X

Elaborated by John Fielden and Jamil Salmi.

* Examples of buffer bodies are the University Grants Council in Pakistan or Sri Lanka and the Higher Education Funding Council for England.

** Examples of specialized agencies are ICFES (responsible for the common entrance assessment) in Colombia and HESA in the UK (responsible for higher education statistics).

Note: A mark in **bold** indicates that it is essential for that function to be performed by the Ministry of Higher Education.

While the mechanisms that the GOM may consider to use financial incentives more effectively to steer the development of its universities is discussed in detail in Chapter 8, it is important to underline here the important role that the MOHE could play in ensuring a level playing field for all higher education institutions. As discussed in Chapter 2, Malaysia has a complex higher education system, comprising different types of

institutions established under different Acts, rather than a unified system that allows for diversity in institutional types and missions under a common framework, as is the case in most OECD countries. The key strategic issue therefore is the desirability of maintaining two systems of higher education or moving progressively towards one unified system with different institutions – public and private – pursuing different missions but operating within a common set of rules and accommodating credit transfer between institutions with greater flexibility. This could result in a more efficient and competitive environment that would be more effectively conducive to the pursuit of excellence in teaching and research.

Managing the Transition. Finally, in transforming these fundamental dimensions of the prevailing governance patterns and allowing public universities to operate with more autonomy, the GOM needs to consider two implementation aspects. First, it should decide on the scope and speed of reform implementation. One possible approach would be to follow the example of Japan, which recently granted increased autonomy to its 150 public universities all at once within the context of the so-called "corporatization reform". Alternatively, the GOM may want to move gradually, starting with a limited number of universities as a pilot experience, and then expanding to the rest of the sub-sector, as Thailand and Indonesia have done in the past 10 years. While the latter approach has the advantage of providing a testing ground to learn from the initial implementation phase, it has the drawback of differentiating among existing public universities by allowing some to function in a more autonomous manner while keeping the others as constrained as in the past. In a way, the creation of the three private universities sponsored by public corporations (Universiti Teknologi Petronas - UTP, Kuala Lumpur Infrastructure University College - KLIUC, and Multimedia University - MMU) could be already considered as a pilot experience that has successfully demonstrated that the public sector can establish top rate universities that operate very differently from traditional public universities while not being driven by the same profit motives as the regular private universities.

The second implementation aspect that requires special attention is the capacity building needs of the public universities. Managing a university in a fully devolved environment is a complex and challenging task involving special skills, including the ability of managing change and overcoming resistance to that change. These skills will need to be developed and extended in a system that has not encouraged them before. There will also be an immediate requirement for strengthened internal systems of management control and reporting. Planning and decision making processes may also need to be reviewed and restructured so that the newly empowered University Boards and their sub committees are properly involved in all the main strategic decisions.

Funds should therefore be set aside by the GOM for staff development, training and strengthening of management information systems that the public universities will require, and the related training needs of MOHE. The UK experience, for example, suggests that, in order to effectively promote reforms in institutional management, it is important to consider all the means of assisting and enabling the universities to improve themselves and their management capacity. When the polytechnics were given autonomy and taken

out of local government control in 1989, many of them lacked adequate staffing and processes. Over a period of 18 months extensive training and development took place and the UK Ministry of Education commissioned external management consultants and accountants to confirm that each polytechnic was in a proper state of readiness to take on its new financial responsibilities. Some of the following approaches and tools can be relied upon to help build up the management capacity of higher education institutions:

- Programs of workshops and seminars for institutional leaders and managers to meet and discuss ways of making change.

- Commissioned national training and development programs aimed at all the key professional skills such as accountants, property managers, human resource and ICT specialists.

- Provision of central funding to which institutions can bid for help with collaborative software development, use of external consultants, benchmarking exercises and exploration of good management practices.

- External audits of management capacity and skills.

- Publication of good management practice guidelines on matters such as financial strategy, strategic planning, risk management and human resource strategies.[68]

[68] For examples of these, see the publications of the English Higher Education Funding Council and their Good Management Practice program at www.hefce.ac.uk

Chapter 8. An Improved Financing Model for the Malaysian Universities

Strategic Goal: Design and implement a sustainable financing model to support the quantitative expansion and qualitative improvement of the Malaysian universities

Summary of recommendations

- *It will be difficult to achieve the GOM's ambitious enrollment expansion plan using the traditional mode of funding new public universities with government budgetary resources. A three-pronged strategy is proposed to attain the planned enrollment targets for 2010: (a) increased resource diversification in public universities, including higher levels of cost-sharing; (b) balanced growth of the university and non-university sub-sectors with clear quantitative targets; and (c) incentives for further private sector growth.*

- *To promote greater efficiency in the use of public resources, the GOM should consider applying a combination of complementary performance-based funding allocation mechanisms to distribute public resources among the universities.*

- *To guarantee equity in the higher education system, NHFEC should tighten its eligibility criteria to improve the targeting of the neediest students and reform the arrangements for loan recovery to protect the financial viability of the student loan scheme.*

Defining a Sustainable Growth Model and Mobilizing Additional Financial Resources

With only 17.7% of the Malaysian labor force holding some form of tertiary education credentials, a major challenge for the government is to further increase access to higher education in order to meet the growing social demand and fulfill the rising needs for a skilled workforce. With this in mind, the government has embarked on an ambitious expansion plan, aiming to raise the tertiary enrollment rate (17-23 age cohort) from 25% in 2000 to 40% by 2010. This would translate into a total enrollment of about 910,000 students compared to approximately 650,000 in 2005, or a 40% increase within five years.

Clearly, such a rapid growth of enrollment cannot be achieved only in the traditional mode of building and funding new public universities with government budgetary resources. Considering the prevailing constraints on further expansion of the higher education budget, this report suggests a three-pronged strategy to attain the planned enrollment targets:

- Increased resource diversification in public universities, including higher levels of cost-sharing.

- Balanced growth of the university and non-university sub-sectors with clear quantitative targets.

- Incentives for further private sector growth.

Income Diversification and Cost-Sharing

Although public funding remains the main source of support for higher education in most countries in the world, public universities have sought to complement their revenues in a variety of ways, including generating business income from institutional assets, encouraging donations from companies and philanthropists, and mobilizing additional resources from students and their families. Annex 4 provides an overview of the various income diversification mechanisms that Malaysian universities could pursue, in addition to those already practiced in the country. In that perspective, the Ministry of Higher Education could consider implementing a program of financial incentives to encourage the public universities to generate additional resources, above and beyond what they manage to mobilize presently, through continuing education programs, consultancies, research contracts, and other income generation mechanisms.

At the same time, it is important to note that, with the exception of the Scandinavian economies which have very high taxation levels, few countries in the world have been able to significantly expand their higher education system, while at the same time improving its quality, without requiring a growing financial contribution from students and their families to the cost of studies. China, for example, introduced fees in 1997 (equivalent to 20% of unit costs in undergraduate education), followed by the United Kingdom and the Czech Republic in 1998, and Austria in 2001. Tuition fees have doubled in Canada during the 1990s. The top engineering and management schools in India charge about $3,500 a year, equivalent to 7.2 times the country's per capita GDP. By contrast, the fees for Malaysian students in public universities amount to less than 10% of per capita GDP. Table 8.1 below provides some comparative data on tuition fees in a number of countries.

Table 8.1 Average Tuition Fees in Public Universities

Country / Institution	Tuition Fees (US$)	Living Cost (US$)	Total Costs (US$)
Malaysia (private)	4,000	2,600	6,600
Malaysia (public)	290	2,600	2,890
Australia	9,820	7,811	17,631
Canada	6,803	8,707	15,510
France (public)	minimal	12,906	12,906
New Zealand	7,894	10,765	18,659
Singapore	6,082	7,298	13,380
United Kingdom	15,029	11,350	26,379
United States (public)	13,478	11,321	24,799
United States (private)	23,615	12,154	35,769

The long-standing tradition, among many Malaysian families, of sending their children to study overseas, and the rapid growth of private universities in recent years, where students pay up to the equivalent of $6,000 a year, demonstrate that Malaysian students and families are willing to contribute to the cost of their education, provided they can enroll in universities perceived as offering good quality and relevant programs.

Obviously, if some or all public universities were to charge higher tuition fees, the effects on equity and access would have to be carefully considered. However, the existence and further development of the student loan program (NHEFC) should provide a mechanism to ensure that cost sharing does not have adverse equity effects, especially for students from the lowest socio-economic groups. Options for improving the operation of the student loan program are outlined in the last part of this chapter.

The political sensitivity of raising tuition fees should also be taken into consideration to avoid any backlash. This can be addressed through participatory meetings and communication efforts to create ownership among the various stakeholders and mobilize support for the proposed measures. The purpose of these consensus-building activities would be to establish a clear linkage between increased cost-sharing and the likely improvements that additional financial resources would bring about.

Box 8.1 Consensus Building and Cost Sharing in Northern Mexico

The Mexican constitution provides for free public education at all levels, and cost sharing has always been fiercely resisted by the professors and students of the country's largest public university, the National Autonomous University of Mexico (UNAM). In 1999 the university was closed for almost a year by a strike supported by the majority of its 270,000 students after the rector suggested a US$100 increase in tuition fees, from US$8 a year.

In northern Mexico, by contrast, the rector of the public University of Sonora was successful in introducing cost sharing after initiating, in 1993, a consensus-building process to explain to the staff and students the need for supplementary resources to maintain the quality of teaching and learning. After some initial resistance, including a widely publicized 2,000-kilometer march by protesters from Hermosillo to Mexico City, the students accepted the principle of a yearly payment to generate supplementary resources. A participatory process was to determine the allocation of these resources to equity and quality-improvement initiatives. Since 1994, the students have been paying an annual contribution of about US$300 for this purpose. A joint student-faculty committee administers the funds, which are used to provide scholarships for low-income students, renovate classrooms, upgrade computer labs, and purchase scientific textbooks and journals. A poster is prepared every year to disseminate information on the use of the money collected at the beginning of the academic year.

Source: The World Bank. 2002. Constructing Knowledge Societies: New Challenges for Tertiary Education. Washington D.C., p. 87.

Box 8.2 Setting the Policy Framework for Higher Education in California

California pioneered the establishment of a policy framework for a state system of higher education in the United States when it developed and implemented its first Master Plan in 1959-60. The primary issues considered at that time were the future roles of the public and private sectors and, in particular, how the public sector should be governed and coordinated to avoid duplication and waste. Major principles that emerged from the initial master plan still shape the state's system today:

- Recognition of different missions for the four components of the higher education system (University of California, California State University, community colleges, and private universities and junior colleges),
- Establishment of a statutory coordinating body for the entire system,
- Differential admission pools for the University and State Colleges,
- Eligibility of students attending private institutions for the state scholarship program.

The California Master Plan for Higher Education, which is revised about every ten years, is not a rigid blueprint to control centrally the development of California's system of higher education. Rather, it sets some general parameters, focuses primarily on the boundaries among the four sectors of higher education, and strives for a system that balances equity, quality and efficiency.

Source: OECD 1990; Clark 1990.

Balanced Growth of the University and Non-University Sub-Sectors

Even though it is not a financial measure *per se*, spreading enrollment growth across a number of different tertiary education institutions, instead of simply expanding the university sector, can be an effective strategy to implement the enrollment strategy in a more financially manageable way from a public resources perspective. In addition to protecting the resource base of the public universities by absorbing a significant proportion of secondary school graduates, the non-university institutions can make a useful contribution by offering training opportunities that respond flexibly to labor market demand.

As part of its overall tertiary education strategy, the GOM has actively and effectively promoted the expansion of the network of polytechnics and community colleges as well as other types of tertiary institutions such as the Open University. It could therefore set indicative growth targets for each sub-sector of the tertiary education system, including the polytechnics, the community colleges, the Open University and the universities, to guide public investment in the entire tertiary education system and promote a balanced growth of the various sub-sectors, as countries such as New Zealand and South Africa have done in recent years.

Box 8.3 Shape and Size Task Force on Higher Education in South Africa

With a mandate to develop broad strategies to modernize and improve upon higher education in South Africa, the Shape and Size Task force of the Council on Higher Education developed a comprehensive plan for diversifying higher education opportunities in South Africa.

The task force "made the case for higher education as a potentially powerful contributor to, and necessary condition for, achieving the goals of social equity, economic and social development and democracy" and acknowledged that "(h)igher education's primary role is to develop the intellectual and skills capabilities of our society to address and resolve the range of economic (including labour market), social, cultural, political and other challenges faced by society. It must do so at a national, regional and local level as well as contribute to the development of the continent. Higher education must also play a central role in meeting the difficult realities of international competition under the new conditions of globalization."

To meet such broad demands, the higher education system needed to be differentiated and diversified, and the Task Force recognized five particular and significant areas of South Africa's higher education system that together provide a comprehensive system to meet the needs of society.

1. Institutions dedicated to *high-quality undergraduate teaching and learning* ("bedrock institutions"), with locations around the country, providing access to urban and rural students alike. These institutions would have the broadest impact, educating the largest percentage of undergraduate students.

2. *Comprehensive post-graduate and research institutions*, providing undergraduate education as well as graduate-level coursework and degrees, to develop "high-level knowledge producers of national and international standing" across all disciplines (ibid).

3. *Specifically focused Master's and Doctoral level institutions*, providing graduate level opportunities for study and research in three specific areas: Humanities and Social Science; Commerce; and Science, Engineering, and Technology (SET).

4. *Distance education*, allowing innovations at both existing as campus-based institutions and potential distance focused institution(s) to reach more students. Such institutions should be maintained, expanded, and encouraged as a means of diversifying and modernizing the South African higher education system. These institutions could provide undergraduate and graduate training, depending upon their capacity and ability to meet national accreditation standards.

5. *Private higher education*, newly accepted in South Africa through the South African constitution and the Higher Education Act of 1997, meeting the growing demand for higher education that the public sector cannot expand to serve. Private higher education would, however, have to be subject to accreditation and regulation to assure quality and to minimize any detrimental effects it may have on the public system of higher education.

Source: Task Force, 2000, Chapter 3, Retrieved 12/22/05 from

http://www.polity.org.za/html/govdocs/reports/education/chereport3.html

For this strategy to work in the long term, it is important to maintain clear policies regarding the respective roles of both types of institutions. One of the challenges is to dispel the perception that the non-university institutions are second rate compared to the universities, while at the same time avoiding the risk of academic drift often associated with the development of non-university institutions. The transformation of the Egyptian technology institutes into regular universities in the early 1980s and the abolition of the distinction between universities and polytechnics in the United Kingdom in the early 1990s illustrate this danger.

Another challenge, in formulating and implementing a differentiated expansion strategy, is to think through the functional linkages among the various types of post-secondary education institutions that are needed to put in place a coherent lifelong learning framework. The various types of institutions should not operate as parallel, unrelated sub-sectors, but rather as complementary parts of a well-articulated system that offers multiple learning paths. In this context, student mobility could be encouraged by removing all the barriers among the segments of the tertiary education system, among institutions within each segment, and among disciplines and programs within institutions. The promotion of open systems can be achieved through recognition of relevant prior professional and academic experience, degree equivalencies, credit transfer, tuition exchange schemes, access to national scholarships and student loans, and creation of a comprehensive qualifications frameworks such as the one being established by the MOHE. Multiple pathways linking secondary education, both general and vocational, to tertiary education are also needed. Examples include remedial courses (such as those offered in community colleges) and bridge courses on fundamental subjects, particularly in mathematics and science.

Further Growth of the Private Sector

Since 1996, the Government has encouraged the development of private higher education institutions in order to increase opportunities for students without further drain on public funding. This policy has been very successful and private universities and colleges enroll today 40% of the total student population at the tertiary education level. Encouraging further growth of the private higher education sector would usefully complement the strategic approaches of resource mobilization and institutional diversification outlined above.

For that purpose, the GOM could consider the possibility of offering limited subsidies to the private sector. For example, private institutions might be given the opportunity to apply for government financial support in areas of high priority. Access to research funding on a competitive basis would provide the GOM with alternative avenues to promote research and would assist the private universities in their effort to recruit high quality staff including researchers from overseas. Subsidies could also help private institutions invest in building more expensive programs, such as engineering or medicine, which could then be offered at affordable fee levels. Financial incentives to stimulate the development of the private higher education sector can of course be only justified on the

grounds that they provide a means of expanding enrollments at lower public cost than by expanding public universities.

Finally, it is worth underlining that the proposals in this section do not represent a major departure from the present higher education strategy of the Malaysian Government. Indeed, public universities have been encouraged for many years to diversify their resources through contract research and consultancies, the development of non-university technical institutions has been an integral component of the government's expansion strategy, and the rapid growth of the private sector in the past decade has happened as a direct result of government policy to allow that sector to expand. The modifications suggested in this report are meant to complement the present strategy and to accelerate its implementation on three dimensions: (a) reinforcing cost-sharing as a source of additional income; (b) defining clear growth targets for the various sub-sectors of the higher education system; and (c) considering the desirability of providing explicit financial incentives to encourage further growth of the private higher education sector.

Relying on Performance-Based Resource Allocation Mechanisms

Aware of the desirability to move to an allocation mechanism that would stimulate a more effective use of public resources, the Ministry of Higher Education commissioned a study in 2004 to explore the feasibility of introducing a transparent funding formula.[69] Implementing the proposed scheme would be a major step towards aligning the budget allocation process with the Government's policy goals for the university sector. Formula funding can indeed provide financial incentives for improved institutional performance in relation to national policy goals. The authors of the above-mentioned study calculated that the GOM could save between 10 and 30% of the operating budget of the public universities if resources were allocated on the basis of a funding formula using unit costs benchmarked against the better performing institutions.

But formula funding is not the only method to encourage universities to respond in a more effective manner to the objectives of improved quality and relevance.[70] Over the past decade, a number of innovative allocation mechanisms that link funding directly to some measure of outputs or outcomes were designed and put in place in various parts of the world. These performance-based funding approaches differ from most other allocation approaches in the following ways:

- They attempt to reward institutions for actual rather than promised performance.

- They tend to use performance indicators that reflect public policy objectives rather than institutional needs.

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[69] Innovation Associates. 2004. "Development of a New Funding Methodology for Malaysian Public Institutions of Higher Education". Report commissioned by the Ministry of Higher Education.

[70] The proposals presented in this section draw heavily on the findings of an upcoming paper by Salmi, J. and A. Hauptman. 2006. "Innovations in Tertiary Education Financing: A Comparative Evaluation of Allocation Mechanisms". Washington DC: The World Bank.

- They include incentives for institutional improvement, not just maintaining status quo

Four types of innovative allocation mechanisms might be considered as performance-based funding:

- Performance contracts - governments enter into regulatory agreements with institutions to set mutual performance-based objectives.

- Performance set asides - a portion of public funding for universities is set aside to pay on the basis of various performance measures.

- Competitive funds, which support peer-reviewed proposals designed to achieve institutional improvement or national policy objectives.

- Payments for results - output or outcome measures are used to determine all or a portion of funding formula, for example universities are paid for the number of students they graduate, sometimes with higher prices for graduates in certain fields of study or with specific skills.

Performance Contracts

Performance contracts typically are regulatory agreements more than legally binding documents and can take a number of forms. Performance-based evaluation criteria are negotiated between governments or buffer bodies and institutions. The agreements may be with entire systems of institutions or individual institutions. All or a portion of funding may be based on whether institutions meet the requirements in the contracts. The agreements can be prospectively funded or reviewed and acted upon retrospectively. Examples of performance contracts include:

- *France* which since 1989 has devoted one third to half of the recurrent budget to 4-year performance contracts.

- *Finland* and *Denmark* which have contracts that set out general goals for system as well as specific goals for each institution.[71]

- *Colorado (US)* which as part of its new voucher scheme is setting up performance contracts that would penalize institutions that don't meet standards as part of broader reform effort that includes demand-side vouchers and fee for services.

[71] In Denmark, these contracts are called "development contracts" to reflect the long term strategic perspective.

- *Virginia (US)* which is developing contracts with its public universities in which increases in autonomy are exchanged with different reduced funding levels from the state. The Virginia example is interesting as it evolved from a request from the three best universities to exchange a reduction in public funding for greater autonomy in how public funds are spent. The final version applies to all public institutions in the state.

- Some provinces in *Spain* have recently developed an interesting variation on this model called a "contract program" as a result of the new decentralization policy which gives much more powers to the autonomous regions of the country. The first one was signed in 2005 between the autonomous government of Madrid and the six public universities operating in the Spanish capital city. This agreement combines the elements of a funding formula and a performance contract with a multi-year horizon (five years). Not only does the formula allocates resources for both teaching and research, amounting to 85% of the total, but it also provides funding against a number of policy objectives (restructuring of studies in accordance with the Bologna process, better deployment of teachers, improvement in pedagogical practices and use of education technologies, continuing education, etc.). The "contract" also includes a clause for compensatory payments to the universities less favored by the new financing model in order to reduce past disparities.

Performance Set Asides

A portion of funding for recurrent expenses is set aside to be allocated on the basis of a number of performance measures. The set aside varies from less than 5% to in some cases nearly 100% of recurrent funding. The number of indicators varies from single to multiple (as much as twelve or more). The performance measures are typically decided through negotiations between government agency or buffer body and institutional officials. The allocation of funds is not done on a formula basis. South Africa has for a number of years set aside most of its core budget for teaching, research, and other services based on multiple performance measures. This performance funding is supplemented by a competitive fund. In the US, more than a dozen states have used performance set asides over the past decade, including.

- *Tennessee* which sets aside 6% of funds based on multiple criteria - four standards and ten indicators – with each of these given a certain weight. Institutions compete against their own record.

- *South Carolina* which sets aside most of its recurrent budget to performance funding, and allocation decisions were based on a large number of performance criteria. The South Carolina experience is instructive in that it represents an extreme in performance-based funding as it decided to allocate almost its entire recurrent budget on the basis of performance measures. The general evaluation of the South Carolina experience with performance-based funding is that it failed in large part because there were too many indicators and standards and thus the signals provided to institutions were mixed and confusing.

Competitive Funds

One of the more prominent innovations in tertiary education finance over the past several decades is competitive funds which represent an alternative to the more traditional approach of categorical funds. Under such systems, institutions are generally invited to formulate project proposals that are reviewed and selected by committees of peers according to transparent procedures and criteria. Argentina, Bolivia, Bulgaria, Chile, Ghana, Hungary, Indonesia, Mozambique, Sri Lanka are examples of countries that have established competitive funds in the past decade or so, often with financial and technical support from the World Bank.

Competitive funds are typically established for the purposes of improving quality and relevance, promoting innovation, and fostering better management – objectives that are difficult to achieve through funding formulas or categorical funds. The actual eligibility criteria vary from country to country and depend on the specific policy changes sought. In Argentina and Indonesia, for instance, proposals could be submitted by entire universities or by individual faculties or departments. In Chile both public and private institutions are allowed to compete. In Egypt a fund was set up in the early 1990s specifically to stimulate reforms within faculties of engineering.

Box 8.4 The Contribution of Competitive Funds

Well-designed competitive funds can greatly stimulate the performance of tertiary education institutions and can be powerful vehicles for transformation and innovation. Argentina's Quality Improvement Fund (FOMEC) has encouraged universities to engage in strategic planning for the strengthening of existing programs and the creation of new interdisciplinary graduate programs. Within universities, faculties that had never worked together started cooperating in the design and implementation of joint projects. In Indonesia a series of World Bank projects that began in 1993 has succeeded in stimulating ownership within the entire academic community of new paradigms in tertiary education. In Egypt the Engineering Education Fund was instrumental in introducing the notion of competitive bidding and peer evaluation in the allocation of public investment resources. The fund promoted in an effective manner the transformation of traditional engineering degrees into more applied programs with close linkages to industry. The new competitive fund in Jordan has detailed guidelines which are described in an operations manual, and it relies on international peer reviewers for projects of national interest. In Chile a second wave of tertiary education reforms is being supported by a competitive fund for diversification (development of the non-university sector) and quality improvement of all tertiary institutions.

Source: World Bank (2002), pp. 104-105

A fundamental prerequisite for the effective operation of competitive funds—and one of their significant benefits—is the practice of transparency and fair play through the establishment of clear criteria and procedures and the creation of an independent monitoring committee. In countries with a relatively small or isolated academic

community, it is desirable to draw from a regional or international pool of peer reviewers to reduce the danger of complacency and subjective evaluation among a limited group of national colleagues. Use of a transnational pool is a long-standing practice in Scandinavian countries and the Netherlands. One of the added benefits of competitive funding mechanisms is that they encourage higher education institutions to undertake strategic planning activities which help them formulate proposals based on a solid identification of needs and a rigorous action plan.

International experience with competitive funds has shown the need to consider three operational questions when designing a new fund: (a) How to create a level playing field in diversified systems with strong and weak tertiary education institutions? (b) Should private institutions be eligible? and (c) Is it desirable to closely link access to funding with accreditation or similar quality assurance requirements?

In some cases there may be a compelling argument for opening several financing windows with different criteria and funding ceilings or for setting up compensatory mechanisms to increase equity among institutions. In Indonesia, for example, three different windows were designed to serve universities according to their actual institutional capacity. In a recent tertiary education project in China, the top universities were required to form a partnership with a university in a poor province as a condition for competing for resources from the curriculum reform fund. In Egypt the competitive fund in the Engineering Education Reform project had a special window for technical assistance to help less experienced engineering schools prepare well-formulated proposals. Also in Egypt, proposals that included a partnership agreement between a stronger university and a weaker one received additional points for evaluation purposes. In Chile a special window was recently opened to provide preparation funds for universities requiring assistance in strategic planning and subproject formulation.

Governments that wish to encourage the growth of high quality private institutions can use competitive funds to support investments in these institutions. A competitive fund for engineering education in the Philippines had this feature in the 1980s and ongoing funds in Sri Lanka, Chile and Ghana make public funding available to private institutions.

Finally, one of the strengths of competitive funds is that they are more likely to be effective in improving quality than broader-based approaches such as negotiated budgets or funding formulas. Therefore, one way in which competitive funds can improve quality is to link eligibility for funds to participation in the accreditation process, either on a voluntary basis (Argentina) or in a compulsory way (Chile). Another approach is to use quality improvement as a criterion in evaluating proposals and selecting recipients.

Payments for Results

There are two ways in which some countries pay for results. One approach uses some set of performance measures to calculate institutional eligibility for all or part of their formula funding of recurrent expenses. The second occurs when governments or private

entities agree to pay institutions for each student who completes a year of study or receives a degree in certain fields of study or with specific skills.

Examples of countries that have built performance into their funding formulas include:

- *England* where the recurrent expenses formula is paid on the basis of the number of students who complete each year of study.

- *Denmark* which has a 'taximeter model' in which 30% to 50% of recurrent funds are paid for each student who passes exams.

- *Netherlands* where half of recurrent funding is based on number of degrees awarded.

- South Africa where the funding formula takes both the number of students enrolled and the number of graduates into consideration.

Demand-Side Funding Allocation

While the large share of public support of higher education in most countries is provided directly to institutions, many nations also provide some portion of the public funds for tertiary education to students and their families. In Malaysia as in many other countries, substantial resources are allocated directly to students in the form of grants and student loans, as will be discussed in the next session. But one of the more innovative student-based approaches is demand-side vouchers which finance the recurrent expenses of institutions indirectly through vouchers provided to the students who chose in which higher education institution they want to study.

Demand side vouchers are so innovative that there are few examples of countries or states that use them to pay for recurrent expenses. The most prominent examples can be found in the state of Colorado (US) which began implementing a voucher scheme in 2004 to pay a portion of the recurrent expenses of undergraduates in both public and private institutions, and in the former Soviet Republic of Georgia which is in the process of introducing a similar voucher system. The recently launched Universities for All program (ProUni) in Brazil constitutes an interesting variation of a voucher scheme. Under that new program, the Brazilian government uses tax incentives to "buy" places in private universities for deserving, academically qualified low income students who were not admitted in the top public universities because of the limited number of places.

Box 8.5 The Voucher Experiment in Colorado

Under the Colorado plan, all undergraduates at public and private institutions in Colorado are scheduled to receive a uniform voucher (officially referred to as 'stipend') that covers a portion of the average cost per student at Colorado public institutions. Students then submit the voucher to the institution they choose to attend (including private institutions in the state) to be used to defray an equivalent amount of their tuition fees and related expenses. Students and their families are responsible for paying the tuition fees over and above the amount of the voucher although these costs can be covered through student financial aid with no effect on the amount of voucher received.

In the first year of the plan, the vouchers were worth $2,400 per student, which covered about half of the estimated costs of educating undergraduates in that year. The $2,400 value of the voucher was substantially below the initial estimates of the program because actual funding fell short of levels projected at the time the legislation was enacted. Colorado students attending private institutions were eligible for $1,200 in the first year of the program. The amount of tuition that voucher recipients are responsible for paying varies depending on the institution attended.

Funding of Research

To integrate its research universities into the global research community, Malaysia could consider allocating more R&D resources on a competitive basis, providing special incentives for collaborating with foreign research institutes, universities and private companies, offering special R&D funding allocations that are not tied to undergraduate enrollment, and introducing programs for attracting world class researchers and professors from abroad, much as South Korea, Singapore and China are doing today.

The experience of OECD countries indicates that one of the most effective ways of allocating research funds is to promote the development of centers of excellence at particular institutions specializing in certain fields or endeavors. Centers of excellence have the potential of improving the relevance of research if the themes on which the centers focus accurately reflect national priorities and societal needs. New Zealand and the Netherlands are examples of countries that have funded their academic research through centers for excellence. A number of states in the U.S. have also adopted this approach to supplement the research funding embedded in the core funding formula in a more specialized fashion. The China '211' project, the Brain 21 program in South Korea, and the Millenium Institutes recently established in Chile and Venezuela with World Bank funding are also examples of how countries establish or boost research centers of excellence. Table 8.2 describes the most recent "excellence" initiatives implemented throughout the world.

Table 8.2 Recent "Excellence" Initiatives

Country	Number of Target Institutions and Eligibility Criteria	Resources Allocated	Investment Horizon
Germany Excellence Initiative 2005	• 40 graduate schools • 30 Clusters of Excellence (universities and private sector) • 10 Top-level research universities	$2.3 billion in total	Five year funding Two rounds: 2006, 2007
Brain Korea 21 Program	• Science and Technology: 11 Universities • Humanities and Social Sciences: 11 Universities • Leading Regional Universities: 38 Universities • Professional Graduate Schools: 11 Universities	$1.7 billion in total	7 years Two rounds in 1999
Japan Top-30 Program (Centers Of Excellence for 21 Century Plan)	31 Higher Education Institutions	$150 million a year	Launched in 2002
China 211 Project **Canada Networks of Centers of Excellence**	100 higher education institutions 19 currently funded Networks of Centers of Excellence 15 previously funded Networks	$18 Billion in 7 years $77.4 million a year since 1999 $47.3 million a year in 1997-1999 $437 million in total in 1988-1998	Launched in 1996 Operating since 1988 Permanent program since 1997
UK Funding for Excellent Units	Higher education institutions with the highest marks after the Research Assessment Exercise	$8.63 billion disbursed after 2001 RAE	Two rounds: 1996 and 2001
Chile Millennium Science Initiative	Groups of Researchers:	3 Science Institutes: $1 million a year for 10 years; 5-12 Science Nuclei: $250 thousand a year $25 million in total in 2000-2004	Every 5 years for nuclei and every 10 years for institutes

In summary, there is a large range of resource allocation mechanisms that the GOM may consider to pursue its policy objectives for higher education development. The experience with performance-based allocation mechanisms in various countries over the past decade or more suggests that tying policies to results can have many beneficial effects. It also indicates that rather than relying exclusively on one funding method,

countries are better off selecting a mix of allocation instruments to meet the various policy objectives sought as long as these instruments complement each other. Annex 6 presents an assessment of different allocation mechanisms to help visualize their relative contribution to various policy objectives such as expansion, quality improvement, efficiency and sustainability.

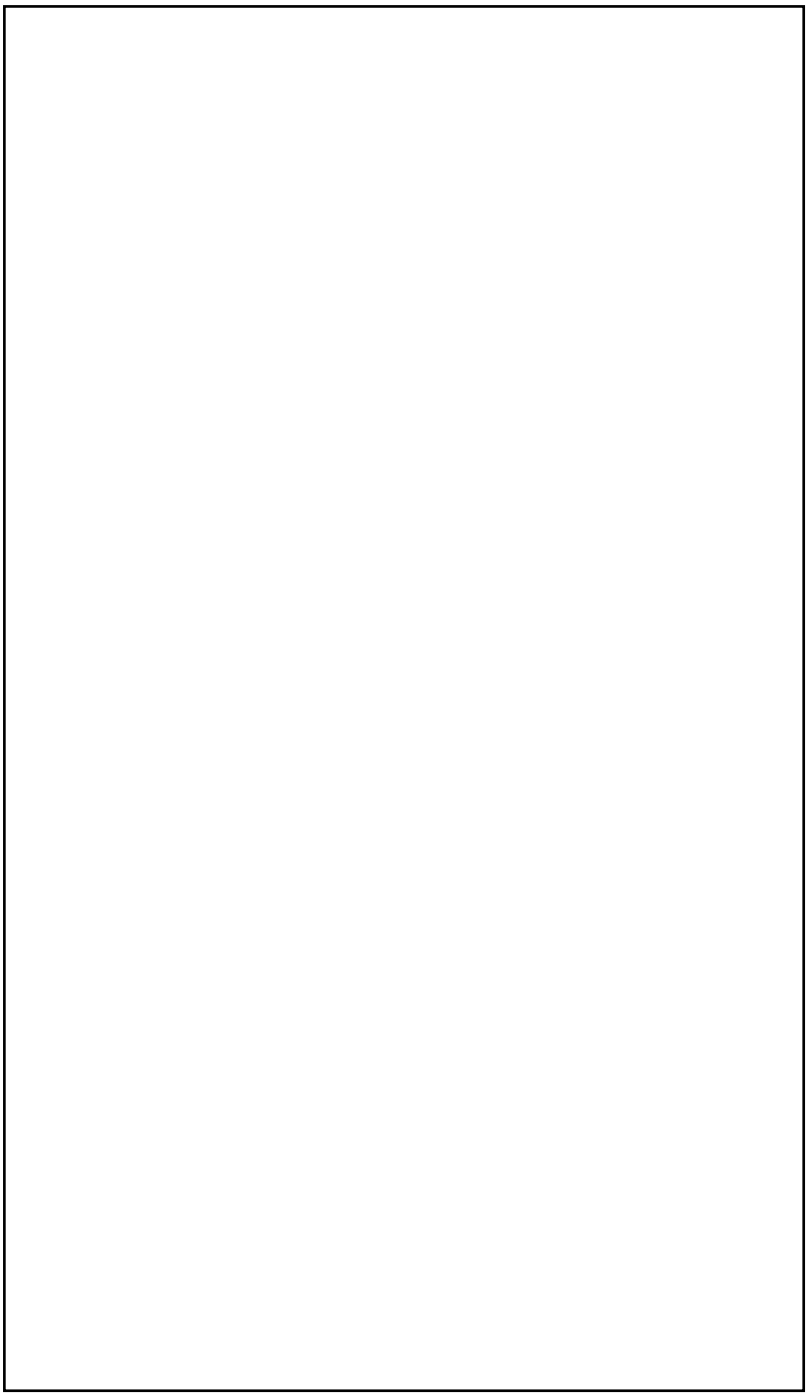
Guaranteeing the Financial Sustainability of the Student Loan Scheme

The GOM has endorsed the fundamental equity principle that no academically qualified student should be denied access to higher education for lack of financial resources. As the public universities move towards greater cost recovery and the private higher education sector continues to expand, the existence of the national Student Loan Agency, NHFEC, is the main guarantor of equity in the Malaysian higher education system. Making sure that NHFEC operates as an efficient and viable agency is therefore of crucial importance.

Considering the shortcomings documented in Chapter 3, a number of adjustments need to be made to the loan program to ensure efficiency and financial sustainability. To begin with, the eligibility criteria need to be tightened by placing an income ceiling so as to make sure that only students from low and middle income families benefit from the subsidized loans. In that regard, the proposal under consideration to ask the parents of new loan applicants to sign some kind of co-guarantee agreement should not be linked to assets ownership. Otherwise it would introduce a bias against students from low income families. The Student Loan Agency in the Northern State of Sonora in Mexico, ICEES, has been able to improve loan recovery in a major way by requiring parents of loan applicants to participate in a formal co-guarantee signature ceremony that does not involve any financial guarantee but has a highly symbolic signification. NHFEC could also make tuition fee payments directly to higher education institutions instead of giving the money to the students, to avoid the use of loan money for purposes other than educational. The loan amount for diploma students should be sufficient to cover actual tuition fees for their programs.

In order to improve loan recovery, NHFEC will need to reexamine its administrative arrangements, including finding more effective methods to locate students (computerized MIS, use of social security number, link to degree award ceremony, etc.) and enforcing stricter sanctions against delinquent graduates such as relying on a collecting agency to garnish part of their income and reflecting a graduate's loan repayment history to his/her credit rating. Alternatively, the Inland Revenue Office, which in theory is in charge of student loan collection, could be tasked by the GOM to be fully responsible for loan recovery performance. As an overall recovery target, the GOM could take as benchmark the Australian experience with the Higher Education Contribution Scheme, where the level of repayment matched the level of new loans after 10 years.

Another factor that may improve loan recovery is to program the repayment schedule in line with the natural evolution of salaries. Relying on graduated payments or making payments proportional to earnings as in the UK and Australian schemes, instead of fixed



Chapter 9. Improving the Quality of Teaching and Learning

Strategic Goal: To upgrade the quality of learning and research in Malaysian universities

Recommended Actions:

While quality education may be defined in terms of internationally accepted criteria and standards for academic programs and educational experiences, a "world-class" education implies achieving a much higher threshold of quality where academic performance and output are measured relative to a league of very elite institutions.

Universities that consistently top the list in various international ranking competitions are the ones whose faculty make significant contributions to the advancement of knowledge through research, who teach using most innovative curricula and methods under most conducive circumstances, who make research an integral component of undergraduate teaching, and whose graduates stand out because of their success in intensely competitive arena during their education but more importantly, after graduation. It is the international reputation of universities in promoting these achievements that make them world class. Moreover, it is the degree of their dynamism and the rate with which they foresee new challenges and are able to respond to them that sets them apart from the rest.

To move towards international recognition, the GOM has rightly taken the first step to determine where its system and institutions stand today (in relation to other world class universities) and what support is needed to enable them to compete at an international level. Key areas of change to consider include:

- *Start with a mutually agreed upon definition of "quality" and determine what indicators will be used to measure quality and academic performance at a "world class" level. Use benchmarking at the program level with international institutions to fine-tune identified indicators and measures.*

- *Ensure that Malaysian universities complement each other in terms of their mission, priorities, and academic orientation at the national level and regional levels if necessary. Encourage universities to pursue diverse missions so that they are able to* **respond to the changing needs of their constituencies.**

- *Give complete autonomy to public universities and expect full accountability in return. Empower these universities to make independent decisions about their mission, governance, hiring of their academic leaders, academic and non-academic staff, selecting students, and introducing new programs and courses.*

- *Ensure that the general context and governance structures create a climate that upholds academic values including autonomy, freedom of expression, collegiality, integrity, and lack of discrimination.*

- *Target programs/institutions that have potential of achieving world-class status and reinforce their capacity accordingly.*

- *Evaluate socio-economic and cultural policies in light of aspirations and consider alternative policies that may reinforce the aspiration of universities to achieve academic excellence nationally and internationally.*

- *Develop a capacity to compile and analyze data on all aspects of higher education. Make the output of such analysis and raw data available to all institutions to utilize in their own short and long-term strategic planning and decision-making.*

Understanding Malaysia's Place in the World Rankings of Universities: an Operational Definition of Quality

The distinction between quality education and world-class education requires some elaboration. While quality education may be defined in terms of internationally accepted criteria and standards for academic programs and educational experiences, a "world-class" education implies achieving a much higher threshold of quality where academic performance and outputs are measured relative to a league of very elite institutions.

Having a clear vision of what it is that gives a particular university or program the attribute of being world-class will enable the GOM and, with increased autonomy, the universities to decide what fundamental changes need to be made and how best to prioritize and use resources to achieve international recognition.

To move in this direction, the GOM has rightly taken the first step of determining where its system and institutions stand today and what support is needed to enable them to compete at an international level. Issues concerning governance and autonomy, decentralization, performance based resource allocation, and equity will necessarily frame the discussion for change and these are addressed at length in other reports. These issues are also inextricably linked with issues related to quality and relevance addressed more directly in this chapter.

The quality of education of Malaysian universities can be established by using criterion referenced and/or norm referenced benchmarks[72] on a range of dimensions including

[72] Criterion referenced approach sets the parameters of good practice in an area. The system or university then establishes its level of success by determining whether those criteria have been achieved. The Standards elaborated in the *Guidelines on Standards of Specific Disciplines at the Bachelor Degree Level, Volume 1* are criterion benchmarks. Norm referenced benchmarks are performance standards relative to others and as such, they foster competition. If Malaysian universities were to benchmark various aspects of their performance against the best performing universities, they would be using norm referenced benchmarking.

governance and academic leadership, external impact, teaching, students, academic programs, research, and infrastructure. This range of dimensions makes it possible to get a measure of how the system is set up (input variables), the way it functions and its internal efficiency (process variables), and its productivity and impact (output variables)[73] relative to a set of standards and/or relative to the performance of other universities and programs. Various media and other agencies that conduct comparative rankings place different levels of emphasis on variables selected for comparison. Some rankings are done within a class of universities[74], allowing institutions with various missions and orientation to compete on a level playing field.

Table 1 in Annex 7 shows the indicators used in rankings carried out by *The Times, Financial Times, US News and World,* and *Asiaweek*. In contrast to this long list, the ranking exercise performed by the *Shanghai Jiao Tong University (SJTU)* and the *Times Higher Education Supplement (THES)* use a very limited and rather exclusive set of indicators. They pertain primarily to the output of academic work including the quality of graduates and their success as well as the output of research and its impact on the advancement of knowledge. Table 2 in Annex 7 compares the indicators used by the *Shanghai Jiao Tong University (SJTU)*, the *Times Higher Education Supplement (THES)* and *Asiaweek*. Finally, Table 3 in Annex 7 shows the indicators used in the annual ranking of Canadian universities carried out by the weekly news magazine, Maclean's. It is worth noting that across different ranking exercises, indicators most frequently used are: (a) faculty credentials, in particular, their research productivity and the impact of their publications; (b) student selectivity; (c) faculty/student ratios; (d) the importance given to alumni, their accomplishments, and their contributions following graduation; and (e) reputation as viewed by peers.

There are some data concerning the performance of Malaysian universities in international rankings which point to areas in need of substantial improvement if the quest for quality and excellence is to be realized, For instance, in the 2004 ranking by *THES*, two Malaysian universities, Malaya University and Universiti Sains Malaysia ranked 89th and 111^{th,} out of 200, respectively. The relative low standing was primarily because of the low scores they received on the "Citations/Faculty" indicator. I n the 2005 rankings of the *THES*, Malaya University dropped to 169th out of 200 and Universiti Sains Malaysia did not make the list at all. In 2006, Malaya University's ranking further dropped to 192 whereas the University of Kebangsaan Malaysia moved up from being 289th in 2005 to 185th in 2006. Despite this seemingly significant leap, it can be asserted that a salient trend is that all Malaysian universities that have appeared in international

[73] Examples are: input variables (e.g., autonomy in governance, resources allocated, CGPA of admitted students, qualifications of faculty, available budgets, types of programs, etc.), process variables (e.g., methods of instruction and assessment, educational experiences of students, etc.), and most importantly, outcome variables (e.g., graduate employment rates, number of awards won by students and faculty, number of publications, etc.).

[74] Maclean's weekly news magazine which performs an annual ranking of Canadian universities places them in one of three categories: primarily undergraduate, comprehensive, and medical-doctoral. The Carnegie classification of universities will release five new classification schemes for use by the higher education community on November 17, 2005. The new classifications will include all accredited, degree-granting, non-specialized institutions of higher education in the United States.

rankings have scored very low on faculty citations. Looking back at the regional rankings of *Asiaweek* (2000), the 4 Malaysian universities that were ranked in the top 60 also received low scores for Research (citations) as well as for Financial Resources (internet bandwidth) indicators (Table 4). This suggests that low research output and impact has persisted over time and has not contributed in any way to the reputation of Malaysian universities. This is one area that needs to be addressed directly and effectively.

Table 9.1 Malaysian Universities' Performance on 2 Key Indicators in Asiaweek's 2000 Rankings

University	Rank	Research/Citations (20%)	Financial Resources/Internet bandwidth (10%)
Technological University	30	1.72/0.01	0.83/0.13
University of Malaya	47	2.14/0.12	2.00/0.09
Putra	52	3.37/0.10	1.05/0.06
Science Malaysia	57	1.39/0.12	2.00/0.09

Source: http://www.asiaweek.com/asiaweek/features/universities2000/schools/multi.overall.html. Retrieved October 14, 2005.

In Tables 9.2 and 9.3, comparative scores from the *THES* 2005 and 2006 for the top overall ranked university (Harvard), the top publicly funded university (Cambridge), the top ranked publicly funded Canadian university[75] (McGill), Malaya University, and 4 other Asian universities are presented. The drop in Malaya University's standing from the 2004 ranking can be in part attributed to extremely low scores obtained on two indicators: recruiter review[76] and citations per faculty. It is worth noting that the Asian universities that have received overall high rankings, have also scored highly on these two indicators.

[75] Universities in Canada are primarily funded by provincial governments. For instance, more than 1/3 of McGill's 2004-2005 operating budget of $914,873,000 comprised grants from the Quebec and other Governments. Further details can be found at http://www.mcgill.ca/about/quickfacts/financial/.

[76] The "recruiter review" is a new indicator introduced in the 2005 ranking which reflects the opinion of employers (financial institutions, airlines, manufacturers in areas such as pharmaceuticals and the automotive industry, consumer goods companies, and firms involved in international communications and distribution) about the quality of graduates.

Table 9.2 Comparative Ranking of Selected Universities in the 2005 THES Ranking

University (ranking)	Peer Review (40%)	Recruiter Review (10%)	Int'l Faculty Score (5%)	Int'l Student Score (5%)	Faculty/Student Score (20%)	Citations/ Faculty (20%)
Harvard (1)	100	100	17	23	21	57
Cambridge (2)	96	73	65	34	20	16
Beijing University (15)	71	37	7	4	26	0
National University of Singapore (22)	62	12	94	45	8	7
McGill University (24)	52	48	33	31	23	8
Hong Kong University (41)	43	19	82	21	17	4

Comparing the performance of Malaya University in the 2005 rankings against top ranking universities of 4 other emerging economies of Asia, the following observations can be made:

a) Other than the National University of Singapore that has scored better than average (amongst its immediate peers) on almost all 6 indicators, the others have achieved their overall high status due to receiving relatively high scores on some indicators. For example, Beijing University has received a high score on "peer review", "recruiter review", and "faculty/student ratio".

b) While Malaya University's performance in relation to its immediate peers is better on two indicators that measure the presence of international faculty and students, its score of "0" on "recruiter review" warrants a closer analysis. One possible explanation for this rating is that in relation to its peers in this table, Malaysia has not yet become a major outpost for the operation of multinational companies.

Table 9.3 Comparative Ranking of Selected Universities in the 2006 THES Ranking

University (ranking)	Peer Review (40%)	Recruiter Review (10%)	Int'l Faculty Score (5%)	Int'l Student Score (5%)	Faculty/Student Score (20%)	Citations/ Faculty (20%)
Harvard (1)	93	100	15	25	56	55
Cambridge (2)	100	79	58	43	64	17
Beijing University (14)	70	55	5	11	69	2
National U. of Singapore. (19)	70	44	82	47	22	8
McGill University (21)	57	61	31	33	52	10
Hong Kong University (33)	48	40	84	27	46	6
U. of Kebangsaan (185)	32	22	9	6	25	0
Malaya University (192)	33	14	10	7	24	1

In the 2006 rankings, the most salient observation is that the ratings received on the citation indicator for both Malaysian universities continues to be a major factor with a negative influence on overall ranking.

Universities that consistently top the list in various international ranking competitions are the ones whose faculty make significant contributions to the advancement of knowledge through research, who teach using most innovative curricula and methods under most conducive circumstances, who make research an integral component of undergraduate teaching, and whose graduates stand out because of their success in intensely competitive arenas during their education but more importantly, after graduation. These graduates: (a) have mastered specialized knowledge and can apply that knowledge to practice; (b) have developed complex cognitive abilities (e.g., analytical thinking, problem-solving, reasoning, etc.), strong communication skills in more than one language, and literacy in the use of technologies; (c) have the desire and ability to engage in life-long learning; and (d) will be able to make meaningful contributions to the advancement of their local community, their country, and the world. It is the international reputation of universities in promoting these achievements that make them world class. Moreover, it is the degree of their dynamism and the rate with which they foresee new challenges and are able to respond to them that sets them apart from the rest.

International university league tables do not take into account differences between publicly and privately funded systems nor do they accommodate for diversity of mission, context, and organizational structure. For these and other reasons they are often criticized as being unfair. The reality, however, is that ranking exercises are happening whether universities are willing participants or not and in this era of internationalization, it simply is not to the advantage of universities to be a player on the edges of the global scene. As flawed as the methodologies of ranking exercises might be, they do provide a measure of overall comparative performance and in the absence of a better scheme, have a significant impact on the international reputation of institutions involved.

Academic programs, teaching, and student learning

Academic Programs

In countries such as Canada where universities have complete autonomy in their governance, decisions concerning the content of academic programs are made internally and with the approval of various institutional bodies including the Senate. The creation of a *new degree*, however, has to be approved at the provincial level by the respective Committee of Presidents/Principals. Periodic program reviews conducted by internal and external peers ensure that academic and administrative standards are met. One of the advantages of such setups is the ability of the institution to position itself in a timely manner in niche areas and respond quickly to what it perceives as growth areas and R and D opportunities.

Thus, in considering improvement in academic programs, minimally, a number of questions should be addressed:

- To what extent does a given academic program compare with similar programs in the best universities with respect to the rigour applied for course and program approval, course or program content, complementary resources and support infrastructure (laboratories, libraries, instructional material and media), and credit value?

- How responsive are programs/courses to new and emerging demands and to what extent is new and cutting edge research integrated into the course/program content?

- How relevant is the knowledge and skills gained by students to professional practice and to the needs of the labour market?

- How do others (international and national institutions) view the quality of a given academic program and to what extent are they willing to accept programs/courses as equivalent to what they themselves offer?

The overall system governance structure would want to ensure that:

a) Universities are given complete autonomy in determining the scope and breadth of their academic programs.

b) Institutions embrace and apply the highest standards of integrity to uphold the credibility of courses and programs.

c) Programs and curricula, especially in professional fields, take into consideration the needs of industry and the private sector.

d) Libraries, existing technologies and media, and physical space support and complement academic programs and enable students attain specified outcomes.

e) Academic programs are reviewed systematically by external and international peer reviewers as part of a QA cyclical review and/or institutional performance assessment exercise.

Language of instruction

Interviews with faculty and students carried out for the purpose of this report also convey a strong preference for designating English as the language of instruction. Although all individuals who participated in the interviews had an excellent command of spoken English, a world-class performance would require that graduates and faculty also have the facility to consume the scientific literature, most of which is in English, and more importantly to make significant contributions to this literature in their respective disciplines.

Teaching

Teaching quality and methods of delivery

Stakeholders of all universities worldwide, including students, parents, governments that fund universities, and the popular media use every opportunity to communicate to universities that they expect graduates to be able to think and reason, work in teams, and learn on demand during a life-time. To ensure the success of all students and to foster learning that goes far beyond mastery of content, the best universities ensure that their staff are enthusiastic experts in their field, have pedagogically relevant skills, and are well supported in their teaching. These universities also ensure that their instructional environment, equipment, and infrastructure supports and enhances the delivery of quality teaching.

As Malaysian universities move to become world-class institutions, they should encourage and support innovative approaches to teaching, in particular at the undergraduate level. A measure of quality is the extent to which senior researchers and academics are involved in the teaching of undergraduate courses.

Box 9.1 Importance of Undergraduate Teaching

When Andrew Chi-chih Yao, a Princeton professor who is recognized as one of the United States' top computer scientists, was approached by Qinghua University in Beijing last year to lead an advanced computer studies program, he did not hesitate… Dr. Yao said he had expected to concentrate on creating a world-class Ph.D. program but had found surprising weaknesses in undergraduate training and had decided to teach at that level. "You can't just say I'll only do the cutting-edge stuff," he said. "You've got to teach the basics really well first."

Quoted from the New York Times, October 28, 2005

One of the innovative approaches to teaching undergraduates that is currently being adopted in the top research intensive universities of North America is based on Ernest Boyer's vision which advocates the integration of research in undergraduate teaching.[77]

The University of British Columbia, for instance, is promoting "research-based learning", an approach linking undergraduate students to research teams with extensive reliance on information technology for basic course information.

Another key aspect of curriculum reform has to do with the ability of universities to organize traditional disciplines differently, taking into consideration the emergence of new scientific and technological fields. Among the most significant ones worth mentioning are nanotechnology, molecular biology and biotechnology, advanced materials science, microelectronics, information systems, robotics, intelligent systems and neuroscience, and environmental science and technology. Training and research for these fields require the integration of a number of disciplines which have not necessarily been in close contact previously, resulting in the multiplication of inter- and multidisciplinary programs cutting across traditional institutional barriers. For example, the study of molecular devices and sensors, within the wider framework of molecular biology and biotechnology, brings together specialists in electronics, materials science, chemistry and biology to achieve greater synergy.

[77] Boyer was the President of Carnegie Foundation for the Advancement of Teaching until his death in 1995. Prior to that he was the Chancellor of State University of New York and U.S. Commissioner of Education. His paper is entitled *Reinventing undergraduate education: A blueprint for America's research universities* and is available from <http://naples.cc.sunysb.edu/Pres/boyer.nsf/>.

Box 9.2 Integrating Research into Undergraduate Teaching and Learning

Many students graduate having accumulated whatever number of courses is required, but still lacking a coherent body of knowledge or any inkling as to how one sort of information might relate to others. And all too often they graduate without knowing how to think logically, write clearly, or speak coherently. The university has given them too little that will be of real value beyond a credential that will help them get their first jobs. And with larger and larger numbers of their peers holding the same paper in their hands, even that credential has lost much of its potency.

By admitting a student, any college or university commits itself to provide maximal opportunities for intellectual and creative development. These should include:

- Opportunities to learn through inquiry rather than simple transmission of knowledge.
- Training in the skills necessary for oral and written communication at a level that will serve the student both within the university and in postgraduate professional and personal life.
- Appreciation of arts, humanities, sciences, and social sciences, and the opportunity to experience them at any intensity and depth the student can accommodate.
- Careful and comprehensive preparation for whatever may lie beyond graduation, whether it be a graduate school, professional school, or first professional position.

The student in a research university, however, has these additional rights:

- Expectation of and opportunity for work with talented senior researchers to help and guide the student's efforts.
- Access to first-class facilities in which to pursue research—laboratories, libraries, studios, computer systems, and concert halls.
- Many options among fields of study and directions to move within those fields, including areas and choices not found in other kinds of institutions.

Source of quotation and to download document: http://naples.cc.sunysb.edu/Pres/boyer.nsf/

Box 9.3 McGill: An Example of a World Class Multi-Disciplinary Program in Environmental Studies

When it comes to environmental problems, there are no simple solutions. Besides the physical and biological aspects, each environmental issue has cultural, economic and ethical dimensions as well. That is why approaching environmental issues from a single vantage point rarely works. Three McGill faculties -- Agricultural and Environmental Sciences, Arts, and Science -- have pooled their resources to create the McGill School of Environment (MSE). Over 100 faculty members from are contributing in some way to the School. MSE programs of study bridge the boundaries between disciplines. Each approaches the environment from many dimensions -- never from a single point of view. Thus students become schooled in viewing environmental issues through multiple lenses. The result? Graduates with novel and powerful perspectives enabling them to view, analyze and resolve current and future environmental issues.

Source of quotation: McGill University website <http://www.mcgill.ca/mse/

The new patterns of knowledge creation do not imply only a reconfiguration of departments into a different institutional map but more importantly, imply the reorganization of research and training around the search for solutions to complex problems, rather than the analytical practices of traditional academic disciplines. This evolution is leading to the emergence of what experts call "transdisciplinarity", with distinct theoretical structures and research methods.[78]

Other examples of innovative implementation of curricula include co-op programs that integrate in-school and on-the-job training in a systematic way. For example, Waterloo University in Western Ontario has earned a high reputation for its cooperative programs in engineering, and is considered among the best in the country.

Another important pedagogical innovation that Malaysian universities could consider would be to design and implement problem-based learning programs, especially in engineering. Problem-based curricula have been successfully implemented at McMaster University in Ontario, Canada, and the University of Maastricht in Holland who were among the first universities to introduce problem-based learning in their medical and engineering programs. The positive experience of the Multi Media University in Cyberjaya could be considered as a successful model implemented within the country with the potential of being duplicated in other Malaysian institutions.

[78] Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., and M, Trow (1994). *The New Production of Knowledge: Science and Research in Contemporary Societies*. London: Sage.

Box 9.4 Waterloo University: An Example of a World-Class Co-op Program

The co-op program at Waterloo gets top billing in the university's promotional material. With 3,600 participating employers, Waterloo channels some 11,000 students annually into a work-study system that has defined the university from its inception. The engineering program is probably best known-all of its students log time on the job before graduating. But co-op is by no means restricted to technical programs. Simon Lewchuk, a 21-year-old honors arts and business student, took a placement with the Ontario Federation of Agriculture, where he lobbied for farmers and even sat in on meetings with cabinet ministers. And last summer, Erin Betts, a 23-year-old political science major, taught health-education courses with the Red Cross in Guyana, knowing it would provide practical experience for a career in international development. "You don't have to be in a certain field to apply for a certain co-op job," she says. "The system is really good that way."

Source of quotation: Maclean's Magazine, November 15, 2004.

Box 9.5 Aalborg University: An Example of a World Class Program Based on Problem-Solving

Technological development in an ever more globalized world has created a demand for engineers who are oriented towards a global market, have the ability to be involved in interdisciplinary professional and intercultural teams, and who possess lifelong learning competencies. This results in a need for educational programs, which provides engineering graduates with new types of process-oriented and global competencies. The study form at AAU [Aalborg University in Denmark] is an example of such an educational program. In this master program [MPBL], AAU is now offering an opportunity to gain theoretical and practical competence of problem based learning. The MPBL is offered by UNESCO International Centre for Engineering Education - Centre for Problem Based Learning (UCPBL) which is hosted by the Faculty of Engineering and Science, Aalborg University (AAU).The MPBL is a two-year part-time program, organized as technology-supported distance education. This makes the program flexible in a way that enables you to participate no matter where you live worldwide.

Source of quotation: Aalborg University website <http://www.mpbl.aau.dk/pbl/>

Realigning universities on the basis of inter- and multi-disciplinary learning and research themes does not imply only changes in program and curriculum design, but also significant modifications in the planning and organization of the laboratory and workshop infrastructure. From the Georgia Institute of Technology comes a successful experience in developing an interdisciplinary mechatronics laboratory serving the needs of students in electrical, mechanical, industrial, computer and other engineering departments in a cost-effective manner.[79] A unique partnership bringing together Penn State University,

[79] Mechatronics is "the synergistic combination of precision mechanical engineering, electronic control, and systems thinking in the design of products and manufacturing processes." The case-study is described

the University of Puerto Rico-Mayaguez, the University of Washington and Sandia National Laboratories has permitted the establishment of "Learning Factory" facilities across the partner schools which allow teams of students from industrial, mechanical, electrical, chemical engineering and business administration to work on interdisciplinary projects.[80]

To conclude this section, there is evidence that similar innovations in teaching and collaboration with industry are not beyond the reach of Malaysian universities. For instance, University Science Malaysia has been actively promoting inter-disciplinary programs to support this type of university-industry collaboration and, in this regard, it can be seen as a leader in the country. Similarly, MMU and CosmoPoint College of Technology have been able to establish links with companies in the Multi-media Super Corridor and place their students through an active internship program to gain field experience. This often leads to employment opportunities for the students following graduation.

If universities want to make their curriculum relevant to workplace needs, they must forge strong links with potential employers both in the public and private sector in order to create relevant and experiential learning opportunities for their students. This is one way that they can pave the way for the future employment of their graduates.

Evaluation of teaching

One of the most important gestures of universities that are recognized for their teaching quality has been the creation of policies and the dedication of resources to support the development, formal assessment, recognition, and rewarding of good and innovative teaching.

The most common form of teaching evaluation used across the board internationally is student course ratings. Other common mechanisms include the use of teaching dossiers or portfolios, and evaluation by peers, chairs, and deans. These are used as a formative measure, to improve teaching, and summatively, to render judgment about teaching performance for administrative purposes such as tenure, promotion, and salary increase decisions. More recently, teaching evaluations are used by students to make choices at the time of course selection.

Policies and initiatives for the improvement of teaching and learning vary in different countries to fit political governance and to respect institutional autonomy. A range of these initiatives in Australia, the UK, and Canada is presented in Table 9.4 below.

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in Arkin, R., Lee, K-M., McGinnis, L., and C. Zhou (1997*). The Development of a Shared Interdisciplinary Intelligent Mechatronics Laboratory*, Journal of Engineering Education. April 1997, pp.113-118.

[80] Lamancusa, J., Jorgensen, J., and Jose Zayas-Castro (1997). *The Learning Factory—A New Approach to Integrating Design and Manufacturing into the Engineering Curriculum*, Journal of Engineering Education. April 1997, pp.103-112.

Table 9.4 Teaching and Learning Improvement Initiatives

External Incentives to Improve Teaching in Australian universities following the Higher Education Support Act (2003)	Initiatives in the UK spearheaded by the Higher Education Academy, an independent organization supported by universities	Institutional and national level initiatives in Canada
National Institute for Learning and Teaching in Higher Education	Institutional support in strategic planning and in leading the development of research and evaluation to improve the quality of the student learning experience	Prestigious National Teaching 3M award, coordinated by the Society for Teaching and Learning in Higher Education
Learning and Teaching Performance Fund	Subject matter and staff development, by leading and informing professional development activities, recognition of staff in higher education, and by promoting good practice quality information, advice and resources	Teaching Development Fund available on a competitive basis at institutional level
The Australian Awards for University Teaching	An authoritative and independent voice on policies that influence the quality of teaching and learning in higher education	Teaching Development units in almost all Canadian universities Salary increase, tenure, and promotion policies contingent upon quality teaching as evidenced by teaching portfolios and student course ratings. Teaching awards at Faculty as well as institutional levels

Students and student learning

Path of entry to university

The quality of students entering a university is an indicator that appears on almost all international rankings (See Appendix III) and the ability of universities to select their students from the largest possible pool of applicants is one way of ensuring that they get the best academically qualified students in their system.

Box 9.6 Formal Comparison and Ranking of Students Using Standardized Scores

In Québec, Canada, students entering universities from different colleges (Cégép) do so on the basis of an R score, or CRC (Cote de rendement collégial), which is a method of comparing and ranking students. The R score does this by measuring how far above or below the class average a student places by looking at the class average and the standard deviation, or grade spread. The value arrived at is then adjusted according to the relative strength of the group by looking at the weighted results of all the courses taken in Secondary IV and Secondary V by all the students making up the class. The R score is calculated for all courses except high-school make-up courses, Physical Education courses and courses with less than 6 students in a section. The R score is expressed by a number that can range from 1-50 although most R scores fall within the range 15 -36. The R score average is the weighted cumulative average of all the individual R scores. The weighting is a function of the number of credits attributed to each course. The R score is calculated by the Ministry of Education and accessed by the Registrar's Office on behalf of students.

Source: Vanier College website. Retrieved October 15, 2005 from: http://www.vaniercollege.qc.ca/advising/rscore.html.

Student progress and retention

Time to program completion is one of the indicators that good universities and most ranking exercises use to monitor progress and the internal efficiency of the system. A strong benchmark in this regard is that 95% of students complete their program within the specified period of time. Systematically compiled time-series data from different cohorts will be necessary to get an accurate picture of whether student progress is in line with the best international standards. Moreover, in an ethnically diverse system such as Malaysia, in addition to overall data, it would be useful to have data on different ethnic groups as well as international students to discern any variances that may exist between groups.

Another measure that universities use to follow student progress is first to second year retention rates. From interview data, it appears that retention is not a major problem in Malaysian universities. Nonetheless, a close examination of trends is still warranted as it could reveal particular patterns in program areas and this could alert the responsible entities to redress the situation in a timely manner and before it adversely influences student experiences.

Student learning experiences

In order to enhance the learning experience of incoming students as the student population expands, Malaysian universities should consider organizing First Year Experience Seminars which have been found, in other contexts, to greatly facilitate student transition from high school to university as well a-s quickly integrate the new students into their intellectual community of the university. There is ample international

evidence that the quality of the first year experience is a crucial factor affecting retention, completions and overall student satisfaction.

Box 9.7 Examples of First Year Seminars at Berkeley and Sydney Universities

Freshman Seminar Program was launched at the University of California at Berkeley in 1992. Virtually every campus department and academic unit is offering at least one seminar course each semester. This program is designed to provide an opportunity for small groups of entering students to work with faculty members on scholarly topics of mutual interest in a casual environment. Enrollment is limited to 15 for freshman seminars. UC Berkeley offers a $2,000 research stipend to all professors teaching a seminar in addition to their regular teaching load.

One of the goals of the University of Sydney's Strategic Plan is to provide high quality undergraduate teaching to enhance student learning. The University is therefore committed to enhancing the First Year Experience (FYE) of its undergraduate students on a number of levels…The Institute for Teaching and Learning (ITL) is working with faculties, departments, staff and students across the University to ensure the quality of students' academic orientation and transition and to implement four principles relating to the First Year Experience:

- Students will be familiarized with the University's physical environment, academic culture and support services.
- Students' sense of purpose and direction will be developed by promoting their understanding of what their courses involve; where their course will lead them; and what their learning in those courses will involve.
- Students' engagement with the University, including with their peers, will be promoted and supported.
- Students' learning will be enhanced by developing their knowledge and skills, including generic skills, and by taking into account students' diverse backgrounds and abilities.

Source of quotations: University of California at Berkeley website. Retrieved October 14, 2005 from http://www.berkeley.edu/. University of Sydney website. Retrieved October 8, 20055 http://www.itl.usyd.edu.au/FYE

Retrospective view of student learning experiences

It is the primary objective of the MOHE to ensure that the educational experiences of students lead to mastery in a field of knowledge, the development of intellectual skills and values, and exposure to relevant experiences.[81] To attain this objective, the Quality Assurance Division has taken a leading role in developing a set of standards for each discipline, outlining the learning outcomes expected of programs by soliciting input from various stakeholders. The extent to which programs actually adhere to these standards

[81] *Source*: *Education in Malaysia*, MOE, June 2005, p.12.

remains to be determined after programs have gone through the formal process of quality assurance.[82]

World-class universities gauge their capacity to provide quality education by seeking input from current students about their academic experience. They also keep in touch with their alumni and from the time they graduate, connect with them to get input about their learning experience and the relevance of their education to their chosen career paths. In Australia, this is done by means of a questionnaire, administered to graduates six months after the completion of their program of study. At McGill University in Canada, graduate students are given a survey at the time they defend their thesis. Periodic alumni surveys provide data for up to 10 years following graduation. This line of communication also makes it possible for these universities to hear about the accomplishments of their alumni and draw on their support to advance the mission of the institution.

These activities are typically carried out by the institutional research unit of the university which prepares data for the overall performance assessment of the institution, for strategic institutional planning purposes, as well as for academic units which in turn incorporate received feedback in curriculum revisions and teaching practices. Employability rates and success in employed field then become attestations to a positive university experience. It shows that this experience has helped students develop content, skills, and attitudes that are relevant and usable in the workplace. In fields where employment opportunities are more limited, achieving high rates of employment is even a stronger attestation to the quality of education received. To help students secure jobs and to maintain their tie with them subsequently, top universities have placement offices that coordinate job searches and prepare students for a successful integration into the labor market.

The Malaysian system has begun to systematically compile data about graduates through surveys that are collected at convocation. While this is a positive step, it has several limitations. For instance, data are gathered one time, within three months of graduation; information is not specific enough to inform authorities whether employment is in the field of study, and whether graduates find that their academic experience prepared them sufficiently for the demands of their workplace. Placement offices do not appear to be well-developed entities in either public or private universities.

Recruitment

As underlined by the official document issued by the Ministry of Education Malaysia entitled *Executive summary: Education development plan 2001-2010,* finding and retaining sufficient numbers of highly qualified faculty will require immediate attention if Malaysia wants to compete at an international level. The system has to carefully explore immediate and long-term solutions to this imbalance and to ensure that a particular view does not dominate recruitment policies and the selection process and that it achieves diversity in the workforce. In so doing, it can gain the confidence of the public and more

[82] This aspect is elaborated under section V.

importantly of potential qualified applicants who may not come forward because of existing perceptions of bias in the system.

The most immediate available resource is the league of senior professors who must retire at the age of 56. Currently, many do return to the system, taking on teaching and other responsibilities but they do so on a contractual basis. This status, as perceived by them or by their peers is inferior to the rank they held prior to retirement. At 56, most academics are at the pinnacle of their careers in particular if they are top researchers. When the system is in dire need of qualified academics, creating flexible conditions to retain productive faculty in their status and position could be one avenue of addressing shortage in faculty.

Box 9.8 A Flexible Approach to Retain Productive Faculty

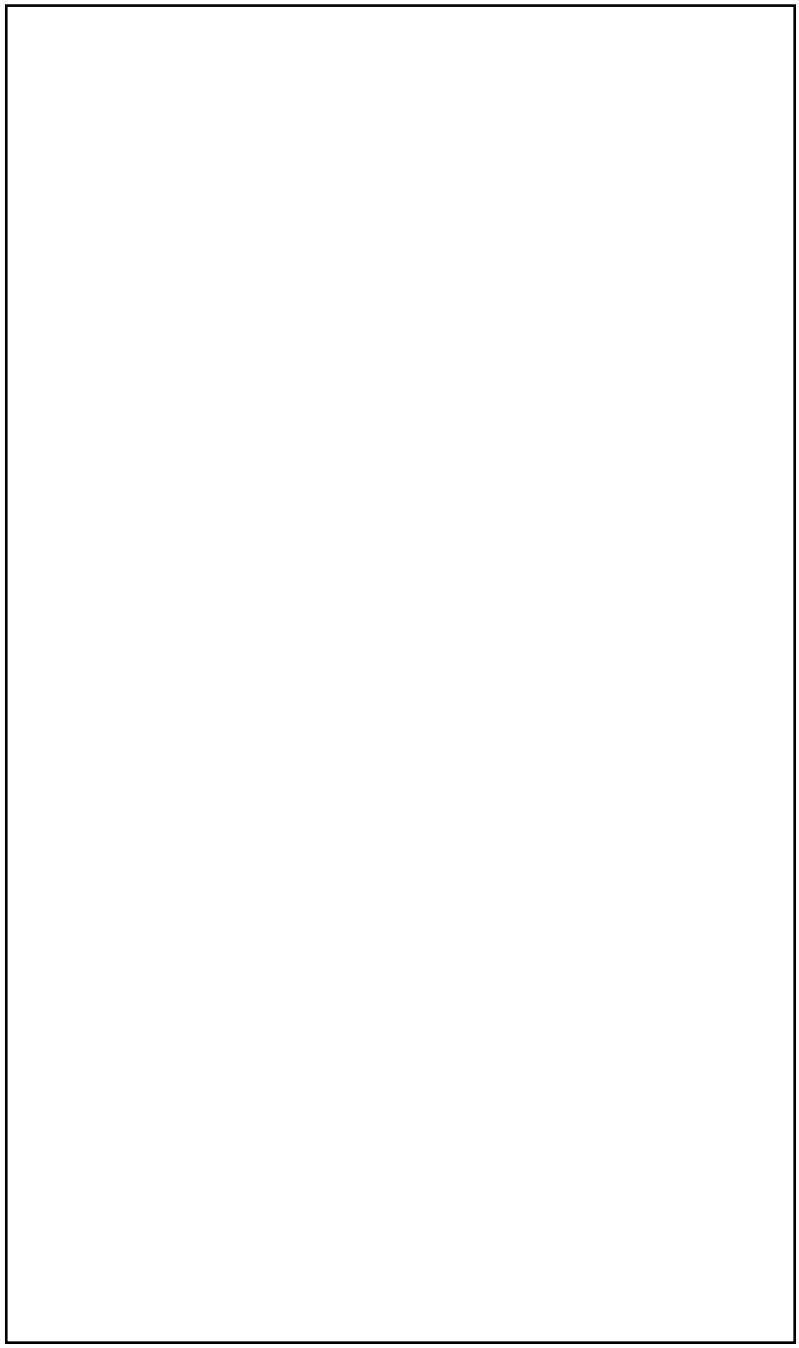
In the province of Ontario in Canada, the mandatory age of retirement is 65. The University of Toronto, located in the Province, until recently, enforced the mandatory retirement age. More recently, it realized that it wanted to retain and attract senior scholars and because it did not want to wait for the provincial government to legislate the end of mandatory retirement, in the spring of 2005, it reached an agreement with its faculty association to replace it with a new agreement. Although faculty can retire at 65 if they wish to, they will also have other options. [One of the] Highlights of this newly reached agreement include the right to choose:

- Postponed retirement beyond 65. This faculty continues to participate in the pension plan and accrue benefits and can retire at any age with one year's notice.

Source: University of Toronto Faculty Association web site: www.utfa.org

A second resource that is already available in the system is the large number of faculty (about 75%) who do not have a doctoral degree. These individuals are employed by the system to work while they try to complete their studies. If their progress toward successful completion of the PhD degree is seriously hampered, it is probably due to considerable workload. A measure to systematically release them to fast track the completion of their degree requirement can be another solution to the problem of academic staff shortage. This could begin with granting this privilege first to those who have been more successful and/or advanced in the doctoral students.

Active and planned recruitment of new faculty is another avenue to replenish staff. Recruiting top candidates from the local pool may become increasingly difficult because of competition from private universities and enterprises and their ability to be more flexible in offering more attractive and competitive packages to entice candidates. This puts additional pressure on the GOM to improve the salary scale, benefits, and working conditions of academics to be able to attract as many available qualified individuals as possible.



Box 9.9 Canadian Federal Government Initiative to Repatriate and Attract Internationally Renowned Researchers

Concerned about its own needs, in 2000, the Canadian government provided $900 million to establish the Canada Research Chairs (CRC) program to support the establishment of 2,000 research professorships in universities across the country. The number of such positions available to each university corresponds with the overall degree of success of a university in obtaining research grants from the Federal Government. An Interdisciplinary Adjudication Committee reviews all nominations.

The program supports Tier 1 and Tier 2 chairs. The first is tenable for seven years and renewable for outstanding researchers identified by their peers as world leaders in their fields. For each Tier 1 Chair, the university receives $200,000 annually for seven years. Tier 2 Chairs are tenable for five years and are renewable once, for exceptional emerging researchers, acknowledged by their peers as having the potential to lead in their field. For each Tier 2 Chair, the university receives $100,000 annually for five years.

To date, this program has attracted 1504 top researchers internationally, 214 of whom are Canadians who were working abroad. At McGill University which is one of the top research intensive universities of the country, the CRC program has resulted in the recruitment of 75 top researchers of whom 29 are Canadian.

Source: Telephone interview with the CRC office and their website: http://www.chairs.gc.ca/

Another example is the efforts of China to support its ambitious expansion goals.

Box 9.10 China's Efforts to Build World Class Universities

China wants to transform its top universities into the world's best within a decade, and it is spending billions of dollars to woo big-name scholars like Dr. Yao [a Princeton professor] and build first-class research laboratories…China has already pulled off one of the most remarkable expansions of education in modern times, increasing the number of undergraduates and people who hold doctoral degrees fivefold in 10 years…In engineering alone, China is producing 442,000 new undergraduates a year, along with 48,000 graduates with masters' degrees and 8,000 Ph.D's…Officials at Beijing University estimate that as much as 40% of its faculty was trained overseas, most often in the United States.

Source: Quoted from the New York Times, October 28, 2005

The ability to offer competitive employment packages is one condition of success of the international recruitment scene. Another condition is the well-coordinated efforts of the immigration authorities to ensure flexible and smooth processing of work permits or visas

for this category of visitors. The current Malaysian context, both conditions would pose complications for the recruitment of top tiered international academics.

Faculty Development

In meeting the goal of excellence, the development of academic staff, one of the key resources, is a major issue and responsibility. A university that expects superior performance from its academics has to reflect its intent in relevant policy documents and clearly state the university's commitment to career development. These will include making specific provisions for integrating new faculty in the system, conducting systematic performance appraisals, providing timely and constructive feedback, encouraging and recognizing superior performance with different incentives, and rewarding excellence in performance.

In the Malaysian context, faculty development is particularly important because of the large number of academics who do not have a PhD degree as yet and as such, may not have had the opportunity to ground themselves in their discipline sufficiently to conduct original research. The GOM has already made a huge investment in this force and it counts on them to be productive contributors to the system. Formal structures to support continuing professional development will be necessary to elevate academic performance to a higher level and sustain it over time. This means that staff development will have to necessarily take on a broader scope to include the development of research capacity as well as teaching and ability to use related technologies.

Most universities in OECD countries in particular in the UK, US, Australia and Canada, promote faculty development through dedicated units within the institution that report to a senior officer such as the VP Academic or the Provost. The primary mandate of these units is teaching development. In addition to these units, there are also initiatives at national levels which provide leadership in policy development as well as specific resources for the development of faculty. In the UK, the Higher Education Academy has been created recently at the national level to lead and guide professional development in order to enhance the learning experiences of students.

Box 9.11 Teaching Improvement Initiatives in the UK

Founded in May 2004 as an independent organization, the Higher Education Academy is funded by grants from the four UK funding bodies, subscriptions from higher education institutions, and grant and contract income for specific initiatives. It is owned by the higher education sector (Universities UK and the Standing Conference of Principals) and is responsive to the sectors needs. Its mandate is threefold: (a) Institutional support in strategic planning and in leading the development of research and evaluation to improve the quality of the student learning experience; (b) Subject matter and staff development, by leading and informing professional development and recognition of staff in higher education, and by promoting good practice quality information, advice and resources; and (c) National policy, by providing an authoritative and independent voice on policies that influence the student learning experience.

Source of quotation: The Higher Education Academy website http://www.heacademy.ac.uk/

Similarly, in the United States, The Carnegie Foundation for the Advancement of Teaching offers extensive support for the advancement of teaching at the all levels, including undergraduate and graduate education. A sample of their initiatives and programs can be found in the box below.

Box 9.12 Initiatives by the Carnegie Foundation for the Advancement of Teaching to Promote the Scholarship of Teaching

- The **Carnegie Academy for the Scholarship of Teaching and Learning (CASTL) Program in Higher Education** works to develop a scholarship of teaching that will improve student learning, enhance the practice and profession of teaching, and bring to teaching the recognition and reward afforded to other forms of scholarly work.
- Cultures of Teaching and Learning in Higher Education is a family of projects designed to explore the growth of communities of scholars who regard teaching as serious intellectual work on campus and in the disciplines.
- The Integrative Learning Project is a three-year project that will work with ten selected campuses to develop and assess advanced models and strategies to help students pursue learning in more intentional, connected ways.
- A U.S. Professors of the Year program to recognize faculty members for their achievement as undergraduate professors.
- The Carnegie Initiative on the Doctorate is a multi-year research and action project to support departments' efforts to more purposefully structure their doctoral programs
- Preparation for the Professions Program investigates the preparation for various professions offered by academic institutions, and compares across professions the approaches to teaching and learning that these institutions use to ensure the development of professional understanding, skills and integrity.

Source: The Carnegie Foundation for the Advancement of Teaching website http://www.carnegiefoundation.org/

The significant message that these and other educational, pedagogical, and teaching development initiatives convey is that teaching is being increasingly valued in world-class universities. One way that the message is getting across is through the resources being made available to support teaching and learning and corresponding policies that take the effectiveness of teaching with respect to graduate competencies into account. The most apparent reason for this point of view is that universities now serve very diverse groups of students with different intellectual abilities and motivation and this has changed the nature of the teaching task and the demands it has placed on faculty time and energy. The preparation and goals that enabled the elite students of the past to succeed even in the worst teaching situations are not producing the same results today.[86] An international survey carried out more than a decade ago found that even then, students were inadequately prepared in basic cognitive skills including written and oral communication and mathematics and quantitative reasoning[87]. The growing participation of mature students in higher education has added a new layer to student diversity. In Finland, for example, there are more adults enrolled in continuing education programs (200,000) than regular students enrolled in degree programs (150,000).[88]

Tenure and promotion

The tenure and promotion exercise provides an opportunity for universities to benchmark their faculty against their international peers. This is done successfully when the process systematically involves international external peer reviewers to scrutinize tenure dossiers. North American best universities give their faculty 5-6 years to demonstrate that they can attain a high record of performance before they become eligible to apply for tenure.
Thus, tenure is an earned status, based on competitive performance and measured against international benchmarks. Elsewhere the process of granting a "permanent" status is different. Figure 9.4 below shows common practices in a range of countries.

[86] See for instance: Astin, A. W. (1998). The changing American college student. Thirty-year trends, 1966-1996. *The Review of Higher Education, 21*(2), 115-135.
[87] Boyer, E. L., Altbach, P. G., & Whitelaw, M. J. (1994). *The academic profession: An international perspective*. Ewing, NJ: California/Princeton Fulfillment Services.
[88] Salmi, J. (2001). Tertiary education in the 21st century: Challenges and opportunities. *Higher Education Management, 13*(2), 105-130.

Table 9.5 An International View of Tenure and Performance Evaluation

Country	Tenure	Evaluation of Performance Processes
United States and Canada	Yes	Awarded by institution rather than by Government; Review of academic performance (research, teaching, and service) happens no later than 6 years of appointment; If tenure is not granted, the individual has to leave the university; with tenure, individual is promoted in rank; holders of tenure can be terminated for violating university policy or dereliction of duties.
United Kingdom	No (abolished since 1980)	All ranks hold 5 year term appointment subject to periodic evaluation and reappointment procedure.
Europe	Granted mainly to senior members of civil service and certain other academics	Carefully monitored and competitively awarded. Percentage of faculty with permanent contracts range from 40%-50% in Germany and Finland to 50%-60% in Austria Norway Spain, and the Netherlands and 80% in France and Ireland, and 90% in Italy. Tenure does not guarantee promotion in rank. Appointment to senior rank follows careful scrutiny and sometimes after a national search.
Japan	In practice, yes	At the time of full-time appointment, individual has permanent job. Promotion process, however, is very rigid.
China	Yes	Academics given permanent status at the time of hire regardless of rank.

Source: Altbach, P. (2002). How are faculties faring in other countries? In R. Chait (Ed.) *the questions of tenure* (pp. 160-181). Cambridge, MA: Harvard University.

In North America, the concept of tenure is inextricably linked to the concept of academic freedom. This is not the case elsewhere where tenure is considered to be an administrative procedure, linked to employment practices and civil service issues.

The Malaysian system may wish to reexamine its policies and practices concerning tenure on two levels if it wants to compete with the best world universities: On the level of policy, it has got to settle on a model that places accountability - course-credit system, the structure of academic ranks, performance-based salaries, periodic review of productivity, and other aspects – at the forefront. This implies introducing reforms in academic appointments, in general, and changing the civil service status of academics, in particular. On the level of procedure, it may wish to render the tenure review process credible and acceptable at an international level and this requires a process of peer review which involves international academics of renown to participate in the evaluation of the academic performance of Malaysian academics.

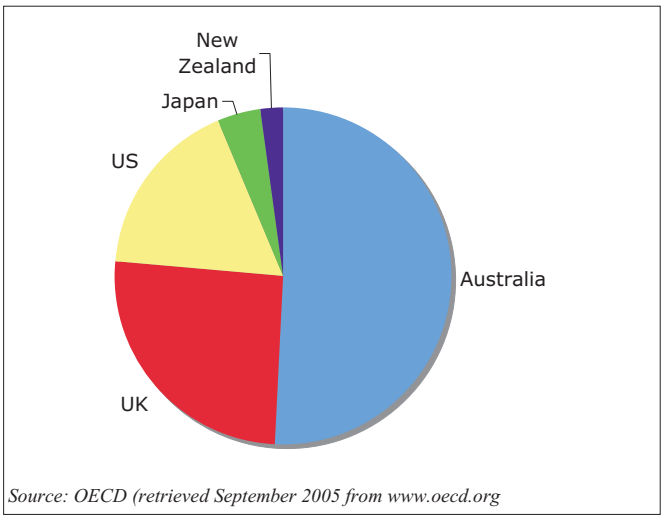
Internationalization

The ability of graduates to be functional in international contexts and in different cultures and languages with ease is an indicator of the quality of education they have received. Advanced countries have been preparing their students to succeed on the international stage through bi-lateral and multi-lateral exchange and mobility programs for students and academic staff. The International Academic Mobility (IAM) initiative which includes the Canada-European Community Program for Co-operation in Higher

Education and Training, and the Program for North American Mobility in Higher Education, The Erasmus Mundus co-operation and mobility program of exchange at the post-graduate level in the European Union, and The University Mobility in Asia and the Pacific (UMAP) in which Malaysia holds full membership are examples of these initiatives. These initiatives provide students' with exposure to international experience and forge links that support academic and research activities across boarders.

A cornerstone of internationalization is the extent to which local students are exposed to other educational systems. Malaysia has a long history of providing scholarships to its students to study abroad. Indeed, it sends more students abroad than it receives. The net intake is -5.3%. The majority of Malaysian citizens who study abroad (47.6%) are enrolled in Australian universities followed by 23.8% in the UK and 16.2% in the U.S. In total, 96.9% of its citizens who attend a university outside the country are studying in OECD countries.

Figure 9.2 Percentage of Malaysian Citizens Studying Abroad (2003)



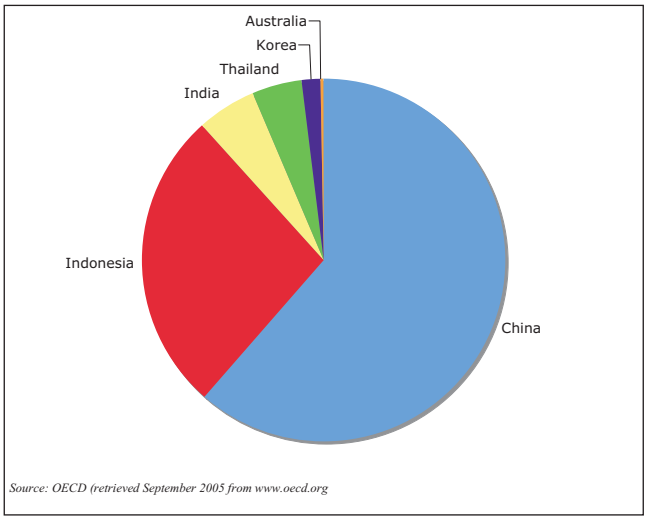
Source: OECD (retrieved September 2005 from www.oecd.org

Of the students who are studying abroad, slightly less than half (47.6%) are in advanced research institutions and most likely in doctoral programs. The remaining 52.4 are in professional programs geared to prepare graduates for direct entry into the labor market. Although the consensus is that most Malaysians have strong national ties and prefer to return to their own country rather than be lured by more attractive opportunities in the countries where they study, without data, this claim cannot be substantiated. "Bright students from developing countries, drawn to the top universities in the North, tend to stay and work in host countries after they have completed their studies. So many foreign highly skilled workers were originally students who have now changed status, a process helped by generous policies."[89]

[89] Article by Dominique Guellec, responsible for science and technology indicators at the Organization for Economic Cooperation and Development (OECD) and retrieved on November 2, 2005 from http://www.scidev.net/

The GOM also intends to promote Malaysia as a regional educational hub and to attract increased number of international students to study in its primarily private universities. The goal is to increase the number of international students in the Malaysian system, primarily the private system, to 100,000 by the year 2010. At the present time, that number is 5,735 comprising 12.8% of the total number of students in post graduate programs in public higher education institutions.

Figure 9.3 Foreign Students in Malaysia as a Percentage of Total Number of Foreign Students (2003)



Worldwide, China and India are the biggest exporters of international students. Malaysia has been able to capitalize on this market. In 2003, OECD reported that 86.9% of its international student body was from Asia, primarily from China and Indonesia and today, it has extended its active recruitment to other Pakistan and other Islamic countries.[90] However, Malaysia attracts only 4.0% of the total number of Chinese students that study abroad. And despite the fact that India is one of the largest international student exporters worldwide, Malaysia has been able to attract relatively few Indian students. Only 0.1% of its international student body is from OECD countries. If current demographic data on the Chinese and Indonesian international students show that the majority are Muslim and recruitment activities are also targeting foreign students from the same religious background, Malaysia will have to be content with limited diversity in its international student population. This will also limit the opportunity of Malaysian students in the internationalization process. A strong evidence of quality will be the capacity of Malaysian universities to attract international students from OECD countries, and in particular those that have excellent systems.

[90] Source: *Wandering scholars*. The Economist. September 10, 2005, Vol. 376, Issue 8443, p. 18.

Box 9.13 Denmark's Internationalization Strategy

Denmark's Ministry of Education promotes a multi-faceted strategy of internationalization to direct the development of a more globally relevant national system of higher education—at individual and system-wide levels. Initiatives include the physical mobility of Danish and international students and academic staff across borders, exploring international contexts across academic fields, and studying foreign languages. Internationalization across Denmark's system of higher education also includes developing cooperative and competitive relationships with institutions abroad and promoting mutual recognition of qualifications. Finally, the Danish government encourages participation in international comparisons and surveys to promote transparency and domestic quality development and to encourage a shared understanding of education policy questions and the development of joint strategies.

Source: Internationalisation of Danish education. Retrieved December 25, 2005, from http://pub.uvm.dk/2004/internationalisation/kap01.html)

Quality Assurance

Malaysian Qualifications Framework

One of the most important reforms underway in Malaysia is to unify the quality assurance (QAD) and accreditation (LAN) systems. Countries that boast universities with international reputation (e.g., US, UK, Australia, Canada), all have unified systems that serve the public as well as the private institutions under one umbrella. If implemented along international models, this structural change should also have implications on the autonomy, capacity, credibility, and technical know-how of the unit, entrusted with the responsibility to provide guidelines and procedures for recognizing national qualifications offered by all education and training providers in the country: private or public, local or foreign.

Accreditation – Lembaga Akreditasi Negara (LAN)

As the accreditation system looks inward to improve itself and to raise itself to a level comparable to the most sophisticated accreditation systems in the world, it will have to consider how to reincarnate itself so that its activities: (a) continue to be guided by evolving high standards; (b) are forward looking and allow for innovative practice; and (c) address a number of the shortcomings that characterize the present system. A robust accreditation process would necessarily:

- be understandable by and acceptable to all stakeholders
- be fair, transparent, and objective

- involve credible members
- take into account the requirements of training and education, private and public systems
- incorporate feedback loops for continuous improvement and fine tuning
- be simple, manageable, and adaptable as well as efficient and effective
- have built-in mechanisms for ongoing monitoring of its own efficiency and effectiveness

Both the National Commission for Evaluation and Accreditation of Argentina Comisión Nacional de Evaluación y Acreditación Universitaria - CONEAU), and the National Commission of Accreditation of Chile (Comisión Nacional de Acreditación de Pregrado), for instance, have introduced external review mechanisms for their respective systems. In the case of the latter, this has been carried out with support from the World Bank within the Higher Education Reform Program. The latter has involved the INQAAHE in the process of carrying out an external assessment of the agency.

Quality Assurance Division (QAD)

In order for the practices of the Malaysian Quality Assurance system to be in line with the most advanced international quality assurance systems, it would need to:

- Reincarnate itself as an integrated, unified, and completely autonomous quality assurance and accreditation system that can address the needs of **all** higher education institutions fairly and equitably.
- Involve credible peer reviewers including international experts in the external review process of programs. Ensure that individuals involved in the peer review process receive sufficient training for the task at hand.
- Make all QA reports of institutions publicly available.
- Ensure that the system is fair and efficient, functions without delays, is devoid of unnecessary bureaucracy, does not intrude in the primary activities of universities and does not stymie innovation.
- Assume a more constructive and formative role and ensure that recommendations made by the QA agency following program reviews are meaningful and possible to implement.
- Build in a system for the review of the agency itself, using external and international experts.

The MOHE can, in turn, provide incentives for institutions and programs that engage in program review in set cycles. It could, for instance, designate discretionary funds for institutions that participate in the process, address changes recommended in QA reviews, and demonstrate that program/unit strategic plans are informed and based on the review exercise.

ISO

Many Malaysian universities, both public and private, are vying to acquire ISO 9001 2000 certification for quality management of its various units and activities, including academic programs[91]. The desire to acquire the ISO approval can be appreciated for at least two reasons. The first is the appeal of receiving certification from an internationally recognized body. The second is that the certification process is a means to standardize procedures related to the management and administration of academic activities.

While the presence of these procedures and related structures are necessary for successful performance, they should not be taken as guarantee that the product of the system is of good quality. This shortcoming in underscored in a recent UNESCO report on Quality Assurance. The critique is addressed to defining quality as a threshold which is the case in the ISO process. "… when criteria and standards [thresholds] are based on quantitative "input" factors, … [they] cannot readily be adapted to changing circumstances or to stimulate change and innovation. In this respect, the "threshold" can mitigate against improvement. Neither does it take account of "output" standards, the actual achievement by graduates, the criteria used to assess these achievements, and how that assessment is verified."[92]

Therefore, units and institutions that are bearing the cost of ISO certification and are investing considerable amount of time in preparing required documentation have to ask themselves what is the value added of this activity? What will they be looking for as evidence of improved quality of education and student learning beyond obtaining certification? To what extent are activities related to ISO redundant with respect to activities promoted by QA or LAN? Will ISO certification be necessary if the higher education system has a robust unified QA system in place that is recognized internationally?

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[91] The following definition was retrieved from
<http://www.iso.ch/iso/en/aboutiso/introduction/index.html>
ISO 9000 families are known as "generic management system standards". "Generic" means that the same standards can be applied to any organization, large or small, whatever its product - including whether its "product" is actually a service - in any sector of activity, and whether it is a business enterprise, a public administration, or a government department. "Management system" refers to what the organization does to manage its processes, or activities. .. ISO 9000 is concerned with "quality management". This means what the organization does to enhance customer satisfaction by meeting customer and applicable regulatory requirements and continually to improve its performance in this regard.

[92] Source: Campbell, C., & Rozsnyai, C. (2002). *Quality assurance and the development of course programmes*, p. 21. UNESCO. Retrieved November 8, 2005 from:
http://www.cepes.ro/publications/pdf/Campbell&Rozsnyai.pdf

In summary, the Malaysian quality assurance enterprise is in the process of change. In anticipation of the legal adoption of a unified quality framework, LAN and QAD are now operating under one leadership and are physically located under one roof. The nature of guidelines and procedures that direct the activities of these two bodies and the extent to which these guidelines converge internally and with internationally acceptable standards and procedures will ultimately determine the success of the MQF and its impact on improving the quality of Malaysian universities.

Chapter 10. Producing the Right Graduates to Increase Relevance

Strategic Goal: Improve the labor market information "infrastructure" to provide accessible and timely flow of relevant labor market information to facilitate informed decision making about education, careers choices, manpower planning, and policy design.

Recommended Actions

- *Make modest changes to the ongoing labor force survey (LFS) to realize its potential as the key source of labor market information in the country. This includes adding questions such as public or private education, and wage and salaries, and going towards a rotating sampling frame. These simple changes vastly improve the usefulness of the LFS for labor market analysis and for rigorous impact evaluations of a wide range of government programs.*

- *Set up a labor market observatory tasked to conduct labor market studies in the public interest, and for the government. Its mandate would include publication and wide dissemination of relevant labor market information to all stakeholders, including education and training institutions, government agencies, employers, and individuals. Given limited public sector capacity, the observatory could be structured along the lines of a national institute, located in a university, and draw upon research expertise from the university and beyond.*

- *Reconsider the existing policy of limiting public access to the wealth of micro labor market data generated by government institutions. Many countries make appropriately sanitized micro data available to researchers at a nominal cost. Research made possible by such data access not only develops capacity in local universities on Malaysian issues, but it also enlists the expertise of the research community in addressing pressing policy questions in areas where the government may have limited capacity.*

- *Continue the current practice of annual tracer studies of graduates in public institutions of higher learning, and require private universities to participate and contribute their findings to MOHE as well. Getting continuous feedback from both public and private university graduates about the workplace relevance of training received is essential for universities to improve their curricula, and for policymaking by the government. Periodically, the government should conduct larger scale tracer studies using micro-level data collected by universities and surveys of graduates a year or two after graduation.*

- *Rigorously evaluate the attachment and retraining programs for unemployed graduates using a control group of unemployed graduates that did not participate*

in these programs. Most publicly-funded programs in Malaysia, including those targeting unemployed graduates, are rarely if ever evaluated rigorously using a quasi-experimental approach and the net impacts of policy interventions as well as their cost-effectiveness are seldom known. Such information is needed for improving the design and targeting of programs, and for resource reallocations to better performing programs.

- *Consider institutionalizing systematic monitoring and impact evaluations within the framework of performance-based budgeting for all government programs that receive substantial public resources. The culture and capacity to undertake M&E in government agencies is limited, and the practice should be phased in gradually. Lessons from other countries highlight the need to adequately fund government agencies for staff training in M&E methods and to commission impact evaluation studies from independent experts.*

The Government has responded to the post-2000 phenomenon of rising numbers of unemployed graduates with numerous policy initiatives to make them more employable through job attachment and retraining programs, to place them in employment through incentives to employers, or provide them with the wherewithal to set up small businesses. These are recognized as short-term policies, correctly, since Chapter 5 suggests that the graduate unemployment phenomenon is largely due to a short-term imbalance between supply and demand of graduates, and unemployment that accompanies initial search for a good match by young graduates. The latter implies that with expanding tertiary output, the continued presence of temporarily unemployed graduates is unavoidable and some, but not all, will find employment as the economy recovers.

The challenge for policy makers is not simply ensuring that graduates find employment, but rather employment that best uses their education. An engineering graduate could find employment as a waiter, but that would be wasteful of the resources that individuals, families and the government have invested in that human capital. The issue then is not just insertion of university graduates into any job, but the effective transmission of knowledge and skills acquired in universities to jobs that will best use them. This means that policymakers should be guided not just by whether graduates find jobs, but whether these are productive and well-paying jobs, and that policies to assist them are both efficient and cost-effective in delivering the desired labor market outcomes as compared to the alternative of not intervening. This will require a greater degree of focus on monitoring and evaluation, and on evidence-based assessments of policy effectiveness than has hitherto been the case in Malaysia.

This dictum applies more broadly and equally to all workers, to all types of education and training institutions and firms that create knowledge and skills, and to labor market policies that seek to improve the match between worker skills and knowledge and employers that can best use them. It carries even more weight if the massive human capital investments in education and training that the government has made, and is making under the 9th Malaysia Plan, are to bear fruit in the real sector for improving productivity and competitiveness. Labor markets intermediate between the education and

training sectors and the real economy, and how efficiently it operates to match workers to jobs and to transmit knowledge and skills to the real sector will have implications for the realization of the government's Knowledge Economy strategy.

The chapter is organized as follows. The first section discusses international experiences with a wide range of active labor market programs (ALMPs) for the unemployed. Collectively, they paint a cautionary picture about the effectiveness of many kinds of ALMPs, including some like those that the government has introduced for unemployed graduates. Global experience suggests that some work well, others do not, and results can vary across countries, suggesting that individual countries must rigorous evaluate their own programs and, if needed, redesign them to improve effectiveness. With this as background, the second section turns to Malaysia, reviewing different short-term policies that are in place or being proposed to address the specific issue of graduate unemployment. The concluding section focuses on other areas where longer-term improvements could be made to institutions and policies that influence the operation of labor markets, including several recommendations for strengthening the workplace relevance of education and training, improving the labor market information system, and institutionalizing the monitoring and evaluation of programs.

International Experience with Active Labor Market Policies

OECD countries and, to a lesser extent, transition and developing countries intervene in the labor market in different ways to help the unemployed and other disadvantaged groups find employment. These include interventions to enhance labor supply through training and retraining programs, increase labor demand through public works or wage subsidies to employers, and improve the functioning of labor markets through employment services. Some of these interventions, referred to as Active Labor Market Policies (ALMP)[93], have been evaluated rigorously in a number of countries by comparing the post-program employment and wage gains of targeted groups to a comparison group of unemployed individuals with similar attributes that did not participate in the program (see Box 10.1 below).

[93] Many OECD countries also offer unemployment insurance and other forms of income support during unemployment, and these are called Passive Labor Market Policies. This second category of passive is also common in transition countries but are not widely used in East Asia.

Box 10.1 Evaluating Labor Market Programs

The net impact of a program cannot be determined simply by measuring the post-program experiences of beneficiaries, since these measures reveal little about what would have happened in the absence of the program. Rigorous evaluations require comparisons of post-program experiences of participants with those of a comparison group with identical attributes who did not participate. The differences in outcomes between the two groups (e.g. employment or wage gains), can then appropriately be attributed to the effects of that intervention.

Most program evaluations use so-called "quasi-experimental" techniques, relying on existing survey or administrative data to identify a group of individuals to compare to the targets of the intervention. "Experimental" techniques, which involve random assignment of individuals to either the program or comparison groups, are the gold standard but are not often used because of high cost and potential ethical issues they raise in denying treatment to the comparison group. Quasi-experimental approaches in contrast are relatively low cost, and they can be done at any time after the program has begun. However, they require strong technical skills to address potential biases that might arise, and access to good survey or administrative data to identify an appropriate comparison group.

For further details, see World Bank (2002), "*Impact Evaluation: Techniques for Evaluating Active Labor Market Programs*", Employment Policy Primer Series No. 2, Social Protection Unit.

The international experience suggests a cautionary note about the effectiveness of many ALMPs. An OECD review in 2000 concluded that "the track record of many active measures is mixed in terms of raising future employment and earnings prospects of job seekers and producing benefits to society".[94] The World Bank's recent assessment came to similar conclusions that the overall payoffs to ALMPs are usually modest, some programs demonstrate positive labor market outcomes for targeted groups while others show no effects or even negative impacts[95]. This meta-assessment was based on a review of over 150 rigorously evaluated ALMPs from OECD, transition and developing countries that used a comparison group to identify the net impacts of policy interventions.

Table 10.1 summarizes the main findings of the World Bank meta-assessment, the net (additional) impacts of program participation on employment and wages, and related comments for each broad category of ALMP:

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[94] John Martin, 2000. "*What works among Active Labor Market Policies: Evidence from OECD countries' experiences*", OECD Economic Studies, No. 30.

[95] Betcherman, Karina Olivas, and Amit Dar, "*Impacts of Active Labor Market Programs: New Evidence from Evaluations with Particular Attention to Developing and Transition Countries"*, Social Protection Discussion Paper Series, No. 402, World Bank, January 2004. It updates an earlier review by Dar, A. and Z. Tzannatos (1999). *Active Labor Market Programs: A Review of the Evidence from Evaluations",* Social Protection Discussion Paper No.9901, World Bank, adding more recent studies and using a larger sample of ALMPs from developing countries.

- The most effective type of intervention is **employment services** (career guidance, information about available jobs, job search assistance, access to education and training programs, etc.). The preponderance of evaluations suggests that employment services can improve future employment (16 studies out of 22) and earnings (11 out of 17), and it is cost-effective because of the relatively low cost of delivering employment services to the unemployed. Employment services are most effective when labor demand conditions are favorable.

- Evaluations of **training and retraining programs** generally yielded mixed results on future employment (28 studies out of 39) and wage gains (15 out of 29). Training programs tend to be expensive, but do yield positive outcomes when the training is specialized, structured to lead to formal qualifications, and is sponsored by employers and takes place within firms rather than when delivered as purely institutional class-room training.

- **Training programs targeting youth**, typically disadvantaged youth with low educational attainment, had the poorest track record as compared to other training programs for the unemployed, on improvements in employment (6 out of 17 studies) and wages (3 out of 12). The low success with "curative" interventions suggests that the policy focus should shift to "preventative" policies, i.e. back to the education system and addressing the causes of poor youth educational achievement and school dropouts.[96]

- **Wage and employment subsidy programs** to increase employer demand for the targeted group of unemployed have mixed to poor results on future employment (7 studies out of 23) or on wages (5 out of 12). Compounding the mixed results, wage and employment subsidies may involve substantial deadweight costs (subsidizing employers who would have hired without the program) and substitution effects (subsidized hires displacing non-subsidized employees).

- **Self-employment assistance programs** to help a sub-set of the unemployed start small businesses have also had mixed results, and the small number of scientifically evaluated programs makes strong conclusions about their effectiveness difficult. Post-program employment (or business survival) rates are often positive (8 studies out of 10) though earnings gains are mixed (3 out of 5). Programs that provide mentoring and counseling, in addition to financial assistance, tend to do better than those that just provide the latter. They also appear to be more effective for the better-educated among the unemployed.

[96] Martin Godfrey (2003), "*Youth Employment Policy in Developing and Transition Countries – Prevention as well as Cure*", Paper prepared for the Social Protection Unit, World Bank.

Table 10.1 Summary of International Experiences with ALMPs

Intervention	Summary of Overall impact	Comments
Employment services	Generally positive impacts on employment and earnings in developed and transition countries. Costs relatively low so cost-benefit ratio usually positive. Little evidence for developing countries	Programs have most positive impacts when economy is good. Impact limited when labor demand is low.
Training for the unemployed	Positive impacts on employment but no effect on earnings in developed countries. Positive on both in transition countries, few studies in developing countries.	Program effectiveness benefits from on-the-job training and employer involvement. Women often seem to benefit more than men. Programs have most success when economy is good.
Training for youth	Negative impacts on employment and earnings in developed countries. Positive impacts in developing countries (Latin America), though the sample of ALMPs is small.	Youth employment problems are more effectively addressed through earlier, education-related interventions. And training is most effective combined with employment, basic education and social services, but can be costly.
Wage and employment Subsidies	Overall negative impacts on employment and earnings in developed and transition countries. Recent evaluations in developed countries more favorable. Very little evidence in developing countries.	Programs may be more effective when combined with training. Deadweight and substitution effects may also be important but are often not assessed
Micro-enterprise and self-employment Assistance	Not enough labor market-oriented evaluations to determine the overall employment and earnings impacts. Such programs tend to have low take-up.	Some evidence of positive impacts for better-educated individuals. Results are better when technical and advisory services accompany financial aid.

Source: Adapted from Gordon, Olivas and Dar (2004), Table 12**.**

This broad review indicates that ALMPs are not a panacea, and governments should have realistic expectations about what can be achieved by these policy interventions. Some programs work well and can improve future labor market outcomes for the unemployed, while others do not. Some programs may yield positive outcomes but are not cost-effective, which might suggest that policymakers shift to alternative ways of delivering services to the unemployed. Results for the same type of ALMP can also vary dramatically across countries. There is a growing body of knowledge about what makes some programs more successful than others, but much remains to be learned. For these reasons, the authors of the World Bank meta-assessment recommend that countries should evaluate their own programs, drawing upon global best practices and what works and does not work domestically, and as necessary redesign programs to improve their effectiveness or abandon those that are irremediably ineffective.

Short-Term Policies to Address Graduate Unemployment

With the overview of international experiences with ALMPs as background, this section turns to a selective review of the policies that the Malaysian Government has implemented, or has proposed, to make university graduates more employable. This review is necessarily brief, and is limited by lack of familiarity with the workings of these

programs (some of them are still proposals), and by access to relevant data. A tracer study exists but no conclusions can be drawn about program effectiveness given low response rates, the short post-program period over which participants were followed, and the absence of a comparison group.

The Government of Malaysia has responded to the growing numbers of unemployed graduates with a wide array of short-term ALMP measures, starting in 2001 and continuing in the 2006 Budget Speech with the introduction of several new policy initiatives. These include the following measures:

Training and Attachment Program for Unemployed Graduates (SSL). The program is designed to familiarize unemployed graduates with the workplace and to provide them with new skills. Graduates registered under the program are attached to public sector agencies and, to a more limited extent, private companies. They participate in training schemes administered by different government agencies, including the Public Service Depart
ment (PSD), Ministry of Education or MOE (assistant tutor scheme), Human Resource Development Corporation (PSMB) for ICT and Language training, and the Economic Planning Unit (research attachment and private sector attachment schemes). The largest schemes are those coordinated by PSD, PSMB and MOE that together account for over 82% of the 39 thousand graduates who participated in the SSL program as of August 2005.

A tracer study, conducted on SSL participants completing the attachment and training program as of June 2002[97], revealed relatively poor labor market outcomes – 22% of respondents reported finding employment three months after program completion. The scheme that had the highest placement rate (6%) was the ICT and Language training scheme coordinated by PSMB. Few strong inferences about program effectiveness can be drawn from this tracer study, given its low response rate, small sample size, and absence of a comparison group.

Graduate Reskilling Scheme (GRS). The GRS, implemented in parallel with the SSL program in 2001, was designed to retrain unemployed graduates and give them new skills in specialized and high-demand areas. Training institutions, including state skills training centers (SSTC) and skills development centers (SDCs) from the most populated states such as Penang, Johore, Selangor, Pahang and Perak were involved in implementing the GRS. The GRS was smaller than the SSL program, involving no more than 3 thousand unemployed graduates. The 2006 Budget substantially expands the role of these state level training centers with an allocation of RM100 million, with which state training centers are to introduce new courses under the Industrial Skills Enhancement Scheme and train 4,800 unemployed graduates.

[97] Five attachment schemes were included in the tracer study, including those coordinated by the Public Service Department, the Ministry of Higher Education, PSMB, and two schemes by the Economic Planning Unit. The tracer study had a very low response rate of 9 percent, and a sample of about 2 thousand respondents.

A 2002 report by SERI to the Penang State Government provides some insights into the GRS (and SSL) programs.[98] Citing a Jobstreet.com survey of unemployed graduates, the report highlighted several concerns about implementation of the SSL and GRS programs: poor dissemination of information, limited availability of slots, the quality of training (too basic), inadequate allowances while training, and administrative red tape. The Penang Skills Development Center (PSDC), working with the private sector and with SMIDEC (the national SME agency), addressed some of these concerns with a GRS that offered more relevant training courses in English communication, presentation and negotiation skills, project and supply chain management. Over the year-long course, candidates were also trained in two widely demand fields – the Microsoft Certified Systems Engineer (MCSE) and Cisco Certified Network Associate (CCNA) certifications – and were interned in a small and medium enterprise for 5 months of practical experience.

Graduate Training Scheme (GTS). The new training scheme launched in 2005 under the direction of PSMB, targets unemployed degree and diploma graduates completing their studies in 2003. GTS seeks to enhance the employability of unemployed graduates through training and certification in specialized skills such as English, information and communications technology, tourism, event management and financial planning. Using PSMB's wide network of registered public and private sector providers, participants receive 3-5 months of training, followed by 2 months job attachment in the private sector that training providers are required to arrange for trainees.

The design of the GTS is significant for several reasons. First, it seeks to provide not only specialized training in high demand areas, but also training that is certificated. This is consistent with the large positive employment impacts of Spain's National Plan of Training and Reemployment that provided specialized training courses to the unemployed in agriculture, industry and management that led to formal qualifications. Second, it restricts training providers to arrange attachments only in the private sector, not government agencies that have taken on a disproportionate share of the unemployed graduates in other programs such as SSL. Finally, training providers are required to conduct tracer studies of their trainees (which fosters a focus on outcomes), and receipt of these findings by PSMB is a condition for full payment for services rendered.

Double Tax Incentive for Employers. The tax incentive, announced in the 2006 Budget Speech, is designed to encourage publicly listed corporations (PLCs) to provide employment opportunities for designated unemployed graduates. PLCS that hire and provide on-the-job training to graduates are entitled to deduct from taxes double the amount of the allowances paid to participants in the Training and Attachment Program for Unemployed Graduates. The deduction is to be given for a period of 3 years, effective from tax year 2005 onwards.

Such demand-side subsidy programs are supposed to compensate employers for the initial cost of hiring and training the unemployed person. The intent, however, is that the new employee's productivity would increase by the time the subsidy is over, so the

[98] Socio-Economic and Environmental Research Institute (2002), "Economic Briefing to the Penang State Government: Unemployment Situation in Penang", Volume 4, No. 4.

employer continues to employ that person. Combining the subsidy element with training may thus improve the likelihood of positive outcomes, as in the case of Germany's Public Employment Program, and Argentina's *Proempleo* wage subsidy program for retrenched workers (see Box 10.1). The Malaysian initiative includes job training. However, the government should be cognizant of deadweight and substitution effects that might arise if employers would have hired graduates even in the absence of the incentive, or substituted designated graduates for unsubsidized graduate hires.

Box 10.2 Argentina's Program of Wage Subsidies for Employers

The *Proempleo* program was an experiment to address the heavy layoffs of workers by the main employer in the city. It provided retrenched workers with a voucher that entitled the employer hiring such a worker to a wage subsidy of $150 per month for those over 45 years and $100 for those younger than 45 (for comparison the minimum wage was $200). This study was evaluated using an experimental approach in which the unemployed were randomly assigned into three groups – vouchers, vouchers and training, and a comparison group without vouchers. The evaluation indicated that the wage subsidy had a significant impact on increasing the probability of employment in the private sector (14% for the voucher group versus 9% for the comparison group.

Source: Emanuela Galasso, Martin Ravallion and Agustin Salvia, 2001 "*Assisting the Transition from Workfare to Work: Argentina's Proempleo Experiment*", World Bank.

Using Training Levies for Graduates. The Ministry of Human Resources is reportedly studying the possibility of allowing employers to use levy contributions to the Human Resource Development Fund (HRDF) for the pre-employment training of graduates. Under the HRDF Act of 1993, employers contribute 1% of payroll to the HRDF from which they are partially reimbursed for allowable expenditures on training provided to current employees. Employers are allowed to expense their levy contributions over three years. The proposed amendment to the HRDF Act would allow employers to use unutilized levies to provide pre-employment training to graduates that they hire.

It is unclear if this will create additional incentives for employers to hire graduates. Levy contributions to the HRDF "belong" to individual employers, so the amendment would in principle not provide additional resources to the firm. The evidence reported in Chapter 5 suggests that many employers are already hiring graduates and presumably training them as new employees using their HRDF levies.

Young Entrepreneur Program. The 2006 Budget Speech also rolled out a program to train unemployed bumiputra graduates as self-employed entrepreneurs. The PROSPER scheme, to be implemented by the Ministry of Entrepreneur and Cooperative Development, would encourage graduates to set up small businesses in fields such as ICT, tourism, *halal* products, food processing and packaging. They would be trained in new courses developed by state skill training centers under the Industrial Skills Enhancement Program, with financing of up to RM 50,000 each to set up a business.

The international experience suggests that such self-employment assistance programs can help a small sub-set of the unemployed, but they are not for everyone since many of the unemployed do not see self-employment as an option. The Malaysian scheme recognizes this and only targets 200 graduates to be assisted in 2006. Programs that work usually include not only financial assistance to set up a business, but also a package of training, counseling and assistance in developing and implementing a business plan. Successful examples include Romania's Small Business Consultancy and Assistance Program, which offered displaced workers with legal, marketing, sales, financial and consulting services, and Canada's Self Employment Assistance (SEA) Program which has demonstrated positive short-term earnings gains and high rates of business survival (see Box 10.2). The evidence also suggests that better educated males fare better in these programs, which augurs well for the Malaysian initiative targeting graduates.

Box 10.3 Canada's Self-Employment Assistance (SEA) Program

The Canadian Self-Employment Assistance (SEA) program showed a positive and sizeable earnings gain in the year following the program. Participants in the SEA program are eligible for up to 52 weeks of self-employment assistance with financial support to set up a business if they were on employment insurance. The short-term business survival rates (and therefore probability of self-employment) are high, and participants experience positive earnings gains of $213 more per week than the comparison group. They also increased work hours by 13 hours, comparing their experiences before and after completing the SEA program.

Source: Frank Graves and Benoit Gauthier (2000), "*Evaluation of the Self-Employment Assistance Program*", Human Resources Development Canada

Long-Term Policies to Improve Labor Market Outcomes

Over the long-term, more efficient labor markets will lead to improvements in labor market outcomes, for university graduates and for other educational groups as well, and a more effective transmission of knowledge and skills from education and training institutions to the real economy. In meeting this challenge, the Government should focus on several longer-term policy priorities: improving the workplace relevance of education and training; strengthening employment services; making labor market data more accessible for research; disseminating widely labor market information; and encouraging systematic monitoring and rigorous evaluations of labor market programs. Each of these priority areas are discussed below in turn.

Increase Workplace Relevance of Education and Training

An underlying premise in the design of the government's ALMPs is the mismatch between the education and training graduates receive in tertiary institutions and the knowledge and skills required by the workplace. These measures seek to overcome limitations – in education and skills, familiarity with workplace demands, and student

expectations – not adequately addressed by educational institutions through job attachments, training, placements in the private sector and direct job creation. These skills gap bridging measures, however, are short-term in nature and their effectiveness remains to be determined. As the previous section noted, it may be more important for the government to focus on "preventative" policies and address directly these perceived supply side limitations.

The government has already started to formulate various strategies and measures to address these supply side issues (Mid-Term Review, 8th Malaysia Plan). The include reviewing academic programs with private sector input, incorporating soft skills in the curricula, offering programs on entrepreneurship, double majors, and structured career counseling services. Chapter 9 of this report discusses extensively other areas in which the Government could improve academic programs, teaching, student learning and quality assurance, and need not be repeated here. Some additional recommendations, more pertinent to the links between education institutions, the labor market and the private sector, include:

- **Strengthening career counseling for students**. Interviews with different public and private institutions of higher learning, as well as reports for MOHE,[99] indicate that career counseling for students is weak and poorly utilized. Effective career counseling requires that universities have professionally trained counselors, strong ties to the private sector community, and access to good information on available job opportunities and high-demand careers drawn from the institution's own graduate tracer studies, and from government labor market information sources (this is developed further below).

- **Fostering stronger university-industry linkages**. Universities, public and private, will need to strengthen their linkages with the private sector and with industry to ensure that their curricula better reflect the needs of the workplace. How well they do this will be reflected in job placement rates, and in how well graduates perform subsequently in the labor market. Some of the proposals of the Federation of Malaysian Manufacturers (FMM)[100] for better integrating private sector needs in university curricula should be considered – for students, early exposure to industry work requirements, including managing and servicing labs and research centers, assignments to work with industry, and one-year attachments to industry within sandwich programs; for faculty, encouraging private sector assignments as part of their career development, especially important for engineering and science faculties, to better reflect industry needs in their curriculum; and establishing a permanent industry lecturer program within universities to further strengthen industry-university linkages.

- **Introducing programs in high-demand fields**. Universities need to identify the gaps in their course offerings that are in high-demand in the private sector. What

[99] National Higher Education Research Institute (2003), "*Laporan Kajian Masalah Pengangguran di Kalangan Siswazah*", University Sains Malaysia, Penang.
[100] See FMM paper of May 2005, "University Curriculum", mimeo, Kuala Lumpur.

these gaps are can be identified through systematic consultations between universities and the private sector, through market surveys, and from labor market information provided in government publications. Competition for students will create incentives for universities to do so. When the costs of developing and delivering these programs at reasonable cost inhibit their introduction, the Government of Malaysia should consider co-financing their development costs. This is already reflected in the Human Capital component of the 2006 Budget with, for example, 10-year tax allowance to private institutions of higher learning on qualifying capital expenditures to deliver high-demand courses such as biotechnology, medical and health sciences, immunology, and material sciences and technology.

- **Continuing improved annual tracer studies of graduates**. The practice of conducting annual tracer studies of graduates using a common format should be continued, for **all** institutions public and private. Private higher education institutions have not participated to date, and the absence of data on their graduates who make up almost half of university graduates in the country severely limits informed policymaking. Tracer studies provide individual institutions with invaluable ongoing feedback from graduates, to improve curricula design and workplace relevance of teaching, and for use in career counseling. Collectively, they provide MOHE with comparative data on how the different institutions under their purview are performing, and for monitoring broader trends and developments. Periodically, perhaps once every three years, MOHE should commission a larger-scale tracer study, one that follows graduates for a year after convocation, and that rigorously analyzes **individual** graduate data from each institution, public and private, for insights into their school-to-work transition and successful integration into the labor market.

Strengthen Employment Services

A strong employment service is the cornerstone for the efficient operation of labor markets and for the delivery of active labor market policies to the unemployed. The World Bank meta-assessment of ALMPs highlighted the global consensus that employment services – comprising job search techniques, career counseling, testing and assessment, matching job seekers with training and retraining programs, and job brokerage services – are the most cost-effective measure among all the ALMPs. They are relatively inexpensive to deliver, yet demonstrate significant employment and wage gains for the unemployment as compared to those not using employment services.

Employment services in Malaysia are provided by state labor offices (*Jabatan Tenaga Rakyat* or JTR) supported by the Ministry of Human Resources. Surveys of graduates and retrenched workers in 2001[101] suggest that the JTR is not a popular source of employment information for job seekers, and most use alternative sources of information

[101] See previous citation by SERI (2002), "Economic Briefing to the Penang State Government: Unemployment Situation in Penang". The findings are based on a national survey by Jobstreet.com, and on surveys of retrenched workers and unemployed graduates in Penang state.

such as the broadcast and print media, and referrals from family and friends. The majority of respondents do not regard the JTR as an effective channel for finding employment because of lack of confidence in the services provided by JTR, staffing shortages, poor publicity and lack of information about JTR, and relative inaccessibility to JTR services by rural job seekers. This is consistent with what respondents in graduate tracer studies say about how they search for employment, and confirmed by the broader population of respondents to the Labor Force Survey.

The Ministry of Human Resources has sought to improve employment services in the country by harnessing the potential of ICT. In 2002, it implemented an electronic labor exchange (ELX), linked to all JTR offices, to improve the efficiency of job matching. In a second phase, the Ministry is reportedly rolling out an internet-based Training Management Information System to help match workers who need training or re-training with the specific training providers available.[102] When implemented, this MIS on training programs should significantly expand the range of services that the JTR can provide job seekers. The Ministry has also opened up the provision of employment services by the private sector, licensing several private employment agencies including Jobstreet.com, and introducing alternative (and innovative) pathways to job search. Jobstreet.com provides a popular online recruiting website, with over 20,000 corporate clients and 3 million registered job seekers.[103]

- The Ministry and JTR should develop and implement a vision for what the JTR is, and what is unique about the employment services it provides given the competing services provided by private agencies. Such a vision might be based on the one-stop shop model, such as that used in the United States, which provides job seekers with an integrated package of job search assistance, counseling, testing and referrals to available and appropriate training programs and funding sources.[104]

- To implement this vision will require increased budget allocations to an expanded JTR, for staff training in career counseling and IT, the needed computers and internet to fully exploit the ELX and Training MIS systems, and professional upgrading of JTR staff. There should also be better publicity of the vision, and the expanded packages of services that JTR can provide job seekers.

Make Surveys more Policy Relevant and Accessible

The LFS, conducted quarterly by the Department of Statistics (DOS), is the primary ongoing source of nationally-representative data on the labor force, educational attainment, employment, and unemployment. Several modest changes to the LFS

[102] Dr. Fong Chan Onn, "Combating Unemployment: The Malaysian Experience", paper presented by the Minister of Human Resources at the Bali Summit, December 8, 2003.
[103] Jobstree.com has successfully expanded its job seeker and corporate client base in Malaysia and the region, and recently became a listed company on the stock exchange.
[104] Currently, job seekers have no incentive to register with JTR because Malaysia, unlike other countries which have an unemployment insurance system, does not provide job seekers with unemployment benefits. JTR must provide a compelling reason for job seekers to use its employment services

instrument could vastly improve its potential for addressing many of the policy concerns over unemployment raised in this report, as well as other labor market issues such as skill development and lifelong learning. This might involve, for example, adding questions on public versus private education (which the 2000 Population Census now asks), earnings information for those in wage employment (only asked in a separate Household Income Survey), and participation in post-school training.

Another improvement in going to a rotating sampling frame is that sub-samples of the LFS household members can be followed over time. DOS currently draws independent samples of households each quarter, with no overlap between samples. However, DOS has had experience with such a sampling frame in 1998/99 as part of an effort to monitor the impact of the Asian financial crisis on poverty. The US Bureau of Labor Statistics, and an increasing number of developing countries, relies on a rotating sampling frame for its Current Population Survey, with sub-samples that overlap year-to-year which reduces discontinuities in the data series and also yields sub-samples of household members that can be tracked over time. See Box 10.4.

Box 10.4 The US Current Population Survey's Rotation Sample Frame

The U.S Bureau of Labor Statistics (BLS) uses a rotation sampling approach for the Current Population Survey, the principal source of labor market information in the U.S. Each monthly sample is divided into 8 representative rotation groups, each is in the sample for 4 consecutive months, leaves the sample for the next 8 months, then returns for another 4 months. Under this system, 75% of the sample is common from month to month and 50% is common from year to year for the same month. This procedure provides a substantial amount of month-to-month and year-to-year overlap in the sample, thus yielding better estimates of change and reducing discontinuities in the data series. It also generates – on an ongoing basis – invaluable panel data for policy research since 50% of each rotation group can be tracked over time for a period of one year.

The advantage of going to a rotating sample frame is generating longitudinal information on persons in the labor force, albeit only over a year or 18 months depending on the rotation methods used. These new data could be used to investigate, for the first time in Malaysia, a variety of time-dependent labor market issues including school-to-work transitions, unemployment duration, job mobility, and wage growth. More importantly, it would provide policymakers with ongoing source of data for selecting comparison groups to use in evaluations of labor market programs.

Mexico's urban labor force survey, *Encuesta Nacional de Empleo (ENEU)*, has used a rotating sample design for almost two decades now. This panel dimension of the ENEU has been widely used in evaluating the Government of Mexico's PROBECAT program of retraining for the unemployed, and through feedback from evaluations, improving the design and targeting of the program. See Box 10.4. It is also now being used in evaluating a variety of government programs in the areas of education, vocational training and poverty reduction. To improve the data used in evaluation studies, several ministries working with the national statistical office have now institutionalized the enumeration of special module add-ons to the ENEU survey to collect information specific to the programs being evaluated.

Box 10.5 Evaluating Mexico's Retraining Program for the Unemployed

Revenga, Riboud and Tan (1994) evaluated Mexico's retraining program for unemployed and displaced workers (PROBECAT) using a quasi-experimental evaluation design. A tracer study of the 1990 cohort of PROBECAT trainees was conducted in 1991, one year after completing the program. Exploiting the rotating sample frame of the urban labor force survey in Mexico, the labor market experiences of this 1990 trainee cohort were compared to that of a comparison group of unemployed from the 1990-1991 urban labor force survey, matched by age, education, years of work experience and household attributes. The net effects of the retraining program – on duration of unemployment, employment probability and earnings – were generally positive but the results varied across different groups of trainees. This led the authors to recommend better targeting of retraining services – remedial basic education for low education youth, income support training assistance for unemployed adults, or firm-based attachment programs for those with little prior work experience – at different groups of trainees according to their needs, and the findings of the evaluation study. The Labor Ministry has continued to evaluate the PROBECAT program periodically to this day.

Widely Disseminate Relevant Labor Market Information

There is great demand for timely and relevant labor market information from many different constituencies in the country, including education and training institutions, government agencies, policymakers, employers and individuals and households. Labor markets can operate efficiently only when all these constituencies can make informed decisions based on solid information. This kind of information is a public good, and creating and widely disseminating relevant labor market information is an appropriate role for government. Recommendations to improve the labor market information system include:

- **Greater and more ready access to the wealth of micro labor market data generated by government institutions**. The Department of Statistics, Malaysia's national statistical agency, collects a variety of high-quality statistics through surveys of households and employers – access to these micro data is critical it they are to be used for policy analysis and information generation. Many countries make appropriately sanitized micro data available to researchers at a nominal cost. Research made possible by such data access not only develops capacity in local universities on Malaysian issues, but it also enlists the expertise of the research community in addressing pressing policy questions in areas where the government may have limited capacity.

- **Setting up a labor market observatory tasked to conduct labor market studies in the public interest, and for the government**. Its mandate would include publication and wide dissemination of relevant labor market information to all stakeholders, including education and training institutions, government

agencies, employers, and individuals. Box 10.5 provides an example of a Chile's labor market observatory, which generates labor market information targeting educational and training institutions. The Malaysian observatory could have a broader scope, covering labor market information as well as conducting policy-relevant research. Given limited public sector capacity, the observatory could be structured as a national institute, located in a university, and draw upon research expertise from the university and beyond.

Box 10.6 Chile's Labor Market Observatory for Tertiary Education Graduates

Chile has established a so-called labor market observatory to track the performance of tertiary graduates in the labor market. The observatory was created to monitor the quality and relevance of technical institutes and university undergraduate programs and provide students a firm basis for making informed career choices. The observatory draws on income data from the tax system to collect information on the earnings of recent graduates from technical institutes and universities. Currently, information is available on 44 technical and 69 undergraduate careers, representing approximately 75% of the total enrollment in Chilean tertiary education. The available data has become an important source of reference for students and parents. On average, 4,000 individuals visit the observatory's web page every day (http://www.futurolaboral.cl).

Source: Jose Joaquin Brunner and Patricio Meller (2004). *Oferta y Demanda de Profesionales y Tecnicos en Chile - El Rol de la Informacion Publica*, Santiago: Ril Editors.

Institutionalize Monitoring and Evaluation of Programs

The Malaysian Government has implemented many innovative policies to address a variety of education, training and labor market issues. It collects high-quality survey and administrative sources of information to monitor implementation of these policy initiatives, and in many cases, implements tracer studies to track the attainment of policy objectives. To date, however, there has been less focus on the rigorous impact evaluations of programs and policies using a comparison group that are required to determine if programs and policies are actually achieving hoped-for outcomes, whether such interventions are effectively implemented and if so, whether they are cost-effective in comparison to other policy measures, and to the alternative of not intervening.

Rigorous evaluations of programs and policies will be needed to ensure that the Government's investments in human capital under the 9th Malaysia Plan are to bear fruit, and to advance the country's Knowledge Economy strategy. The following are several recommendations to improve monitoring and rigorous evaluation of programs and policies pertaining to human capital, including some touched on above:

- **Evaluate Education and Training Institutions.** Tracer studies should be conducted on graduates of all education and training institutions so that comparisons can be made of employment outcomes by institution, both public and private, across disciplines and level of qualification. Annual tracer studies are

useful for monitoring purposes, but they should be complemented periodically by larger scale tracer studies that follow graduates over a longer period of time. The LFS, appropriately modified to track cohorts over time, could also distinguish between education in public and private institutions, yielding comparison groups that could be used for policy and program evaluations. Finally, these data should be generated on an ongoing basis, perhaps by a labor market observatory, and widely disseminated to government and educational institutions to design policies, and to students and families to make informed decisions about education.

- **Evaluate Labor Market Programs.** The Government has introduced numerous programs to address the unemployment problems of graduates, and these measures need to be rigorously evaluated using a control group of unemployed graduates that did not participate in these programs. Graduates are not the only ones experiencing unemployment and other labor market related issues; other groups in the workforce are also being assisted through the interventions of the Ministry of Human Resources, the Human Resources Development Corporation (PSMB), the Small and Medium Industry Corporation (SMIDEC), the Ministry of Entrepreneurship and Cooperative Development among others. Their programs also need to be rigorously evaluated, using a quasi-experimental approach, to better provide the Government with information on their net impacts as well as their cost-effectiveness. Such information is needed for improving the design and targeting of programs, and for resource allocations.

- **Institutionalize Monitoring and Evaluation**. The Government could consider institutionalizing systematic monitoring and impact evaluations (M&E) within the framework of performance-based budgeting for all government programs that receive substantial public resources. The culture and capacity to undertake M&E in many Malaysian government agencies is limited, and there are few incentives for these agencies to take on this expanded role unless it is mandated. Many countries in the OECD have moved to such a system, including the United States, Korea and more recently, Mexico in 1999. Lessons learned from their experiences suggest that the M&E requirement be phased in gradually, with annual monitoring complemented by periodic scientific evaluations so as not to overburdened the government agencies. Adequate resources should be allocated from general revenues to finance evaluation studies, and to provide training for staff in M&E methods. To ensure that the evaluation results are credible and transparent, government agencies could commission independent experts to conduct the impact evaluation studies. Local experts and academics have limited experience doing such rigorous impact evaluations, but will develop expertise over time as they are provided opportunities to work with the government.

Chapter 11. Strengthening the National Innovation System

Recommended Actions:

(1) Reforming the Malaysian Science, Technology and Innovation Policy Framework

- *The GOM could reorient the role of the State in Malaysia's future economic development. Specifically, GOM could take a pro-active role in building regional institutions for training- and technology acquisition, devise a comprehensive innovation policy with the same rules and conditions applying to all sectors, and make industry and research institutions (GRIs as well as universities) partners in the formulation, implementation and evaluation of innovation policy.*

- *GOM could make the notion of Innovation Systems the overarching conceptual framework for the formulation, implementation and evaluation of a range of policies, spanning from Higher Education policy to Industrial Policy.*

- *GOM could formulate economic development strategies for each of the regions of the country based on the natural resources and industrial strengths of each region, rather than just one strategy for the national economy as a whole. These regional economic development strategies could be undertaken jointly by industry, government and research institutions, and engage international expertise on global value chains in sectors identified as strategic for each region.*

- *Malaysia could conduct a comprehensive review of STI policies, institutions, and spending allocations to see whether existing programs are supporting the transition to a knowledge-based economy, what programs should be terminated or modified, and what new programs should be inaugurated.*

(2) Involving the Universities in Regional Development Efforts

- *To maximize its scientific and economic relevance, research should be organized along multidisciplinary/problem oriented lines and have close links to teaching and industry. To achieve this objective, Malaysia could inaugurate a Center of Excellence program, similar to the one that Chile implemented.*

- *To ensure that these Centers of Excellence generate the expected economic benefits in addition to conducting top notch science, these centers could be connected to domestic and global technology markets. Therefore, GOM could establish at least one pilot Technology Commercialization Office (TCO) in several key cities throughout the country. Each TCO could be housed in a major university or research institute in the selected city. A Technology Commercialization contractor*

with extensive international experience in technology commercialization could be selected to establish and manage the TCO.

- *Malaysian officials and Malaysian scientists should have a clear view of what Malaysia is trying to commercialize. The current emphasis on venture capital and technoparks suggests that Malaysia is focusing on commercializing inventions. GOM ought to make a greater effort to market the country's research capability and capacity.*

- *Much of the technological knowledge that Malaysian industry needs to utilize in order to become more productive and competitive already exists. The problem is that Malaysian firms, in many cases are unaware of this technology or, if they are aware, many individual firms, especially smaller ones, do not have the technological and engineering capability to modify it for local use. To address this problem, Malaysia could encourage organizations such as SIRIM and the Malaysian Palm Oil Board to help local industry find appropriate technologies, adapt them for local use, and adopt them inside local companies. This would entail broadening the mandate of these organizations from the creation of new technology to finding, adapting, and adopting technologies produced outside Malaysia.*

- *GOM could develop a supplier development program that would support cluster development in selected industries by helping Malaysian workers and enterprise managers acquire the technical skills, organizational capacity, and managerial capabilities which they would need to supply high value-added goods and services both to foreign companies operating in the target industry.*

- *GOM could encourage universities to devise strategies for their contribution to regional economic development, both in terms of active participation in the regions' training and technology institutions, and in terms of interacting with the other agents in the regional innovation system. The formulation of these strategies at the university level should be supported by central government funds, and should require involvement of regional industry, government research institutions, and international experts in the process.*

- *For universities to take an active role in innovation and commercialization, they should be provided with special funds to build institutional capacity for these tasks. Such funds could be tied to performance contracts made with each individual university. This would have the advantage of making it possible to connect such funding with other key objectives and challenges in STI policy-making, and would be well-aligned with the more general objective of shifting to a mode of higher education governance based on performance contracts and accountability procedures.*

- *The GOM could launch a Technology Clinic scheme, following the model developed for this in Finland. This scheme is particularly relevant to Malaysia because it is specifically tailored to servicing SMEs that do not have a high level of technology adoption and innovation know-how.*

- *The key resource for innovation – the sine qua non of a knowledge-based economy – is not so much research as it is entrepreneurs. Therefore, the promotion of entrepreneurship should be very high on the agenda of the higher education sector (as well as in primary and secondary education). In this area, the GOM could draw upon the comprehensive study of entrepreneurship education recently completed by the European Commission.*

"We need to be developers of knowledge and expert practitioners of superior technology. It's vital that we move the nation's innovation agenda forward".

YAB Dato' Seri Abdullah Haji Ahmad Badawi
Prime Minister, Malaysia
Keynote Address at National Innovation Seminar
LimKokWing University, 2004

As the Knowledge-Based Economy Master Plan suggests, to become a knowledge-based economy, the Malaysian economy must evolve from a production-based economy, where competitiveness is based primarily on mass production, low cost manufacturing efficiency, relatively unskilled labor, and low wages to an innovative economy. In the latter, competitiveness would be based on integrating science, technology and engineering into the production process. Creativity, imagination, knowledge and design capability would be embodied in well educated skilled workers. And sophisticated, innovative enterprises would be the source of national prosperity and wealth.

The Knowledge-Based Economy Master Plan states that the Malaysian economy is at a crossroads. Malaysia prospered during the last 20 years because it established itself as a successful production-based economy. Malaysia's global competitiveness rose significantly during this period. But other countries, with even lower wages and more FDI, are now also entering the global economy. If Malaysia wants to ensure continued growth, prosperity, and rising standards of living, it has no choice but to become an innovative, knowledge-based economy. The GOM has stated unambiguously that it wants Malaysia to become a leading innovative economy. Improving the efficiency of the National Innovation System (NIS) is an absolute necessity. This chapter will discuss specific, concrete programs and policies that can be implemented within the Framework of the Ninth Development Plan to achieve this goal.

Malaysian policy makers in general and university rectors in particular are already addressing many of critical tasks needed to improve the effectiveness and efficiency of the NIS, but in a piece-meal fashion. In many cases they are focusing on the correct objectives and they are establishing many of the same innovation and technology commercialization infrastructure institutions that are found in such leading innovative economies as the US, Finland, and Singapore. However, these institutions need to forge closer linkages between local and global technology markets and local and global

research markets. They also need more skilled personnel and sophisticated strategies and programs to achieve their stated objectives. For example:

- Malaysia's current approach to promoting the development of a knowledge-based economy emphasizes the production of new technology – so called technology push via R&D – rather than enhancing the absorptive and innovative capacity of firms. Put differently, whereas Malaysia has well-developed science and technology policies and government spending programs, it lacks an equally comprehensive set of enterprise innovation policies and programs.

- Simply increasing the ratio of R&D spending to GDP and the supply of R&D will not ensure Malaysia's successful transition to a knowledge-based economy if there is no demand for the knowledge and inventions produced by Malaysian engineers and scientists. Finding markets for this knowledge and helping Malaysian firms become more effective and sophisticated consumers of technical knowledge produced outside the country must become just as important as increasing R&D spending and overseas patenting, and improving the quality of Malaysian R&D.

- Malaysia has made important efforts to promote the selling or licensing inventions produced by Malaysian scientists. This is, however, only one facet of technology commercialization. A second, and perhaps more promising avenue of technology commercialization, would be to perform contract research for customers who are trying to solve a specific technological problem. In this approach, Malaysian researchers sell their research and problem solving capability, rather than a specific invention. If they wish to be successful players in the global technology markets, Malaysian universities will need to do more to develop this market niche.

- Malaysia has made impressive strides in establishing technology commercialization programs and institutions, in both universities and government research institutes. The government has also been actively promoting the development of science parks, incubators, as well as the world-renowned Multimedia Super Corridor. But at present, too many of these institutions need more skilled personnel, market experience, and business contacts to run a world class commercialization program. In addition, these institutions may need to focus on a broader range of commercialization options and programs, similar to what is described in the preceding paragraph. There is a wealth of international experience regarding the establishment and operation of these institutions. Malaysia needs to emulate some of these successful examples.

- In addition to seeing universities and government research institutes as suppliers of new knowledge, many countries have broadened their role to include technology acquisition from abroad and diffusion of this technology to

local industries. Notable examples include the Industrial Technology Research Institute (ITRI) in Taiwan, Fundación Chile, and Engineering Research Centers in the US. To support the transition to a knowledge-based economy, Malaysia may wish to consider encouraging some universities to develop these new functions.

- Malaysia has attracted significant foreign investment. But evidence suggests that these foreign firms do not conduct much R&D in Malaysia. Nor do they purchase many high value added goods and services from Malaysian enterprises. International experience suggests that there are a number of supplier development programs that can help Malaysian firms become qualified suppliers to dynamic foreign firms. If Malaysian companies can supply high value added goods and services to dynamic foreign firms operating in Malaysia, there is no reason why they cannot eventually also supply similar goods and services to firms operating throughout East Asia as well as throughout the world. In other words, these programs would help Malaysian firms become suppliers of knowledge-intensive value added goods and services to the global market.

This chapter describes specific policies and programs that Malaysia might want to consider introducing so that it can improve the efficiency and effectiveness of the National Innovation System. Special attention will be given to recommendations that augment the contribution of the universities to innovation. A world-class national higher education system is a *sine qua non* for improving the NIS, for several reasons. First, most of Malaysia's S&T personnel are employed in the higher education sector. Improving the national R&D system will be impossible without the support and participation of research-intensive public and private universities. Second, higher education institutions will have to play a major role in training enterprises to use more sophisticated technology. And finally, via their standard science and engineering undergraduate curricula as well as via their lifelong learning programs, they will play a major role in both training and retraining workers to utilize new technology.

This chapter is organized as follows: The first part will briefly review several tried and true principles of appropriate science, technology and innovation policies. This will be followed by a discussion of policies to reform the Malaysian S&T Framework. The concluding section will discuss specific policies to improve the contribution of universities to innovation. This chapter draws very heavily, but not exclusively, on the Finnish experience, drawing out the lessons that are of particular relevance to Malaysia. This is because Finland has been extremely successful in making the transition to a knowledge-based economy in a relatively short period of time, and thus should be of particular interest to Malaysia.[105]

[105] For a more comprehensive overview of the Finnish model, see Carl J. Dahlman, Jorma Routti, and Pekka Ylä-Anttila, Finland as a Knowledge Economy: Elements of Success and Lessons Learned, World Bank, 2006.

Principles of Appropriate Science, Technology and Innovation Policies

In most successful market economies:

- Business enterprises are at the center of the industrial technology system (See Figure 11.1, below). They generate both the supply of technology as well as the demand for technology. Moreover, most of the technology used by industry is produced **in** the industrial sector **by** the industrial sector, rather than in independent research laboratories and institutes.

- The enterprise sector finances most of the R&D performed in a country and also conducts most of the R&D, including that portion of R&D financed by the public sector.

- R&D is only the tip of the technology development process (Figure 11.2) which, in addition to R&D includes such critically important innovation support activities as: (a) skills for acquiring, using and operating technologies at rising levels of complexity, productivity and quality; and (b) design, engineering, and associated managerial capabilities to acquire technologies, develop a continuous stream of improvements and generate innovations. Different skills are most relevant at different stages of technological development. For example, R&D is most relevant for firms that are closing in on the technological frontier or already at the frontier. Technology acquisition and utilization skills, on the other hand, are most relevant for firms that are at the technology acquisition, assimilation or deepening stages.[106]

[106] This analysis draws extensively from the discussion in Martin Bell, Knowledge Resources, Innovation Capabilities and Sustained Competitiveness in Thailand: Transforming the Policy Process, Report Prepared for the National Science and Technology Development Agency of Thailand, (Funded by the World Bank via IDF Grant No.TF050237), January 2003.

Figure 11.1 The Industrial Technology Development System: A Schematic Framework

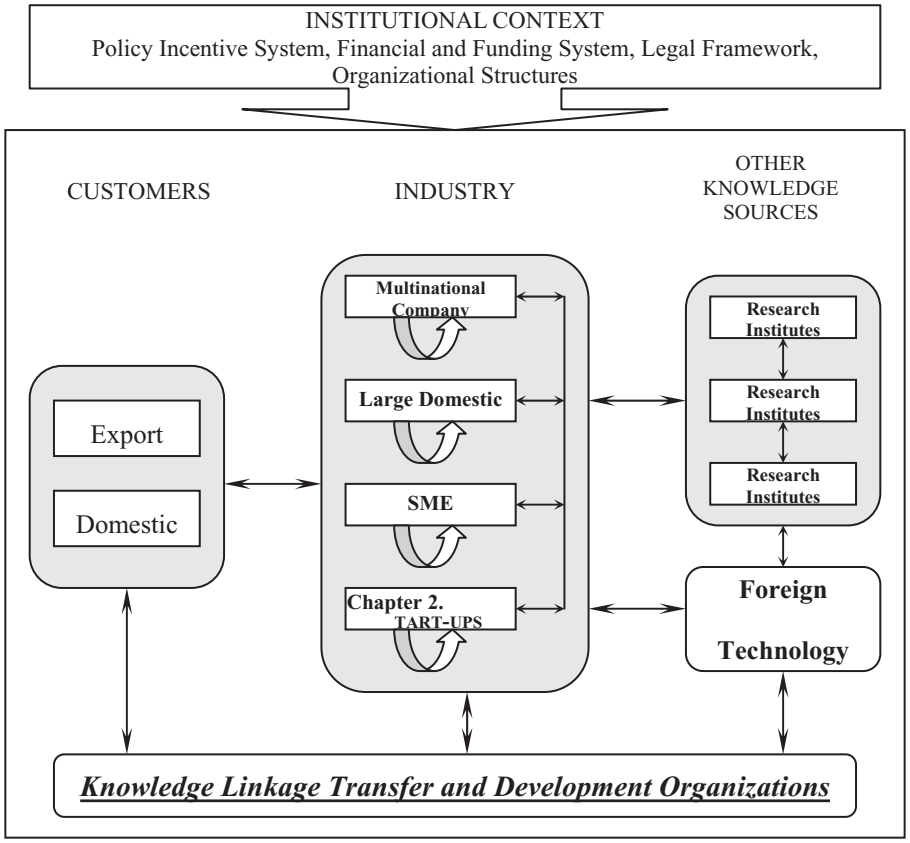
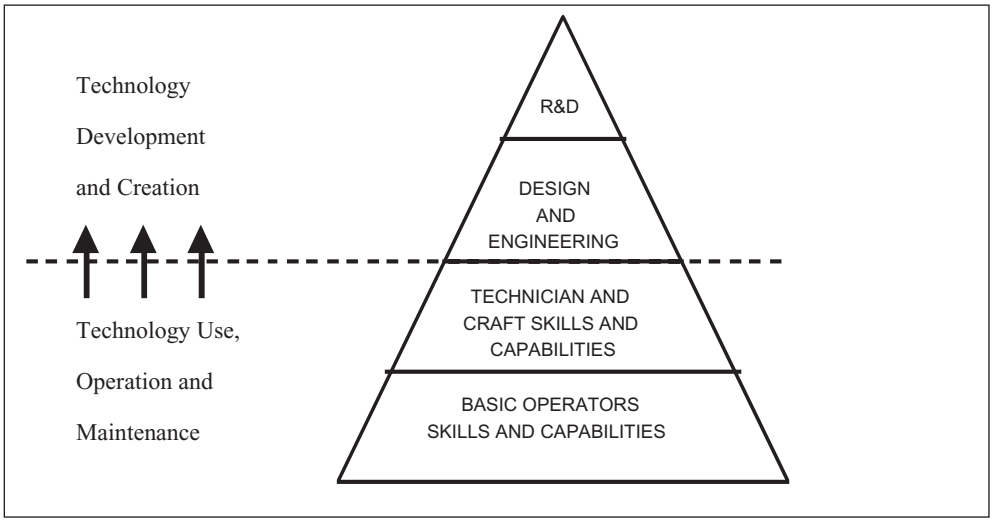


Figure 11.2 Hierarchy of the Structure of Industrial Technology



As the Knowledge-Based Economy Master Plan candidly acknowledges (Chapter 6), the Malaysian NIS does not yet conform to this model. Therefore, Malaysian innovation policies should focus on fostering the transition from the current situation to the new, more efficient arrangements. But in doing so, policy makers need to be alert to several critical policy choices lurking in the background. These include:

Support technology acquisition and diffusion

Basic research and innovation are not synonymous concepts, especially in countries like Malaysia where most enterprises operate below the technological frontier. Few Malaysian enterprises innovate and most of these firms innovate by importing capital equipment rather than by either conducting basic research themselves or purchasing research services from Malaysian or foreign research institutes. For better or worse, in other words, innovation and basic research in Malaysia are separate, distinct, and discrete activities. Policy makers may be missing an important opportunity to increase employment, wages, and overall standards of living if they focus on basic research to the exclusion of the more "mundane" tasks of technology upgrading -- design and engineering, the ability to acquire technology developed outside the country, and the managerial, organizational and technical capacity simply to utilize more advanced technology – in those core industries which operate below the technology frontier.

Support development of high value-added products

Contrary to popular opinion, high tech is not always synonymous with high value added, high wages, and rapid growth. On the contrary, economies such as Malaysia may get more development "bang for the buck" by helping "low tech" sectors increase value added than by trying to develop a few high tech niche products and industries. Policy makers, however, tend to view high tech as the surest route to competitiveness and prosperity. They mistakenly devote considerable resources to building up a small high tech sector while ignoring the competitive enhancing opportunities available from the much larger non-high tech part of the economy. Improving the balance between high-tech and non-high tech is of paramount importance. An imbalance could be especially damaging to long run growth and economic stability if government support for high-tech sectors creates a dual economy: on the one hand a low wage, low productivity traditional sector responsible for the bulk of employment, GDP and exports and, on the other hand, a small high-tech sector that is more or less disconnected from the rest of the economy.

Take full advantage of global knowledge and technology markets

Policy makers should not focus solely on the commercialization of knowledge produced inside Malaysia at the expense of helping firms import innovative technology produced outside Malaysia and adapting it for local use. Even if Malaysia boosts R&D spending (as a share of GDP) to the EU average, vastly improves the targeting and efficiency of its R&D spending, and commercializes a large share of those technological innovations generated in Malaysian laboratories, Malaysia will still be a minor player in the global R&D arena. Like it or not, therefore, most of the economically relevant knowledge that

Malaysian firms will need to boost productivity and compete internationally will be produced elsewhere. Malaysia's success in the global economy will depend as much on the ability and willingness of Malaysian enterprises (both foreign-owned and domestic) to adapt and utilize knowledge produced outside Malaysia as it will be for Malaysian scientists to commercialize the knowledge produced inside Malaysia. Malaysian policy makers and business executives, therefore, should devote more attention to enhancing Malaysia's ability to scour the world for knowledge, import it into Malaysia, adapt it for local use, and integrate it into local production processes.

Connect effectively with global value chains

Policy recommendations to improve the functioning of the R&D and innovation systems typically focus on the promotion of high tech SMEs. This is in part inspired by a desire the success of Silicon Valley. But it is also based on a it is important to note that although, Silicon Valley is a hotbed of small, high tech startups, these SMEs did not arise in a vacuum or in isolation from large dynamic enterprises. On the contrary, SMEs which operate without a dense network of linkages to dynamic larger (foreign or domestic) enterprises will most likely not become a source of well paying jobs, economic competitiveness and rapid growth. Instead, they are likely to become little more than low productivity, subsistence operations. Put differently, links to dynamic large enterprises may be a critical pre-requisite for the emergence of dynamic SMEs. If so, policy makers may be making a serious blunder if their SME policies do not pay sufficient attention to helping large Malaysian enterprises become more dynamic and competitive and helping Malaysian SMEs become qualified suppliers to dynamic Malaysian, EU, or international large enterprises. Developing these supplier relationships through well targeted training policies, supplier development programs, and entrepreneurship education, should become a more prominent feature of Malaysia's SME policy, innovation policy, and competitiveness strategy.

Embed S&T efforts in a broader policy of competitiveness, linkages and entrepreneurship

Innovation policy covers many issues that at first glance would appear to have little to do with innovation. For example, one influential analysis of factors that influence the "national environment for innovation" refers to such items as "sophisticated and demanding local customers," "home customer needs that anticipate those elsewhere," the "presence of capable local suppliers and related companies," "vigorous competition among locally based rivals," and the "presence of clusters instead of isolated industries." These business environmental factors help to establish a strong demand for innovation. They give local enterprises the incentive to innovate, the knowledge about what innovation could be most profitable, and the capacity to assess technology options. Seen from this vantage point, they are an essential complement to local R&D capacity. Malaysia ranks rather well on indices of scientists and engineers and perform rather poorly on indices of clusters and linkages. Its major weakness, in other words, is that it has yet to fully utilize its knowledge and human capital effectively and efficiently. This suggests that policy makers will maximize the effectiveness of education, training, and

R&D initiatives if they embed them in a broader policy of competitiveness, linkages, cluster formation, and entrepreneurship.

Involve business entrepreneurs in technology commercialization

It is generally accepted that entrepreneurs cannot use their entrepreneurial skills to become good scientists. But the converse is also true. Most good scientists cannot use their scientific skills to become good entrepreneurs. Unfortunately, this truism is often overlooked when policy makers attempt to promote technology commercialization. Policy makers establish incubators and technoparks to nurture new businesses started and operated by scientist-entrepreneurs. These commercialization institutions frequently fail to live up to their founders' expectations, in part because they tacitly assume that top notch scientists can handle the marketing, sales, financial, legal and overall managerial tasks performed by a top notch entrepreneurs. This is rarely the case. Therefore, if policy makers want to promote technology commercialization, they will need to establish closer organizational and institutional linkages between top notch scientists on the one hand and top notch entrepreneurs on the other hand.

Policies to Reform the Malaysian Science, Technology and Innovation Policy Framework

Reinvent the role of the State in Malaysia's economic development

The current mix of three main strategies – control, fiscal incentives, and preferential treatment (whether for specific industries, ethnic groups, or other) – is not conducive to Malaysia's transformation to a knowledge-based economy. The GOM might consider modifying its 'control and incentives governance' and instead take a pro-active role in building regional institutions for training- and technology acquisition, devise a comprehensive innovation policy with the same rules and conditions applying to all sectors, and make industry and research institutions (GRIs as well as universities) partners in the formulation, implementation and evaluation of innovation policy. Each of the recommendations below is part and parcel of such a new, pro-active mode of governance. To understand the fundamental issues involved in replacing control management with pro-active governance-at-a-distance, Michel Foucault's analysis of liberalism may be of useful inspiration.

Box 11.1 Liberalism as a Cost-Effective, 'Generative' Mode of Governance

From a regime of governance based on a minute regulation and supervision of men and their affairs, in every detail and in all events, the move from state reason (*raison d'état*) to liberalism was a move toward a regime of governance founded upon a new modality of surveillance. With liberalism came a mode of governance that regulated the freedom of individuals on the basis of their self-disciplining under the impact of a 'cost-effective' surveillance. Jeremy Bentham set out to show how one might make such self-disciplining "function in a diffused, multiple, polyvalent way throughout the whole social body" (Foucault 1991: 208-209). Thus, schooling, the domesticated family, the reformatory prison – all were elements in the liberal strategy of government, attempting "to create individuals who do not need to be governed by others, but will govern themselves" (Rose 1996: 45). Prior to liberalism power was exercised as a means of *deduction*, "a right to appropriate a portion of the wealth, products…, labor and blood, … levied on subjects", making power in this regime "a right of seizure - of things, time, bodies and ultimately life itself" (Foucault 1998: 136). With the advent of liberalism, 'deduction' was no longer the major form of power. The major mode of power in liberalism is "a power bent on generating forces, making them grow, and ordering them, rather than one dedicated to impeding them, making them submit" (Foucault 1998: 136). With liberalism, power was no longer the right to take life or let live, but the right to *foster* life, a power to *invest* life. Opting for a liberal mode of governance means, in other words, to shift from a 'deductive' form of power, to a 'generative' form of power. The mode of governance characteristic of liberalism, is "geared to efficiency and productivity" and to "normalization" (Rabinow 1984:. 20). The role of the state, in this liberal mode of governance, is to develop the norms and standards against which agents are to govern themselves, and to facilitate, support and survey the agents governed. In the case of universities, adopting a liberal mode of governance will thus mean abandoning control management and adopting instead a mode of governance predicated upon: (a) formulating goals; and (b) devising mechanisms for ensuring that the agreed goals are being pursued by the universities.

Sources: Foucault 1991, 1998; Rabinow 1984 and Rose 1996

Require innovation system thinking in all policy-making

To be successful in reinventing the role of the state along these lines, it is of paramount importance to coordinate policies across a wide range of areas. The GOM could make the notion of Innovation Systems the overarching conceptual framework for the formulation, implementation and evaluation of a range of policies, spanning from Higher Education policy to Industrial Policy. In this area, Malaysia may benefit from Finland's positive experiences.

Box 11.2 The Science Policy Council in Finland

The Science & Technology Policy Council of Finland was established in March 1987, to assist the Council of State and its Ministries in questions relating to science and technology. The Science and Technology Policy Council is chaired by the Prime Minister. Other members include the Minister of Education and Science, the Minister of Trade and Industry, the Minister of Finance, and up to four other ministers. In addition to them, the council consists of ten other members well versed in science and technology. These must include representatives of the Academy of Finland, the National Technology Agency (TEKES), universities and industry, as well as employers' and employees' organizations. The Council has an executive committee and a science policy subcommittee and a technology policy subcommittee with preparatory tasks. These are chaired by the Minister of Education and Science and by the Minister of Trade and Industry, respectively. The Council's Secretariat consists of two full-time chief planning officers. The Council has been assigned a number of key tasks, most importantly:

- To direct S&T policy and make it compatible with other national policies
- To prepare plans on the overall development of scientific research and education
- To issue statements on the allocation of public science and technology funds
- To handle the legislative matters pertaining to the promotion of research and technology development
- To follow up and assess policies, programmes and measures adopted

The Council discusses main policy challenges in its triennial policy reviews, and makes general suggestions concerning all actors. This usually includes suggestions on how resources for public funding of R&D should be allocated. The actual implementation of these suggestions is left to the ministries and agencies. Individual research or technology programmes are not decided by the Council, nor by the ministries, but at the level of the implementing agencies. The representation in the STP council of all key stakeholders makes its statements and proposals on science and technology policy a strong basis for subsequent policy-making. It is important to stress that one of the strongest comparative advantages of Finish STI policies has been the high degree of integration of policy-making across a number of key policy areas, including science, innovation, industrial, and economic policies.

Source: Vestergaard 2003

Formulate strategies for innovation and technology-driven economic development

Observers unanimously point to the strategic role taken by the National Technology Agency (TEKES) when explaining the impressive growth record of Finland through the 1990's, rising from deep economic recession in the early 1990s to being among the most competitive economies in the world for the past five years. The role played by TEKES was strategic in the sense that TEKES identified the economic strengths and potentials of the different regions in Finland, and designed technology programs for strengthening the development of key sectors and technologies.

Box 11.3 Strategic Economic Development: the Role of Technology Programs in Finland

Since its foundation in 1983, the National Technology Agency (TEKES) has grown to be the principal promoter of R&D in Finland. TEKES provides funding both to research projects at universities, to long-term R&D projects in companies, and to business R&D projects aiming at developing new products, production methods or services. Through its extensive funding of R&D in universities and companies, TEKES has taken a central role in strengthening the technological competencies and economic productivity of the Finish economy. Approximately half of TEKES' funding takes the form of *Technology Programmes*. Thus, in 2001 TEKES provided 185 million euros to financing technology programmes, out of its 385 million total funding that year. These are devised to promote R&D in specific sectors of technology or industry, and to pass on research results to business in an efficient way. These programmes have proved to be a very effective instrument in promoting cooperation and networking among companies and the research sector in each and every region of Finland. Technology programmes are planned in cooperation by companies, research institutes, and TEKES. The duration of the programmes ranges from three to five years; their volumes range from EUR 6 million to several hundred million euros. TEKES usually finances about half of the costs of programmes. The second half comes from participating companies. Projects funded under each technology program are selected competitively.

TEKES technology programmes are seen as a tool with which to make strategic choices and steer research and development. In the words of TEKES, the technology programmes seek to "strengthen the key technologies and expertise from the perspective of Finland's future and provide a foundation for related business operations" (TEKES 2001). These strategic choices and overall technology priorities are worked out in cooperation with industrial cooperations and unions, companies, universities, and actors in the public administration, under the leadership of TEKES. In fact, this procedure of identifying the needs of industry and society, and design technology programmes to meet those needs, may be said to be the essence of TEKES activities. Previous and ongoing technology programmes in Finland are listed in Appendix A.

Source: TEKES 2001, TEKES 2005, Vestergaard 2003

The GOM should be careful to formulate economic development strategies for each of the regions of the country, rather than just one strategy for the national economy as a whole. Formulating regional economic development strategies, based on the natural resources and industrial strengths of each region, is the only way to ensure a full realization of the high growth potential of Malaysia. It is of paramount importance that the formulation of these regional economic development strategies are undertaken jointly by industry, government and research institutions, and engage international expertise on global value chains in sectors identified as strategic for each region.

In line with the previous recommendations, these strategies should be conceptualized in terms of Regional Innovation Systems. The best national innovation system is that which is comprised of a number of well-functioning, regional innovation systems.

Evaluate STI policies, institutions, and budget spending allocations

In conjunction with the two previous recommendations, Malaysia could conduct a comprehensive review of STI policies, institutions, and spending allocations to see whether existing programs are supporting the transition to a knowledge-based economy, what programs should be terminated or modified, and what new programs should be inaugurated.

As part of a comprehensive budget review, representatives from the Government, scientific research community, universities, and the business community should discuss and agree a mission statement that identifies **limited, mutually consistent, and specific** goals and priorities for Government STI spending. For example, is the goal to preserve existing scientific research institutions irrespective of the quality of their research? To support basic research and prestige science? To develop a limited number of "centers of excellence" that will focus on critical research priorities? To support the emergence of new high tech/science intensive SMEs? To help the private sector commercialize innovations funded with budget resources? To help existing old economy enterprises restructure, modernize their plant and equipment and become more globally competitive? Something else?

Once new goals and priorities have been agreed, it the review may suggest that existing expenditure patterns have little or no relation to these new goals and priorities. Therefore, items that do not promote the new priority goals and objectives should be phased out rapidly. New items should be funded only if they serve one of the agreed priority objectives.

Box 11.4 Finland's Model of Evaluation

Evaluation was a key element in Finland's highly successful science and technology policies through the 1990s. In 1990, the Finish STP council declared "increased evaluation in all parts of the research system and in different sectors of science and technology policy" to be a key objective (STPC 1990: 62). The role intended for evaluation was to continuously inform "objective-setting and selection within the innovation system" and further develop "the knowledge-base which supports decision-making on the improvement of the system" (STPC 1993: 28). Thus, in the Finish approach, evaluation is an integral element in the ongoing effort to identify and further strengthen the comparative advantages of Finish economy through R&D, rather than merely an instrument of public control of the correct use of public funds. This applied for the 2002-evaluation of biotechnological research; *Biotechnology in Finland – Impact of Public Research Funding and Strategies for the Future* (December 2002). This report evaluated "the current status of the Finish biotechnology innovation system", and proposed "improvements as appropriate", all in order to "serve as a basis for drafting the next national biotechnology development programme" (Academy of Finland 2002). The evaluation combined an external assessment by an international expert group with an internal self-assessment exercise, and on the basis hereof formulated recommendations directed to the academic sector, the funding organizations and to industry. Another key example of using evaluation and policy research in a strategic and policy-developing manner is the launching of a technology programme aimed specifically at informing the development of advanced technology policy; namely *ProACT – the research programme for advanced technology policy*. Jari Romanainen, former director of TEKES, motivated the practice of basing the formulation of STI policies on evaluations and STI policy research in the following manner:
Policy design and implementation must be innovative and able to experiment with different approaches and tools in order to meet the challenges of the changing innovation environment. This is possible only if the theoretical framework and methodologies continue to evolve and are able to provide a better understanding of the complex interactions and linkages within the innovation environment. Understanding how the system works is the key to successful policy design and implementation. (Romanainen 1999).

Sources: Romanainen 1999, Vestergaard 2003.

Improving the Contribution of Universities to Innovation

A variety of complementary policy reforms can help to improve the efficiency of the Malaysian NIS. As will be discussed in more detail below, universities will need to play a major role in designing and implementing these programs. The programs that will be discussed below include:

- Funding research competitively and selectively
- Establishing professionally managed Technology Commercialization Offices housed in selected universities

- Developing a Technology Broker program
- Involving the universities in regional development efforts
- Strengthening university-industry linkages
- Building the institutional capacity for third mission activities
- Developing entrepreneurship courses
- Aligning the university culture with the business culture

The rest of this chapter discusses each of these recommendations.

Funding research competitively and selectively

Modern science functions best when: (a) research is linked to teaching; (b) scientists and engineers from different disciplines collaborate in multi-disciplinary problem-solving teams, rather than working alone; (c) the supposed distinctions between basic and applied research are minimized or eliminated; and (d) research scientists and business enterprises are linked closely. Global experience also suggests that modern science is multidisciplinary and problem oriented. It cannot be divided along classical lines of chemistry, biology, etc. It cannot be neatly pigeon-holed into basic research vs. applied research. And it cannot be conducted in research institutes that are divorced from teaching. Boundaries between stages, institutions, and disciplines are much more porous. Therefore, to maximize its scientific and economic relevance, it is essential to organize research along multidisciplinary/problem oriented lines and ensure that there are close links to teaching and industry. None of these conditions currently prevail in Malaysia.

However, experience from Chile, Brazil, Mexico, and Venezuela suggests that a Millennium Science Initiative (MSI) program can introduce these conditions into a country where they did not previously exist. At the same time, it can produce substantial improvements in research quality, research productivity, graduate and undergraduate teaching effectiveness, economic relevance, and economic productivity. In Chile, for example, a $5 million investment in only one research institute resulted in annual savings to the local salmon industry of nearly $100 million as well as quantitative and qualitative improvements in research and teaching.

To replicate these successes, GOM might consider establishing an MSI-like pilot program. If this pilot succeeds, natural evolution will ensure that this newer, more successful and more productive model gradually replaces the older organizational forms and ways of doing business.

In countries where it has been tried previously (or is currently being introduced), MSI funds are awarded on a competitive basis in the form of grants to help transform groups of researchers into globally-recognized centers of excellence. These centers of

excellence are selected on the basis of the following criteria: (a) their potential for conducting world class scientific research; (b) the relevance of that research to the current or future scientific and economic development of Malaysia; (c) their plans for teaching graduate and undergraduate students and for providing fellowships to train and attract the next generation of scientists; (d) their potential for and interest in conducting multidisciplinary research; and (e) their proposals for outreach activities to universities, secondary schools, and the general public.

The competition is generally open to scientists from all disciplines. In this case, there is no attempt to pre-judge which fields should receive funding or to limit the competition to scientists from a few select disciplines. Grants are awarded on a competitive basis and proposals are evaluated by an international peer review panel composed of eminent scientists. Only those proposals that receive top marks for scientific excellence are eligible to receive funding.

A Policy Committee composed of top government and business officials makes the final selection, but the Policy Committee is required to select only from among those proposals that received top marks for scientific merit by the international peer reviewers. However, in making its final selection, the Policy Committee could take factors other than scientific merit into consideration – such as strategic importance of a particular topic for Malaysia's long term development. But the selection would be limited to those projects that have already been evaluated to be acceptable in terms of scientific excellence.

In general, grant proceeds are used to finance: (a) long term research projects conducted by scientific teams composed of institute, university and industrial scientists and engineers; (b) graduate and post-doctoral studies and research, thereby attracting a new generation of scientists to that particular field; (c) modern, up-to-date laboratory equipment; (d) visiting professorships designed to attract world class professors from abroad to teach and conduct research in Malaysia; and (e) other specified scientific/R&D needs specified in the grant application and consistent with the purposes of the project.

Two types of Centers of Excellence are generally supported by this program:

- **Large Centers of Excellence** are composed of approximately 10-15 scientists of international stature performing work in one or more cutting edge fields. One senior scientist from each center serves as the principal investigator of that Center. These large Centers are expected to be able to compete scientifically in the international market and perform cutting-edge research. The large Centers receive up to $1 million per year for three to five years. The precise amount of funding for each Center varies by scientific discipline and the nature of each group's research proposal. In general, though, the resources are commensurate with the research to be performed and with funding received by groups doing similar research in other countries.

- **Small Centers of Excellence** are comprised of smaller groups of promising young scientists with the potential to evolve into researchers of the stature of large

Centers. The Research Director of the small Center should have recently received his/her graduate degree. The selection process is similar to the one used to select larger Centers, but the amount of resources will be smaller than those for the larger Centers. Small Centers will receive up to $150,000 per year for three years.

During the initial phase of this program, Malaysia should be able to support between 3 and 5 large centers and an equal number of small centers. A second round of competition could be inaugurated two or three years after the first competition to support additional centers.

Establish professionally managed Technology Commercialization Offices housed in selected universities

Even if Centers of Excellence improve the quality and relevance of Malaysia's scientific output, Centers of Excellence will not generate the expected economic benefits unless they are connected to domestic and global technology markets. Many Malaysian research institutes, universities and even some high tech enterprises need more know how to find investors, find customers, or determine whether they are selling an invention embodied in a concrete product. They need to improve their capacity to solve complex technical problems and conduct high quality research in response to purchase orders from domestic and international customers.

Global experience suggests that research without links to industry is a luxury expenditure that will have a limited impact on economic and social welfare. However, it is important to note that good scientists don't necessarily make good entrepreneurs. Research excellence and business acumen are different disciplines and require entirely different skills. Not surprisingly, therefore, incubators and technoparks that are started and operated by scientists or university administrators frequently fail to live up to their founders' expectations, in part because they tacitly assume that top notch scientists have the technical skills to handle the marketing, sales, financial, legal and overall managerial tasks performed by top notch entrepreneurs. Therefore, OECD experience suggests that it is important to support Centers of Excellence with professionally managed, specialized business support services dedicated to promoting linkages between scientists on the one hand and entrepreneurs on the other hand.

To accomplish this objective, GOM might consider establishing at least one pilot Technology Commercialization Office (TCO) in several key cities throughout the country. These TCOs could be housed in a major university or research institute in each selected city. But irrespective of their institutional location, they would be expected to work with all scientists in that city. Initially a Technology Commercialization contractor with extensive international experience in technology commercialization could be selected to establish and manage the TCO. Although the TCO will be staffed initially with people with expertise and experience in commercialization, finance, new business development.

The TCOs would provide a wide range of complementary technology commercialization services including such items as:

(i) coaching and training entrepreneurs in how to talk to investors;

(ii) teaching university and scientific institute managers how to commercialize technology, protect intellectual property, negotiate joint ventures, look for strategic partners and other essential business skills;

(iii) conducting technology audits to identify what locally available technologies, scientific developments and innovations developed in local universities and research institutes have the greatest prospect for commercial success;

(iv) operating a technology transfer office that would perform the following range of functions on behalf of the local scientists, institutes and educational institutions: apply for domestic and foreign patents, pay the necessary patent application and annual patent maintenance fees, license the patented IP, enforce ownership rights against alleged infringement, collect royalties from license holders, and distribute royalties according to a pre-determined formula between the TCO (to cover administrative expenses), the institute our university where the IP was invented, and the inventor(s);

(v) providing business and technology commercialization expertise to the technoparks and incubators that have already been established by the Government;

(vi) developing a commercialization strategy – licensing, joint venture, strategic partnership, etc. -- for each of the firms in the incubator and help to connect these local high tech entrepreneurs and scientists with potential customers, strategic partners, joint venture partners and venture capitalists; and

(vii) marketing the identified technologies at international fairs and helping to establish linkages between local research institutes and private companies/international research institutes operating in similar fields, etc.

Box 11.5 The Newcastle Model for PhD-led Commercialization

In the Newcastle model, the dual objective of: (a) efficiently creating spin-off companies and (b) rapidly developing a more entrepreneurial culture at the university go hand in hand with – and mutually reinforce – one another. The Newcastle model takes as its point of departure the recognition of a problem of scale. Even if all senior researchers were successful as entrepreneurs, they are so few in numbers that their aggregate impact on economic development would be, at best, modest. Moreover, if engaged in commercialization efforts they would be unable to do what they do best; produce new knowledge in their research fields. Therefore, the Newcastle model bases commercialization efforts on the *ideas* of top-level researchers and the *work and effort* of the constant flux of students that pass through university research departments.
To promote commercialization of research all PhD's are organized around three 'pillars': (a) immediate IP identification; (b) parallel commercial R&D; and (c) spin-off company environment and support. The first pillar expresses the assertion that early identification of potentially valuable intellectual property (IP) is crucial to commercialization of research. The traditional *serial* model of technology transfer is seen to miss this point entirely. A successful technology pullout from the science base requires co-location and direct interaction with commercialization managers as well as with senior researchers from the outset of the research. The notion of 'parallel commercial R&D' means that the PhD projects are all based on commercially valuable IP and pursued with the support of multi-disciplinary teams, and with reference to potential partners for a future spin-out company, identified from the outset of the project. The model is predicated upon the parallel development of a research thesis and a business plan. This greatly increases the probability that having finished their PhD, students will meet with seed-capital funders to develop further the ideas they have worked on. Finally, the third pillar recognizes the fact that young entrepreneurs have few assets, and that comprehensive support mechanisms to assist them in spin-out company formation must be put in place if their businesses are to have any chance of survival.

Source: Hansson, Husted & Vestergaard 2005

Develop a Technology Broker Program

Malaysian officials and Malaysian scientists need to have a clear view of what Malaysia is trying to commercialize. Specifically, are Malaysian scientists trying to commercialize their scientific inventions or are they trying to commercialize their problem solving research capability. The emphasis on venture capital and technoparks suggests that Malaysia is focusing on the former and not devoting as much time, attention and resources to the latter. This may be a missed opportunity. Therefore, in addition to facilitating the commercialization of inventions, GOM ought to make more of an effort to market the country's research capability and capacity.

This will be a two step process. First, Malaysia could organize specialized technology audits designed to evaluate; (a) the research capability of selected R&D institutes and universities; (b) the inventions and innovations "on the shelf" of these institutions; and (c) their capacity for change. In addition, Malaysia could review the performance of

various universities and research institutes in obtaining grants from various international S&T funding organizations. The audits will provide a detailed inventory of the capability of individual S&T institutions. The information can be put on an electronic data base, posted on the web, and used as a marketing tool to advertise the capabilities available in Malaysia.

Second, Malaysia might encourage technology brokers to become more active in Malaysia. Their clients are typically large international science and engineering intensive corporations facing complex technical research problems. Brokers help these corporations solve their research problems by hiring teams of scientists to conduct the necessary research and develop the requisite technical solutions. To induce brokers to start doing business in Malaysia, the Government can state publicly that linking Malaysian scientists to global markets is a high national priority. It can also post on the internet a databank listing the research capability of various institutes, classified by detailed specialization. More importantly, it can develop a matching grant program to defray a portion of the cost of developing new contract research work in Malaysia. This would be a short term program – no more than 3 to 5 years – designed to introduce Malaysian scientists and research institutes to the global market. The program cost would vary in direct proportion to the program's success. If nobody is interested in conducting research in Malaysia, no matching grants would be issued. Grants would only be issued as brokers develop new, additional contracts with Malaysian scientists.

This program could have several benefits for Malaysia, above and beyond the additional research contracts generated by the program. First, it would help to connect Malaysian scientists to global markets, thereby giving them insight into how the market works, what technical problems are of greatest market interest etc. This will help to inculcate the same entrepreneurial spirit and know-how which they develop by emigrating. Second, foreign firms that establish contacts in Malaysia via technology brokers may eventually decide to establish engineering and research centers in Malaysia, especially around centers of excellence. Contract research can also generate SME spin-offs as scientists learn to identify entrepreneurial opportunities. The key point, at this stage, is to establish a commercially vibrant link to global technology markets and get this process started.

Third, as trust is built up, successful delivery of outsourced R&D not only produces immediate income but can also lead to stronger relationships, such as joint-ventures, spin-off companies, the establishment of local R&D centers, engineering centers or production facilities. Consequently, Malaysian officials could view contract research with foreign private firms generated by technology brokers as part of a long process that could eventually lead to deeper and more rewarding partnerships.

Fourth and finally, many Malaysian universities and research institutes need to occupy a more strategic "place on the map" as desirable sources of contract research and commercially viable technologies. Malaysia needs to improve its image in this respect. Technology brokers, therefore, should be seen as an investment in marketing Malaysian technological capabilities to the world and helping foreign firms answer the question, "why should I conduct research in Malaysia?" These programs might also help to attract

Malaysian scientists living abroad to return and begin doing business in Malaysia. This program would be especially powerful if combined with the technology commercialization center proposal discussed in more detail above.

Create a national centre for technology acquisition, absorption and diffusion[107]

As noted previously, much of the technological knowledge that Malaysian industry needs to utilize in order to become more productive and competitive already exists outside Malaysia. The problem is that Malaysian firms, in many cases are unaware of this technology or, if they are aware, many individual firms, especially smaller ones, do not have the technological and engineering capability to modify it for local use.

To address this problem, Malaysia might consider establishing a Malaysian Industrial Technology Research Institute (MITRI) modeled after it will be modeled more generally on the Industrial Technology Research Institute (ITRI) that has been the technological powerhouse behind the success of Taiwan over the past three decades.

The proposed MITRI would be the prime agency in building pilot versions of new technologies before they are taken up by the private sector. The proposed MITRI would not be engaging in fundamental scientific research. On the contrary, it would be concerned strictly with identifying and evaluating available technologies. It would provide "shared" R&D services for existing and emerging industries in Malaysia. This is precisely what the R&D Department of a large, established company performs. Technologies already being used are subject to testing to see how they can be improved; technologies use by rivals and competitors are constructed and analyzed; potential technologies that could substitute for the ones in use are being evaluated. These are all the activities constructed in the R&D Department of a large firm like IBM or Toshiba or Samsung. Few firms can afford such a Department. If they can, then they can make the technical evaluations of new projects for themselves – or they can hire expensive consultants to do it for them. But most firms will not have the means to benefit from such services – and yet such services are needed, to enable Malaysia to capture its potential latecomer advantages.

Seen from this perspective, the proposed MITRI is an institution that can accelerate the country's creation of **national absorptive capacity** in one field of technology, and hence one business field, after another. Or as another way of saying the same thing, the proposed MITRI would provide a way of raising the absorptive capacity of Malaysian industry as a shared service available to many firms. If it is very successful and helps Malaysian industry to be upgraded and stay abreast of the world technological frontier, then there would come a time when it could be dismantled, or privatized. But that time is probably far off – given the existence of such public R&D technology capture institutions in countries such as South Africa (the CSIR) or Australia (the CSIRO) or Hong Kong

[107] This discussion draws extensively from published materials by and extensive personal conversations with Professor John Mathews about technology diffusion institutions, latecomer economics, and national systems of economic learning. Professor Mathews' articles are available at http://www.gsm.mq.edu.au/facultyhome/john.mathews/ .

(ASTRI) not to mention the continued existence of ITRI in Taiwan and the network of R&D institutions in Singapore assembled under the umbrella of A*STAR.[108]

Develop a Supplier Development Program

Malaysia has been very successful in attracting foreign direct investors, especially in the electronics industry. But Malaysia has been less successful in inducing these foreign investors to procure value added goods and services (both upstream and downstream) from Malaysian suppliers. As a result, Malaysia tends to specializes in the lower wage, lower skilled, lower value added segments of the electronics global value chain. Even this specialization is being threatened as even lower wage countries enter the global market place and compete for investment and jobs that previously went to Malaysia. In an attempt to address this problem, Malaysia developed such programs as the Technology Acquisition Fund. This program provides grants to help Malaysian producers defray up to 70% of the cost of purchasing new technology needed to produce the high quality goods and services demanded by foreign investors and foreign customers.

This is an excellent program. However, subsidizing technology acquisition may address only a portion of the problem facing would be global suppliers. In the Czech Republic, for example, local firms faced similar technology acquisition problems. But a survey of potential foreign customers indicated that this was not the primary variable which they evaluated when selecting a local supplier. Instead, foreign customers wanted to know whether the firm had the managerial and organizational capability to continuously upgrade its technology after it was outfitted with new plant and equipment or would it once again slip into obsolescence and mediocrity. Similarly, they wanted to know whether the firm had adequate quality control programs in place, whether workers received constant training on quality control functions, and whether the firm had a well developed strategic planning function. In other words, they wanted to be sure that the firm was well managed, well organized and well run and not merely that it had a subsidy to purchase reasonably modern technology.

To address this set of issues, the Czech Government, in partnership with DFID from the UK, developed a pioneering supplier development program. The objective of this program was to support cluster development by helping Czech workers and enterprise managers acquire the technical skills, organizational capacity, and managerial capabilities which they would need to supply high value added goods and services both to foreign companies operating in the Czech electronics and auto industries.

The supplier development program achieved these objectives by delivering a comprehensive technical assistance program to help local enterprises upgrade their quality control systems, management skills, strategic planning capacity and technological sophistication. International experience in countries as diverse as Azerbaijan and the

[108]On these technology capability enhancing institutions, see for example Sanjaya Lall, *Learning to Industrialize: The Acquisition of Technological Capability by India.* London: Macmillan, 1997 and S. Lall, S. and C. Pietrobelli, *Failing to Compete: Technology Development and Technology Systems in Africa*. Cheltenham: Edward Elgar, 2002.

Czech Republic suggests that domestic content requirements will build competitive, sustainable local enterprises only if local firms first receive the technical assistance they need to become competitive, qualified suppliers. Thus, program would strive to increase local content not through administrative fiat, but by making local firms more capable and competitive, thereby enabling them to compete for and win more supply contracts.
A recent evaluation of the Czech program revealed that the value of new supply contracts for participating Czech firms exceed the program implementation cost by a factor of 10 or more. The value of supply contracts obtained by these participating firms is expected to increase over time as Czech firms improve their regional and global reputation for quality, technical competence and reliability. Thus, the long term benefit-cost ratio is also expected to increase.

The sequence of events for delivering supplier development services to local enterprises is as follows:

- Advertise the program asking for applications from businesses wishing to become qualified suppliers. Applicants provide evidence of their suitability by completing an application form

- A selection committee made up of government representatives, industry, trade associations, banks, and other potential stakeholders assess all the applications against the criteria set for the program and the most suitable applicants will be offered places in the program.

- For each enterprise selected for the program, two comprehensive assessments are conducted at the inception of the program: one by the company itself and a second by a team of foreign expert assessors. After these assessments are complete, the management team of the company and the expert assessing team will present to each other their findings about the companies' strengths and weaknesses. There will follow a discussion in which the parties will agree a business improvement plan which the company will to undertake in the following six months.

- Business improvement workshops are held during this six month period at which participating companies will be exposed to the latest techniques in manufacturing and management. Experts presenting at the workshops will make themselves available to consult with individual firms. Further representatives of one or more of the foreign investors involved in the program will present the best approaches that suppliers can make to win business with their companies.

- A second series of one day business assessments would commence after this six month period. Companies would be re-assessed against the original model and their achievement of the objectives set out in their initial business improvement plan.

- Those companies who have made the greatest progress would move into a second phase of supplier development involving in-company consultancy from world experts in their sector, introduction to potential clients and assistance to achieve highly specific business objectives such as facility redesign, introduction of lean manufacturing, and new approaches to marketing.

Involving the Universities in Regional Development Efforts

Universities and other higher education institutions can play a vital role in supporting regional development efforts. Three related aspects come into play in this regard: (a) the formulation of an overall vision bringing firms, the State, regional development agencies and higher education institutions together; (b) financial incentives to support the participation of higher education institutions in implementing this vision; and (iii) the creation of technology-oriented higher education institutions as needed.

Strategic Vision for Regional Development. The Finnish experience more than anything shows that there is a great potential in mobilizing universities in regional economic development. In the Finnish model, the technology programs of the National Technology Agency (TEKES) have been a key mechanism for this. A recent study of the role of universities in regional economic development, carried out by researchers at MIT, emphasized the fact that Finnish national policy, through TEKES, has been "proactive in technology development" and has "targeted universities as key actors", as two main elements of the highly successful Finnish model (Chakrabarti & Lester 2004: 6). In mobilizing universities of for regional economic development, two lessons are particularly important. First, it is important to take from the Finnish experience the lesson that R&D funding made available through technology programs such as those of TEKES (see above) can be a major change agent. Second, it is important to learn from the UK experience that universities with a high degree of autonomy are able to be much more entrepreneurial and strategic with regard to regional economic development than universities with limited autonomy. Among the European countries, the UK by far has the strongest tradition for university-industry linkages. Moreover, in the UK it is a widespread practice for universities to engage very actively and professionally in contributing to regional economic development (see Box 11.6).

Box 11.6 The University as a Key Agent in Regional Economic Development – The University of Newcastle

It is an explicit part of the mission of University of Newcastle to contribute strategically to economic development in the North-East part of England. In 2002, a major institutional restructuring of the University was initiated to professionalize as much as possible its interactions with industry and community, and to promote an entrepreneurial culture at all levels of the university. Among the goals of the restructuring process was: (a) to achieve a better coordination of operational and strategic management; (b) to encourage innovation and entrepreneurship at all levels (teaching, research, and reach-out); and (c) to increase income generation.

The restructuring plans recognised from the outset that increased external engagement would put new requirements on university management at all levels. It was further recognised that while a traditional university adopts administrative processes (controlling activity and ensuring procedures are followed), an entrepreneurial university should pursue management processes which would seek out opportunities and make things happen. The key challenge was thus seen to alter management practices in several dimensions: financial management; personnel management, student management, research management and management of the information systems to support these processes.

In parallel with these restructuring processes a set of new principles for interacting with business and community were being devised. Previously research-based, third mission activities focused exclusively on technology transfer, spin-off companies, and consultancies. Now, transfer of knowledge through students came to the fore of third mission thinking. Students were thought to be the main "carriers" of knowledge, and as the potentially most effective channel for employers to the global knowledge base. Following these restructuring processes, the University of Newcastle today has a number of units tasked particularly with promoting entrepreneurship and interaction with industry. Services for business includes Collaborative Research and Consultancy; Professional Development and Training; Graduate Recruitment; Conferences and Corporate Hospitality; Business News; and Feedback. The approach taken is clear from the special 'Services to business'-website:

As one of the UK's leading universities, our reputation rests on the quality of our research, teaching and the services we provide to the business community. We will match your needs with our expertise and find the right solution for your company - whatever its size or location. For more information about our services please contact us and join the hundreds of companies who already benefit from collaborating with us.

The units involved in supplying these services includes the Knowledge House; the Research and Innovation Services Unit; a Technology Transfer Office; a Business Development Team; a Regional Development Office; and a Careers Services Unit. For more information about the University of Newcastle in general and these units in particularly, see Vestergaard 2003.

In addition to making funds available for universities through technology programs such as those of TEKES in Finland, the GOM could encourage all universities to devise strategies for their contribution to regional economic development, both in terms of active participation in the regions' training and technology institutions, and in terms of a wide range of other ways of interacting with the other agents in the regional innovation

system in producing knowledge, graduates and technology commercialization for the benefit of the economic and social sectors of the region that have been identified as strategic.

Financial Incentives for Participation in Regional Development. The formulation of these strategies at the university level should be supported by central government funds, and should come with the requirement of involving regional industry, government research institutions and international experts in the process. The HEROBAC and HEIF schemes in the United Kingdom are interesting examples of such funding mechanisms.

Box 11.7 Financial Incentives for University Involvement in Regional Development Efforts in the United Kingdom

The Higher Education Reach-Out to Business and the Community scheme aims towards developing the capability of Higher Education Institutions (HEIs) to respond to the needs of business, by enabling them to put into practice organizational and structural arrangements to achieve their strategic aims in this area. The HEROBAC Fund is intended to initiate a permanent third stream of funding – complementing existing grants for teaching and research from the Higher Education Funding Council for England's (HEFCE) – to reward and encourage HEIs to enhance their interaction with business. The HEROBAC scheme recently came to an end but all major future third mission funding through government will be channeled through the Higher Education Innovation Fund (HEIF), which was announced by the government's White Paper on Science and Technology in 2000. HEIF thus marks an attempt to consolidate and simplify what might be seen as a confusing array of third-mission support initiatives (Hill 2002). The HEIF scheme has as its core the belief that all HEIs should be engaged with business in different ways. The fund is intended to enable them to develop links across the full range of their academic endeavors. HEIF receives funding from across government, from the Department of Trade and Industry, from the Higher Education Funding Council for England, and from the Department for Education and Skills. The broad funding base indicates a high level of support and commitment for third mission activities across government.

Source: EC 2001, Hill 2002.

Develop University-Industry Linkages

In recent years, the European Commission and the OECD has expended considerable efforts in investigating policies promoting linkages between universities and industry in their member countries (EC 2001, OECD 2002). Through these studies a number of best practice examples have been identified. The Technology Clinic scheme from Finland and the Teaching Company Scheme from UK would be particularly useful in helping to address Malaysia's current challenges (see boxes below). It is likely that the EC and OECD studies contain more material of interest to the GOM. It would be wise, therefore, of the GOM to engage in a comprehensive review of these two studies, in order to identify a larger set of policies and schemes that could be relevant for Malaysia at its current conjecture. "In the following, two schemes of particular interest for Malaysia will

be highlighted: the Technology Clinic Scheme and the UK Teaching Company Scheme". The Technology Clinic scheme is particularly relevant to Malaysia because it is specifically tailored to servicing SMEs that do not have a high level of technology adoption and innovation know-how. A technology clinic is a service to help a company test new methods and new know-how quickly and flexibly. The main goal of the initiative is to promote the adaptation of specified technologies for problem-solving in SMEs in order to introduce new technological possibilities and to raise the awareness of external R&D resources.

Box 11.8 Technology Clinics in Finland

The client of a technology clinic is a SME in need of know how and technology, and the typical assignment for the clinic is a problem that the client cannot solve alone, but which is too small to justify launching a R&D project. Thus, the typical cost is less than 20.000 euros. The core idea is to provide lines of communication between SMEs with specific technological problems, and the leading research experts in the country. An additional outcome of the technology clinics is that SMEs that use their services gain experience in cooperating with universities and research institutions. Moreover, through this interaction with a technology clinic, the external network of the company is expanded with key researchers working in fields relating to the products of the company, and with the employees of the technology clinic, which provides companies with a person-to-person relation to the public R&D funding and services system.
There are six different generic types of TCs: *technology-based clinics* that focus on a specific technology; *theme-based* clinics that aim towards promoting awareness and technology development in relation to a particular theme or problem; *cutting-edge clinics* that aim at keeping Finnish SMEs at the forefront of technological development in particular areas of technology; *catching-up clinics* that aim to help Finnish SMEs catch up with international standards in selected areas of technology; *methodology clinics* that aim to disseminate good management practices and methodologies in the SME sector; and *demonstration clinics* that aim to offer demonstration services to a selected group of customers in a particular sector. Four stakeholders are involved in each technology clinic: A customer SME; the National Technology Agency (TEKES); a clinic co-ordinator; and the technological service provider. The latter is usually a public science institution, but can also in some instances be a private company with particularly relevant R&D expertise in the field. The role of TEKES is primarily that of providing funds – up to 60% of the costs can be covered by TEKES, and the remaining part must be covered by the SME. In 2002, there were 16 TCs in operation, including Intelligent Materials, Wood Fuel, and a Technology Strategy Clinic for Building and Construction Industries.

Sources: EC 2001 and Komulainen 2002a, 2002b.

The GOM launched a Teaching Company Scheme (TCS) in 1997. Unfortunately, however, the scheme was subsequently abandoned (Fatimah 2005). Both from the perspective of graduate unemployment problems and from the perspective of lacking absorptive capacity and innovation activity in many Malaysian firms, the potential benefits of a teaching company scheme cannot be stressed enough. Malaysia should

consider drawing upon the vast experiences in this area in the UK, where a TCS have been in operation for more than thirty years.

Box 11.9 The UK Teaching Company Scheme

The UK Teaching Company Scheme (TCS) – today known as the Knowledge Partnership Program – was first launched in 1975, and is regarded as one of the greatest successes in promoting UK industry-science links. The TCS aims to develop active partnerships between Higher Education Institutions and industry. Firms take on graduates, known as TCS associates, to work full time on specific projects jointly supervised by the Higher Education Institutions and the company. Projects are closely linked to the interests of the firm and aim at achieving a substantial and comprehensive change in the firm, for example in management and production techniques. The scheme has five formal objectives, namely to: (a) raise the level of industrial performance by effective use of academic resources; (b) improve manufacturing and industrial methods by the effective use of advanced technology; (c) train able graduates for careers in industry; (d) develop and retrain existing company and academic staff; and (e) provide academic staff with broad and direct experience of industry, to benefit research and enhance the relevance of teaching.

A typical programme lasts for two years. The graduates have a science and engineering background and are recruited jointly by the partners. The associates spend 90% of their time working in the company on specific projects and are paid at industrial rates. The remaining 10% of their time is spent within the HEI undergoing training. Until 1981, the TCS was financed totally out of public funds, but since then firms have provided up to one-third of the cost of new programmes and at least 50% of the cost of renewed programmes. The programmes range in size from one associate over two years to 14 associates in a three-year programme which is then renewed. A review in 1996 found that 70% of associates were offered employment in participating companies at the completion of a TCS programme. There has been a growing involvement of TCS with smaller companies and in 2000 nearly all the schemes in operation (91%) were with SMEs.

Source: Vestergaard 2003

Provide public funding for building institutional capacity for third mission activities

During the mission, interviewees from universities, governmental agencies (MTDC, EPU) and ministries (MOSTI) pointed to two key problems facing universities' efforts to engage in innovation and commercialization of research: lack of business skills in units charged with this at universities, and lack of public funds to build the institutional capacity needed to address these tasks. Most universities are not well equipped financially and institutionally to meet the triple objective of high quality research, teaching and collaboration with local industry in innovation and commercialization projects. This is a serious constraining factor for Malaysia's efforts to transform its economy to a knowledge-based economy. For universities to take an active role in innovation and commercialization, they must be provided with funds to build institutional capacity for these tasks. Two policy options for providing funds for such institutional capacity building in universities restructuring may be distinguished. One option would be to establish a competitive fund for higher education supporting institutional

improvement projects. The other option would be to tie investments in capacity building for innovation and commercialization to performance contracts made with each individual university. The latter policy option has the advantage of making it possible to connect such funding with other key objectives and challenges in STI policy-making, and would be well-aligned with the more general objective of shifting to a mode of HE governance performance contracts and accountability procedures. It should be stressed that such funds for capacity building should not only allow but strongly encourage universities to draw upon international experience and recruit expatriates in these efforts.

Box 11.10 The Finnish Model of Three-Component Performance Contracts

The Finnish performance contracts include both general goals for the tertiary education system such as quality, impact of education and total number of offered degrees as well as specific goals for the individual institution. Finnish performance contracts are made up of three parts: core funding, performance funding and funding for specific initiatives. Deliverables for all three types of funding are agreed in the contract. The core funding remains stable during the tree-year contract period, whereas performance funding (approximately 3-5% of operational expenditure) is tied to results on a number of agreed indicators. Examples of indicators include:

- Funding for research from external sources
- Assessed learning achievement
- Provision of adult education
- Graduation time
- Participation in international cooperation

Performance contracts such as these, offer a significant degree of flexibility. They allow governments to take account of idiosyncratic characteristics and needs in countries where tertiary institutions are few and differences between them are large. A notable feature of performance contracts is the high demand they place on the capacity of supervisory authorities to engage in an evidence-based dialogue with institutions.

Source: Thorn et al 2005

Develop entrepreneurship courses

It is important to recognize that the key resource for innovation – the *sine qua non* of a knowledge-based economy – is not so much research as it is entrepreneurs. Therefore, the promotion of entrepreneurship must be very high on the agenda of the higher education sector (as well as in primary and secondary education). In this area, the GOM could draw upon the comprehensive study of entrepreneurship education recently completed by the European Commission.

In 2000, the European Commission launched a 'Best procedure project', to promote the exchange of good practice in entrepreneurship education and training among member states. In 2004, the results of this project were published in a report containing a number

of good practice examples. The project took as its starting point the recognition that for Europe to create more new and thriving firms willing to embark on innovative ventures, it will be necessary to encourage and nurture entrepreneurship. For those ends, education was seen as a key factor, by fostering the right mindset, by raising awareness of career opportunities as an entrepreneur or a self-employed person, and by providing the relevant business skills. In mapping ongoing activities, the project concluded that although numerous activities were being developed at all levels of education, many of them were neither integrated into the curriculum nor part of a coherent framework. Initiatives were often isolated, taken by individual institutions, by partnerships or by local authorities.

Frequently, they were driven by external actors and not by the education system itself. Entrepreneurship was more likely to be taught as a separate subject or seen as an extra-curricular activity. As a result of this situation, most students did not yet have the possibility of taking part in entrepreneurship courses and programmes. What seemed to be lacking in most cases was a coherent structure, so that existing activities could have a place in the education system. The main conclusions were, in other words, that entrepreneurship was not yet a common feature or a widespread subject in European education systems, and that nor was the training of teachers on how to bring the concept of entrepreneurship into the classroom yet sufficiently developed. In response to these problems, the project identified 21 examples of good practice in promoting entrepreneurial attitudes and skills in young people through education, from primary school to university. A short description was provided for each good practice, along with contact details of the organization or institution promoting that particular practice, so that further information could be easily obtained. Good practice examples were grouped into seven broad categories: (1) policy measures of support and coordination; (2) entrepreneurship in primary and secondary schools; (3) initial vocational training at the level of secondary education; (4) learning by doing and mini-enterprises; (5) cooperation between educational institutions and the business world; (6) training of teachers on the subject of entrepreneurship; and (7) encouraging entrepreneurship and start-ups at university level.[109]

Malaysia might consider creating a national centre for entrepreneurship education, charged with three key tasks: (a) identify best practices in entrepreneurship education by drawing upon international experience such as the EC studies mentioned above and through international networking and international staff recruitment; (b) train Malaysian teachers in teaching entrepreneurship to pupils and students at all levels of the education system; and (c) develop short courses training managers in Malaysian firms in innovation and entrepreneurship. The latter type of course could include a course in how to formulate good innovation projects and how to apply for public R&D funding.

Of the many 'best procedure' examples identified in the EC study, the 'Science enterprise challenge' program in UK seems a particularly relevant scheme for addressing at the same time a set of the challenges facing Malaysia today.

[109] More information can be found in the report (EC 2004) and on the project website (EC 2005).

Box 11.11 Science Enterprise Challenge (UK)

Teaching entrepreneurship and basic management skills can be particularly important within courses of science and technology, in order to bring scientific knowledge and research closer to the market and encourage commercialization of results. The aim of 'science enterprise challenge' is to establish a network of centers in UK universities, specializing in the teaching and practice of commercialization and entrepreneurialism in the field of science and technology. A total of 12 science enterprise centers were established in UK universities in the first round, supported by funding from the government, and another one was created during the second round of funding. The aims are: to foster the commercialization of research and new ideas; to stimulate scientific entrepreneurialism; to incorporate the teaching of enterprise into the science and engineering curricula; to act as centers of excellence for the transfer and exploitation of scientific knowledge and expertise. 'Science enterprise challenge' intends to raise awareness of the importance of business and entrepreneurship at all levels within universities, and to legitimize commercial activity as a valid aspect of academic life. It also promotes cooperation between academics and the business world to ensure the commercial exploitation of technological innovation. Centers work closely with leading research departments within their own institutions, and receive substantial input from business leaders and entrepreneurs.

Source: EC 2004

Another type of scheme that would be particularly relevant for Malaysia is internship schemes. Student internship in firms is a powerful instrument in promoting entrepreneurship as an issue that must be high on the agenda of universities. It could well be coupled with mandatory entrepreneurship courses in all science, engineering and business degrees. Thus, a particularly pertinent model might be to task third year students in these degree programs with analyzing and suggesting how the company in which they do their internship can engage in technology acquisition and/or technology development that will improve the competitiveness of the company. Such programs might include competition for internships to go abroad for a three-month stay at a 'high-potential start-up company' abroad, following the model introduced at the Norwegian School of Entrepreneurship (see Box 11.12). Another way of combining entrepreneurship courses with on-the-ground practical training, which could be particularly useful in Malaysia, is the creation of 'practice firms', following the scheme launched in Finland (see Box 11.13).

Box 11.12 Three-Phase Entrepreneurship Course – with Internship in Start-up Company Abroad (Norway)

The primary focus of the entrepreneurship programme at the Norwegian School of Entrepreneurship in Oslo is to educate and inspire science and engineering students on the possibilities of entrepreneurship. Knowing that a successful start-up is dependent on a team with balanced skills, the programme is also available to business students.
The programme builds on the assertion that practical experience and interaction with the business environment, outside the native country, can contribute crucially in creating a mindset that is open to innovation and change among students in the home country. Therefore, a three-month internship abroad is an integrated part of the program. The programme consist of three phases:
1. A spring pre-course is intended to provide the students with a basic understanding of business-related topics, and to prepare them for the summer term.
2. The summer term is an intensive three-month period spent abroad, currently in San Francisco, Boston or Shanghai. After a challenging screening process, the students work as interns in high-potential start-up companies. In addition, they follow classes at local universities where they write a complete business plan. This environment of high workload, steep learning curve, challenging personal interaction and new cultural experiences has proven to be a very good testing ground for entrepreneurial traits.
3. Upon returning to Norway, the students write and present a project on the application of what they have learnt to the Norwegian business environment. The students also get an opportunity to talk to venture capitalists and to compete for a start-up grant.

Source: EC 2004

Box 11.13 Practice Firm as a Learning Environment in Entrepreneurship Education (Finland)

In this scheme, virtual firms are created that allow the students to experience different management roles inside a company, thus preparing them to be self-employed or to work in an SME.
A practice firm is a training method based on the simulation of entrepreneurial life in order to study the changing operations and the preconditions of running a successful enterprise. The target groups for practice firms range from the unemployed, students at commercial and technical schools, high schools, colleges and universities, to employees in 'real' companies, people with disabilities, and future entrepreneurs.
In cooperation with the teachers and experts of working life (learning network), the students plan and set up the operational system of an enterprise and run it like a real firm. Studying in a practice firm includes financing negotiations with a real bank manager and, at the final stage, closing of the books. The students work in facilities similar to a real office. They have various roles as managing director, manager of sales, marketing, accounting, etc., according to the organisation of the firm. The roles change so that the students have the opportunity to work in different positions. Every practice firm has a real firm as a mentor company. A practice firm's business plan will be revised by teachers, partners and bank managers in order to ascertain that it is realistic.

Source: EC 2004

When the GOM introduces entrepreneurship education courses that integrate internships or 'practice firm' experience, it will be essential not only that universities collaborate closely with industry partners, but also that universities are allowed to hire staff that have both technical and business skills. This will only be possible if universities are able to offer salaries that are attractive to people with skills in such high demand. In devising such schemes, the GOM should involve MNCs, SMEs as well as business associations.

Annex 1. Terms of Reference of the Study

Background

Sound macroeconomic policies have underpinned Malaysia's economic performance in recent years, making it among the best in the world. Rapid industrialization has been a key to this performance. However, this success has been built largely on the expansion of relatively basic technology sustained by a steady flow of foreign direct investment. In order for Malaysia to sustain its growth prospects in the long-term, the country will need to maintain its competitiveness and move up the technology chain to produce higher value-added technology-intensive products. In order to do this, Malaysia must address an increasing human resource constraint in the form of shortages of scientific and technical skills accompanied by a relatively average level of education in the workforce.

Malaysian colleges and universities are at the pinnacle of the Malaysian education system. Higher education is of great importance as the country drives towards producing a wide base of knowledge workers, competent and well qualified to function in a competitive economy. However, at present only 17.7% of the Malaysian labor force holds some form of tertiary education credentials. The challenge to the government is to further increase accessibility to higher education in line with the democratization concept, meet the growing demand of society for higher education and fulfill the increasing need for skilled workforce. The aim is to increase the proportion of labor force with tertiary education[110] to 35% by 2010 as the country moves towards a knowledge – based economy. Provision of access alone is not sufficient to strengthen the system. Issues relating to quality, financing and system management will also need to be addressed. Given the importance of the higher education sub-sector to the government and the critical need for its improvement, the new Ministry of Higher Education (MOHE) was recently established with the responsibility to oversee the development of the subsector and provide strategic direction for its development.

One key concern is the increasing unemployment rate for university education graduates. The number of unemployed holding a tertiary education credential in Malaysia nearly doubled from 2000 to 2004. According to the 2004 Labor Force Survey, there were an estimated 74,182 unemployed persons with tertiary-level qualifications in 2004 compared to 68,000 in 2003 and 42,500 in 2000. This can be attributed to a combination of demand and supply factors, including skill mismatch and lack of job opportunities for university graduates. As a short-term measure to increase the employability of university graduates, the government implemented the Training and Attachment Program for unemployed graduates in November 2001. Graduates participating in this program were attached to public- and private-sector agencies to gain work experience and were trained in areas

[110] Defined as those with degree, diploma, certificates, "A" level, Sixth Form. Total undergraduate higher education (first degree level) enrollment in Malaysia in 2003 was 516,900. Seventeen public universities enrolled 222,300 undergraduate students (43% of total), and 547[110] private institutions enrolled 294,600 (57% of total).

such as ICT and the English language. A graduate re-skilling program was also implemented for graduates to undergo retraining and re-skilling in specialized areas and the principal results are now available.

Various strategies and measures were also formulated under the Mid Term Review of The Eight Malaysia Plan to address this issue from the supply side. These included reviewing academic programs with private sector input, incorporating soft skills development into the existing the curricula, incorporating entrepreneurship programs, offering double majors and double degrees at higher education institutions, and providing structured career counseling services to students and graduates.

The study will review the readiness of the delivery system to support further growth and development of world class quality universities. In most countries that are approaching the goal of mass higher education, systems are characterized by a diverse array of institutions with increasing institutional autonomy, and including a vibrant private sector. Systems become increasing self regulating, and there are many sources of information that students and families can draw on to judge the quality of education they are benefiting from. Finally, universities have a strong linkages to employers, research and development facilities, and to the regional/global education community. Compared to countries with smaller and more elite systems, the government's role tends toward "facilitation" rather than direct control. Governments achieve this by putting in place *systems* are that support the growth and development of higher education institutions -- legal frameworks, quality assurance systems, incentives for investment, R&D policies, financing mechanisms that help poor students access education, and public financing programs that direct subsidies to strategically important institutions or fields of study.

Objective of the study

The Government is now considering policy directions to make Malaysia a more competitive player in the world economy. Such a strategy will require careful innovations to its university system so that Malaysia can infuse its labor market with a critical mass of graduates with the skills needed for greater value-added production. Malaysia also would like to make its universities more dynamic and responsive to rapidly changing labor market needs. The Government of Malaysia has requested analytical and advisory services from the World Bank to help policy makers develop a vision and strategy for the evolution of the country's universities towards becoming world class. Such a strategy will allow the higher education system and individual universities to respond to policy changes and provide sufficient time to implement, monitor and evaluate the reforms.

The objective of the study is to assess the performance of public and private universities in Malaysia and to devise a draft strategy for improving the outputs of the Malaysian higher education system to meet the needs of a dynamic, global economy and help the country's labor force to be more internationally competitive.

The study is intended to add value by sharing international good practices in terms of strategies, policy measures and know how to ensure that the graduates produced are of good quality and can meet the needs of the economy either as employees or self-employed professionals.

Proposed scope of the study

The study would focus on the university system, looking at both private and public. The study will build on the current and international assessment (World Bank assessment, to compare with world class universities, identify the gap and formulate strategic detailed recommendations on what Malaysian universities have to do if they want to develop human capital for increasing the wealth of the nation. Much of that growth in terms of quantity has taken place in the private sector. This assessment of the system should include some analysis of the strengths and weaknesses (proven or perceived) of the current system.

The study will analyze the systems that are in place to support the growth and development of universities, i.e. the governance, investment, and quality assurance frameworks, as well as labor market information systems. The key stakeholders (various branches of government, university leaders, employers, professors and students) will be consulted to obtain their assessment of the strengths and weaknesses of the systems.

The study will provide an overarching strategic vision for the system and deal specifically with issues of quality assurance, financing, research and development, and labor market linkages. It will also include "internationalization", which includes international recognition of Malaysian degrees, which is tied in turn to the quality assurance process and the ability to attract more international faculty and students to Malaysia. The study will provide detailed short-term, medium-term and long-term recommendations and an action plan for the government's consideration.

Key areas of the study:

a) **Strategic vision for growth and development of the country's university sector – one that is aligned with the existing and future GOM national development plans**

This will include a profile of the university sector and the issues it faces in achieving national development objectives.

> **Vision:** The study will examine national-level plans for Malaysian development and help the Ministry of Higher Education to draft an overall vision for its sector and to develop indicative targets for the growth of public and private universities (including universities and non-university institutions) over the next fifteen years.
>
> **Governance:** The study will review the legislative framework governing public and private higher education and the existing governance arrangements at the national and institutional levels and recommend options for improving the

strategic direction and overall management of the sector. This will include reviewing the current balance between central control and institutional autonomy and recommending the level of regulation that is most effective in achieving the optimal performance from institutions. The study should then recommend alternative models and discuss the advantages and drawbacks of each model.

Finance: The study will review scenarios for the provision of higher education up to 2020 and help identify options for financing such scenarios from a range of sources - including cost recovery, income generation, public grants, competitive funding, performance-based funding, vouchers, student loans, and other methods of financing. The study will focus throughout on the principles of accessibility and equity and recommend ways in which these can be taken into account when considering each of the options, including the strengths and weaknesses of each option.

b) **Quality Assurance**: The quality assurance dimensions are critical to increase Malaysian universities' status globally. This review will cover: a) assessment of existing quality assurance structure and processes in Malaysian higher education at national and institutional levels; b) identification of areas for improvement; c) analysis of factors to consider in designing alternative structures and processes, including assessment of the relationship between quality assurance and other policy priorities such as equity, resource demands, structural changes in tertiary education); and d) recommendations on proposed changes. The quality assurance standards and processes will be reviewed with a particular emphasis on ensuring that they encourage universities to maintain a curriculum that is relevant to the needs of the Malaysian labor market and more broadly to the skills demanded in a knowledge economy, improve staff qualifications, improve university management, and facilitate international recognition of degrees form Malaysian universities.

c) **Graduate Unemployment and Labor Market:** Additional background research will be needed to understand the nature and determinants of graduate unemployment. Do graduates experience short term or long term unemployment? Are graduates from some fields in more demand than graduates from other fields? Are graduates from certain types of institutions having an easier or more difficult time in finding a job? Policy options to improve the situation (supply and demand factors) will be provided.

d) **Science and Technology and Higher Education:** This topic is particularly important as Malaysia progresses and looking for ways to strengthen universities to better respond to global competitiveness. The study will analyze the framework and institutional conditions for industry-university R&D interaction within the context of the overall innovation system. The fundamental policy question that defined the research is how to analyze the formal framework for innovation, and in particular research-business interaction. The overall research questions will include: (a) what are the framework conditions for innovation in Malaysia? This includes a review of the institutional set-up of the Malaysian innovation system, in particular the institutions involved in university-business interactions; (b) which institutions, rules, programs and policies have been

introduced to stimulate (i) university interaction with industry; and (ii) business innovation?, (c) how does the Malaysian innovation system compare in terms of institutional set-up with OECD countries and the developed countries?; and (d) building upon this comparison, which institutional reforms could improve the performance of the Malaysian innovation system? The study will also look into R&D capacity, commercialization of R&D, innovation and university-industry linkages.

Data Sources Available

a. Labor Force Survey
b. Findings from Tracer studies
c. Electronic Labor Exchange
d. Study on the employability of Malaysian Graduates
e. Findings from evaluations of on-going programs, such as the Training and Attachment Program
f. Other published documents and data

Management of the Study

a. The study will be conducted under the supervision of the Director of Human Resources Section, Economic Planning Unit and the Director General of Higher Education, Ministry of Higher Education.
b. A Steering Committee will be established by EPU to provide overall policy guidance and supervision of the implementation of the project. In addition, a technical committee will evaluate the deliverables under the study.

Methodology

The work will be conducted as an expert evaluation similar to the country reviews carried out by the OECD. The team will review existing government policy documents and studies, it will analyze available policy research studies and surveys, and it will conduct interviews with a select group of government officials, university leaders, administrators and professors, as well as representatives of research institutes, professional associations and employers.

Timeline

September 2005 to March 2006

Deliverables

September 30, 2005	20 page aide-memoire summarizing the findings of the mission and providing a draft outline of the report.
October 25, 2005	Draft report from the consultants
November 30, 2005	Complete draft report with recommendations for strengthening support systems for universities in the short, medium and long terms will be sent to EPU and MOHE for comments.
January 16, 2006	Bank internal review of the draft report
February 3, 2007	Draft submission to the EPU
March 2007	Finalize the report for submission to EPU and MOHE
October 15, 2007	Comments from the EPU
December 18-19, 2007	Policy workshop for consultation on the draft report

Annex 2. List of Institutions Visited and Persons Met

Name	Position
ECONOMIC PLANNING UNIT	
Dato' Dr. Wan Abdul Aziz Wan Abdullah	Deputy Director General (Macro)
Datin Zanifa Zain	Director, Human Resource Section
Datin Shamsiah Bt. Haji Dahaban	Director, Social Section
Mr. Wazir Hj. Haron	Senior Principal Assistant Director, Social Services Section
Dr. Ong Hong Peng	Senior Principal Assistant Director, Industry and Economic Service Section
Dr. Badariah Salleh,	Principal Assistant Director, Human Resources Section
MOHE	
Dato' Dr. Haji Shafie Haji Mohd Salleh	Minister of Higher Education
Dato' Dr. Zulkefli Bin A. Hassan	Deputy Secretary General (Development)
Datuk Professor Mohd Yusof Kasim	Deputy Director General
Prof. Dr. Mahani Zainal Abidin	Deputy Director General, PHEI Management Sector
Prof Dr. Md Yusof Abu Bakar	Special Advisor (Minister)
Dato' Dr. Sharifah Hapsah Syed Hasan Shahabudin	Director, Quality Assurance Division
Dr. Mohd Padzil bin Hashim	Secretary of Division, Planning and Research
Dr.Mohammad Naim Bin Yaakub	Deputy Secretary of Division (Research) Planning and Research Division
Pn Rahman Hussain	Director, Management of Student Admission Division
MOE	
Ms. Mawarni Hassan	Senior Assistant Director (Support Service), Malaysian Examination Syndicate
PUBLIC INSTITUTIONS	
Professor Ir. Dr. Radin Umar Radin Sohadi	Deputy Vice Chancellor, UPM
Datuk Prof. Dr. Zuikifli Tan Sri Mohd Ghazali	Vice Chancellor, UTM
Prof. Dr. Ahmad Kamal Idris	Deputy Vice Chancellor (Academics), UTM
Assoc. Professor Hamzah Abdul Jamal	Deputy Dean (Technology Transfer), UTM
Name	Position
Ir. Dr. Ibrahim Bin Hussein	Deputy Vice Chancellor (Academic), UNITEN
Professor Dr. Rahmat Mohamad	Assistant Vice Chancellor, UiTM
Dr. Chan Yuen Fook,	Coordinator, Asean Centre for research on university learning and teaching,UiTM
Fauziedh Hanim Al-Johari	AMN, UiTM
Professor Datuk Dr. A. Hamid A. Hadi	Deputy Vice Chancellor (Academic Affairs), UM
Professor Dr. Khaw Lake Tee	Dean, Faculty of Law, UM
Dr. Mohd Afandi Muhamad	Internal Consultant for Quality, Quality Assurance Management Unit, UM
Mr. V. Navaratnam	Professor of Clinical Pharmacology and

	Addiction Studies, International Research and Training Program, USM
Professor Morshidi Sirat	Director, National Higher Education Research Institute, USM
PRIVATE INSTITUTIONS	
Dato' Idrus Mohd Satha	President, Cosmopoint College of Tecnology
Prof. Dr. Mansor Fadzil	Vice President, Open University
Mr. Lee Fah Onn	Sr. Vice President, INTI College
Y.Bhg. Tan Sri Dato' Dr. Lim Kok Wing	Executive Director, Lim Kok Wing University
Ir. Professor Hean-Teik Chuah	Vice President (R&D and Academic Development), Multimedia University
Dr. Khatijah Khalid	Registra, Sunway University College
Dr. Leong Yin Chin	Director – Academic Affairs, Sunway University College
Tan Sri Datuk Dr. Ng Lay Swee	President, UTAR
OTHERS INVIDUALS AND ORGANIZATIONS	
Tan Sri Wan Zahid	Chairman of the Higher Ed. Policy Committee
Sakib Kusmi	Deputy Director (R&D), Science and Technology Division, Ministry of Science, Technology and Innovation
Associate Prof, Zita Hj. Mohd. Fahmi	Secretary/General Manager, National Accreditation Board
Dr. Wan Mazlan Bin Mohd Woojdy	Malaysia Medical Council
Professor Dato' Dr. Mohd Amin Jalaludin	Malaysia, Medical Council
Sarani Bin Dollah	Deputy Director, Public Service Department

Annex 3. Classification of Countries by Models of National Technological Learning

The **five major models of fast national S&T learning** identified in the course of the recent study under the auspices of the World Bank's Science and Technology program are as follows:

- Passive FDI-dependent,
- Active FDI-dependent,
- Autonomous,
- Creative-isolated, and
- Creative-cooperative learning.

Below, we will attempt to summarize the most characteristic features of each of these five S&T learning models as opposed to the sixth model of 'slow-learning traditionalism'. See also Fig. 2.2 and Fig. 2.3 for statistical illustrations of these models.

These illustrations are based on the new methodology that we hereby propose for initial, relatively fast diagnostics of technological learning processes underway in particular countries. This diagnostics focuses on selected statistical indicators reflecting a country's S&T **learning capabilities** as well as the S&T **learning opportunities** available to this country. We call these radar charts 'Crystals of national S&T learning' not only because of their visual resemblance, but also because, like real crystals, they have a propensity to grow in size as a country progresses in its technological and socio-economic development thereby further expanding the S&T learning opportunities open to it and rooted in its continuously increasing learning capabilities.

Our "crystals of national S&T learning" showcase selected statistical indicators measuring 5 major aspects of national learning:

- Human capital accumulated /**human capability for S&T learning** (see indicators 11, 12, 1);
- **The most accessible opportunities for learning** from foreign sources created by capital goods imports and FDI (indicators 9, 10);
- **The more demanding opportunities for learning** from domestic and foreign sources through domestic R&D (indicators 2, 3),
- **The most demanding opportunities for learning** through mutually beneficial exchange of disembodied knowledge and international S&T cooperation (indicators 4, 5, 6), and
- **Success in using S&T knowledge** for improving technological structures of a country's manufacturing value added (MVA) and of its manufactured exports (indicators 7, 8).

Note that in order to convert all twelve different indicators to the same scale, they were first 'normalized' with respect to the range of variation of each indicator across all the countries for which data are available. Countries with the highest value of an indicator were assigned the 100% score (shown as 1 in our 'crystal' charts) and those with the lowest value the 0% score. The scores of all other countries were calculated as percentages of the range between the maximum and the minimum values using the following formula:

X normalized = (X – X min) / (X max – X min).
Some countries with indicators differing too sharply from all other countries were treated as outliers not included in the range calculation. Thus the normalized scores for these countries are more than 100% and in country-specific 'crystals' these scores are shown as peaks extending beyond the symmetrical 1 by 1 'crystal'. [111]

Note also that the placement of indicators around the radar chart was selected in such a way as to allow our 'crystals' to grow more or less gradually clockwise, from 9 a.m. to 6 p.m. This growth is normally expected to begin from the 'morning' indicators 9 and 10 that reflect the most accessible learning opportunities, requiring minimal accumulation of human capital (importing foreign-produced machinery and attracting some, at least labor-intensive/low-value-added FDI), go through 'around noon' indicators 11, 12, and 1 that reflect 3 different aspects of national human capital accumulation, and then lead to 'afternoon' indicators 2 – 6 that reflect increasingly demanding learning opportunities, requiring progressively higher stocks of national human capital, from learning to perform some domestic R&D to cooperative participation in international research activities at the global technological frontier. Indicators 7 and 8, measuring two interrelated aspects of using S&T knowledge for socio-economic development, are placed so as to 'happen after hours'. We hope that such intuitive placement of indicators will contribute to their easier interpretation.

Not surprisingly, the 'learning crystals' for the most developed and the fastest learning countries tend to be the largest, the most rounded, and the most bottom-heavy (with indicators 5, 6, and 7 reflecting some characteristic features of '**creative-cooperative'** model of learning). See for example Sweden's 'crystal' in **Fig. 3.1**. By contrast, 'crystals' of countries falling in the group of '**traditionalist slow learners'** are barely visible (see **Fig. 3.2),** because most indicators (other than imports of machinery and equipment) are very close to zero, reflecting extremely low capabilities for national S&T learning and the extreme lack of learning opportunities open to these countries.

[111] See for example indicators #4 in crystals of Ireland and Singapore in Fig. 2.3.

Figure 1.1 Fast Learning Sweden

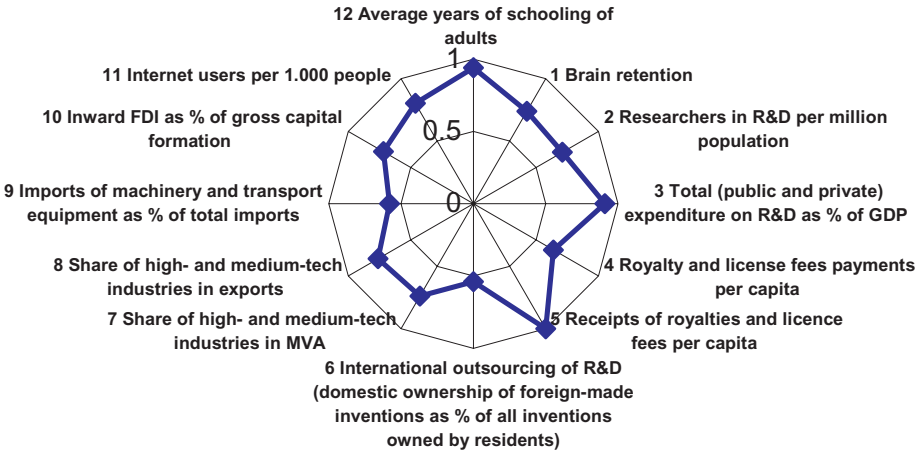
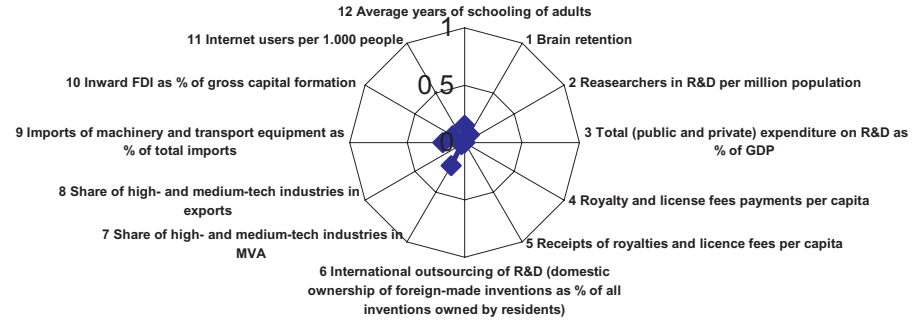


Figure 1.2 Slow Learning Bangladesh



It seems evident that it takes a certain minimal level of human capital for a developing country to engage in successful technological learning and upgrading. Below this level national S&T learning process and reducing a country's technological gap with developed countries may prove impossible unless deliberate external aid is provided aimed at building these country's learning capacity. All the least developed countries (LDCs) including most countries in Sub-Saharan Africa find themselves in this position, lagging further and further behind the technological frontier (see Fig. 2.2).

Next, for countries that have reached a certain minimal level of learning capacity, the most accessible ways of technological learning and upgrading would probably be through importing foreign-produced capital goods and attracting some FDI, usually carrying some new, foreign-produced knowledge and skills with them. The problem is that attracting FDI tends to be a big challenge for the poorest countries and their governments are often in no position to influence the direction or the characteristics of FDI that do enter their economies. Thus this initial model of FDI-dependent learning is called '**passive FDI-dependent'** (the term coined by the British researcher Sanjaja Lall).

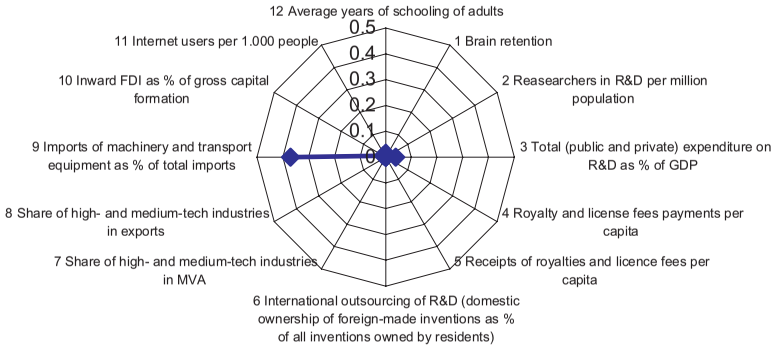
In poor countries, the major attraction for FDI is the opportunity for cost minimization stemming from the abundance of low-cost, low-skill labor. So most FDI will naturally focus on the most labor-intensive, low-value-added industries and industrial operations such as textiles or manual assembling of medium to high-tech goods (from automobiles to PCs). However assembling these goods of imported components and exporting them through TNCs networks does not require any considerable capacity building in participating developing countries. In our 'crystals' this situation is reflected by 'unexpectedly' high shares of high- and medium tech industries in passive FDI-dependent countries' exports, visibly contrasting with the much lower shares of the same kind of industries in their MVA (see arrows from 8 to 7 in Mexico's and Philippines' crystals in Fig. 1.4).

Note that, even if relations of a developing country's government with foreign investors have to remain relatively passive, the same government's policies can still be active in facilitating maximal technological learning by domestic firms from all the opportunities created by the presence of FDI. Then the initial growth of FDI can be expected to lead to further increase in the stock of national human capital, including due to an increased demand for it from domestic firms. Thus the predominantly left-sided crystal will start to grow its top (indicators of human capital).

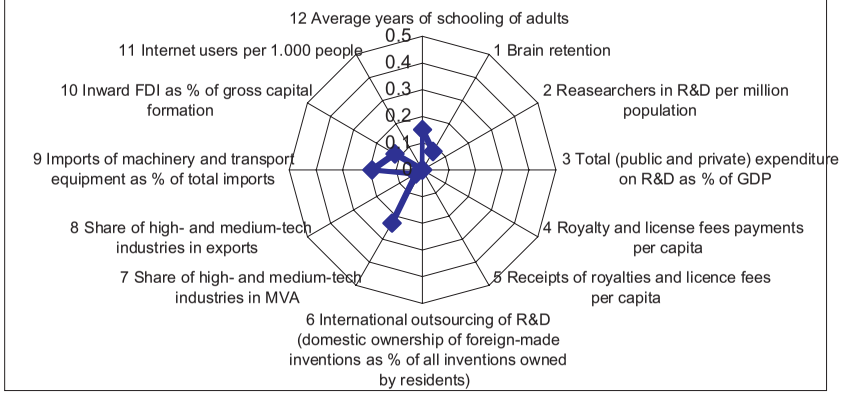
As a country's human capital continues to grow, this country acquires additional opportunities for learning by investing in domestic R&D for adapting available foreign knowledge to domestic needs as well as for new knowledge generation. A country at this point may have a wider choice of learning opportunities from foreign sources too – through more active relationships with foreign investors, who may be encouraged to invest in higher-skill operations including local R&D, or through more autonomous learning by imitating and, if necessary, licensing foreign technologies while limiting the country's reliance on FDI. Thus two different learning strategies/models – '**active FDI-dependent'** and '**autonomous**' learning – may be found in different countries with comparable learning capabilities (e.g. compare human capital indicators in Ireland and Korea or in Singapore and Japan as shown in Figure 1.4)

Figure 1.3. "Crystals" of National S&T Learning for Sample Slow-Learning Countries

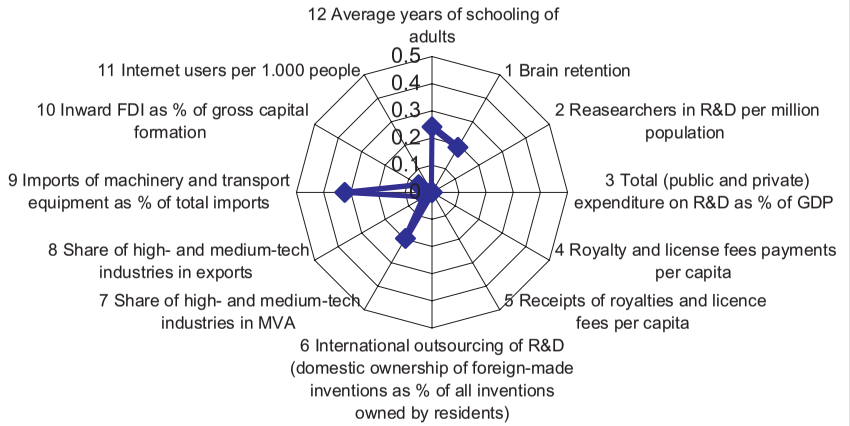
Burkina Faso



Bangladesh



Cameroon



Madagascar

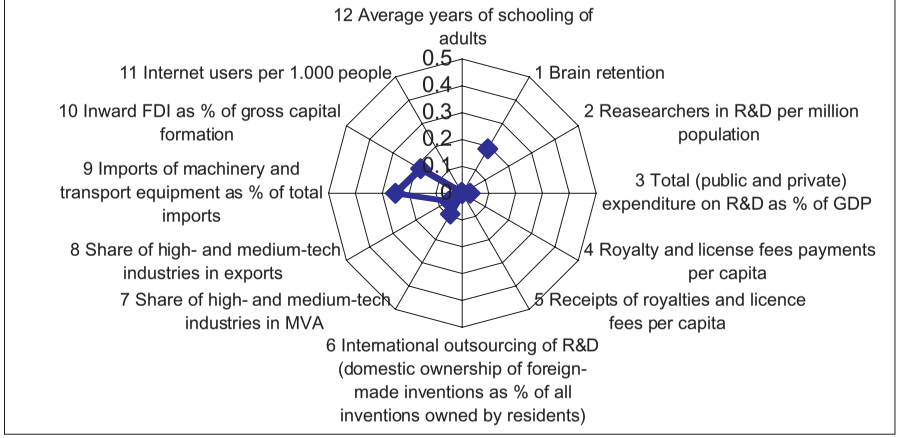
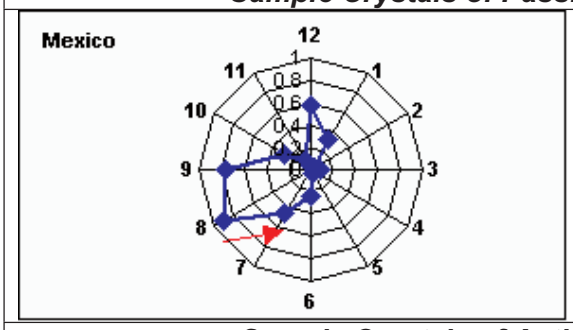
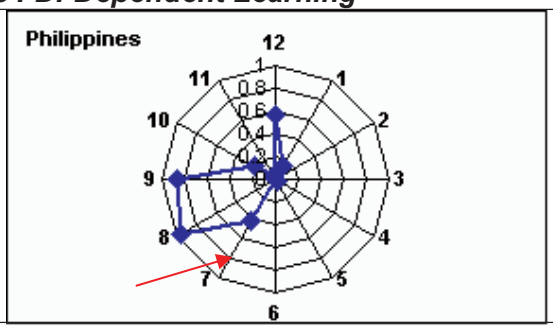


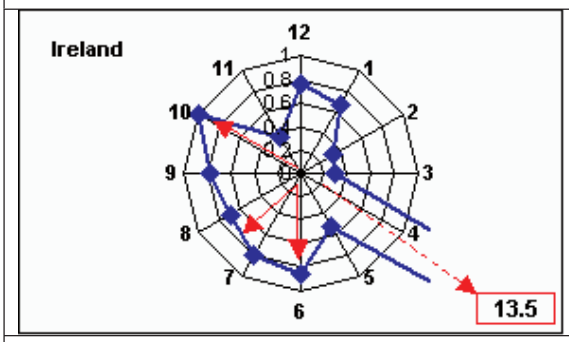
Figure 1.4 Taxonomy of National S&T Learning Models

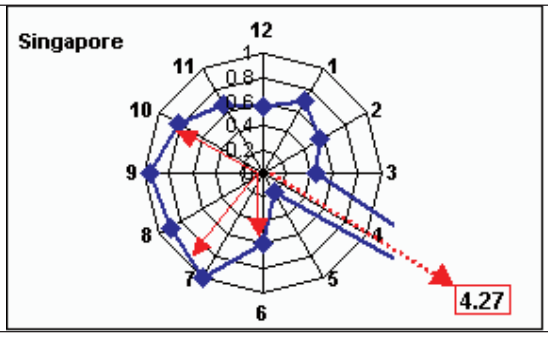
Sample Crystals of Passive FDI-Dependent Learning



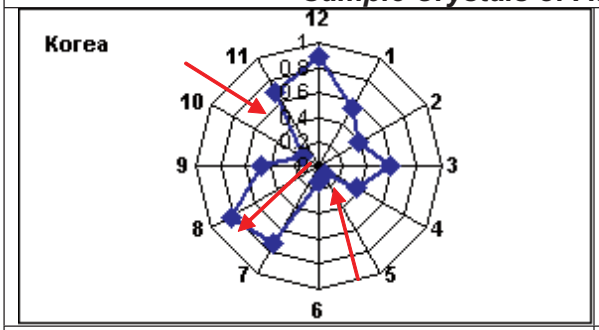


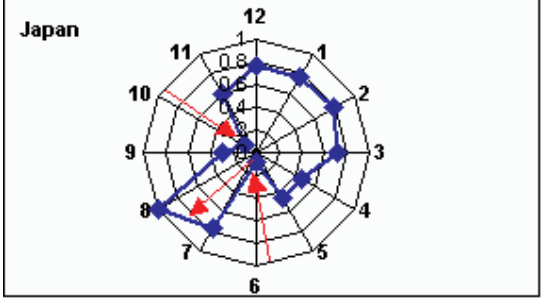
Sample Crystals of Active FDI-Dependent Learning



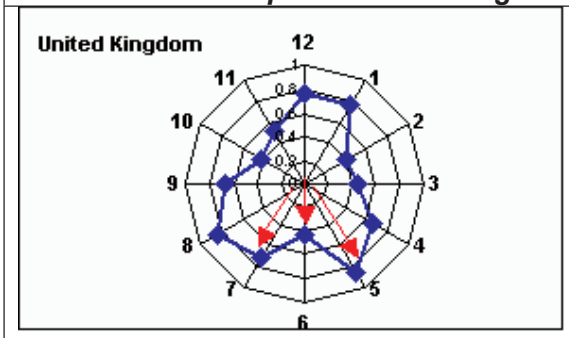


Sample Crystals of Autonomous Learning

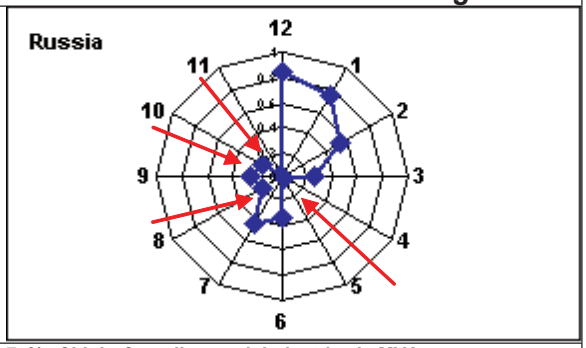




Creative-Cooperative Learning



Creative-Isolated Learning



1. Brain retention
2. Researchers in R&D per million population
3. Total R&D expenditure as % of GDP
4. Royalty and license fees payments per capita
5. Royalty and license fees receipts per capita
6. International outsourcing of R&D
7. % of high- & medium-tech industries in MVA
8. % of high- & medium-tech industries in manufactured exports
9. Capital imports as % of all imports
10. Inward FDI as % of gross capital formation
11. Internet users per 1,000 people
12. Average years of schooling of adults

To summarize, the term "**passive FDI-dependent learners**" will refer to countries with low or medium technological learning capabilities, for whom the way out of non-learning traditionalism has been open thanks to their exposure to foreign direct investment. However, these countries do not undertake significant efforts to facilitate local absorption and dissemination of foreign S&T knowledge, e.g. by upgrading local workers' capabilities or by targeting the kind of FDI most relevant to the country's long-term technological learning interests. Note that even this learning model may not be available to countries with very low endogenous capabilities and/or low attractiveness for foreign investors.

By contrast, the group of "**active FDI-dependent learners**" consists of countries that are capable of and have succeeded in actively facilitating and promoting national S&T learning from various opportunities provided by FDI. Some of the relevant policies do require the recipient country's ability to rely on relatively favorable negotiating positions, e.g. on its being sufficiently attractive for foreign investors. However, some other "activist" policies, such as government support for basic literacy and science education, can be chosen by any country with strategically thinking leadership.

The 'learning crystals' of these countries will differ from those of 'passive' FDI-dependent learners not only by the higher human capital and R&D indicators (see indicators 11 – 3) but also by the much higher shares of high- and medium-tech industries in their MVA (indicator 7), more balanced with the share of these industries in exports (8). In addition, examples of Ireland and Singapore appear to suggest the most recognizable feature of this learning model—the unusually high score for Royalty and license fees payments, many times higher than the scores of any other countries (see indicator 4 in Fig. 1.4). One of the possible explanations to this aberration appears to be that these extremely high payments are boosted by intra-firm transfer pricing practices, since it is well known that most of these payments are made by TNCs operating in these countries.

The group of "**autonomous learners**" includes countries that have succeeded in active learning from foreign sources without heavily relying on FDI. Some policy instruments for such learning include active learning from open-source S&T publications, hiring foreign consultants and managers, acquiring foreign patents and licenses, learning through contract manufacturing as well as from foreign equipment suppliers and highly demanding foreign customers, incl. by copying and re-engineering high-quality foreign goods.

Note that relying on autonomous learning model requires relatively advanced levels of endogenous S&T capacity. In addition, opportunities for autonomous, as well as active FDI-dependent, learning are currently more limited than before due to the recent proliferation of international free trade and IPR agreements explicitly prohibiting many of previously proven practices (e.g. re-engineering or local content requirements to foreign investors).

Our 'crystals' help to see some of the main differences between active FDI-dependent and autonomous learners. The most obvious differences are to be found in the level of their reliance on FDI (see indicator 10) and payments for foreign patents and licenses (even though autonomous learners compare quite favorably on indicator 4 to the most developed, creative-cooperative learners). Next, such autonomous learners as Korea and Japan tend to invest higher shares of their GDP in R&D (indicator 3), and these investments are made mostly by domestic firms and government institutions rather than by affiliates of foreign TNCs. However autonomous learners appear to lag behind in international outsourcing of R&D (indicator 6) and (as shown by other indicators, not included in our 'crystals') also in other forms of international S&T cooperation.

Finally among "**creative-cooperative learners**" are the countries with the highest levels of accumulated human capital that play the role of technological leaders in at least some niches of the global economy. These countries find themselves in the most opportune position for further technological learning from both, new knowledge generation by domestic R&D and from international S&T cooperation as the most effective way of acquiring foreign-produced knowledge e.g. through international outsourcing of selected R&D tasks, joint R&D projects, or strategic business partnerships. Creative-cooperative learners make the highest investments in domestic R&D (see indicators 2 and 3), engage in the most balanced, two-way exchange of patents and licenses (indicators 4 and 5), and in addition invest in foreign-performed R&D activities so as to become legitimate owners of resulting inventions (6). One more way of maximizing national S&T learning available predominantly to the most developed countries is attracting the inflows of highly qualified immigrants from other countries, the so-called "brain gain" (not yet reflected in our "crystals" for the lack of comparable data across developed and developing countries).

Within this context, Russia appears to belong to a very small group of countries that could be called "**Creative-isolated learners**" – countries with relatively high endogenous S&T capabilities that attempt to produce most of the needed technological knowledge domestically, with minimal reliance on international knowledge flows and S&T cooperation. This is the model that used to be characteristic of most countries of the Soviet block during the Cold War period (although there was in fact some S&T cooperation going on within the block). In today's globalized world it may still be used by some politically isolated countries (e.g. North Korea). But in Russia, that is no longer compelled to remain technologically isolated by political circumstances, it appears to survive mostly as a result of political inertia – see the relatively high indicators 12 - 2 (availability of human capital for domestic innovation) contrasting with much lower indicators reflecting various opportunities for learning from foreign sources.

Moreover, in the market-based economy that became even more natural resource-based than before the transition, the "creative' component of the model (meaning national capacity for creating new technologies) became weaker, because Russian scientists found themselves even less connected to the needs of any economic industries and Russian science became more of a "pure science" with rather unclear practical purpose. At the same time the "isolated" component of the model (meaning limited opportunities for

technological learning from foreign sources) probably did not become any weaker, because freedom of foreign travel can hardly compensate for the acute shortage of funding needed for scientists' foreign travel, or for subscriptions to foreign periodicals (at least for public libraries), for purchasing PCs and paying for Internet connection (needed by every modern researcher), or for acquiring patents and licenses (wherever the needed foreign technology happens to be protected by intellectual property rights). At the same time imports of foreign equipment and FDI remain relatively low.

Our "Taxonomy of national S&T learning models" may help to classify a country of interest as belonging to a certain "type of learners" and thus point to some pertinent foreign experiences in dealing with similar risks and challenges. Many countries however will fall somewhere between the typical models, whether because several routes of technological learning are simultaneously experimented with in different sectors and/or different regions of their economies or because these countries currently happen to be in transition from one prevailing model of technological learning to another. This is particularly characteristic of the largest and the fastest developing countries such as China, India, and Brazil[112].

Anyway, 'stamping' every country as belonging to a certain model of technological learning is neither necessary nor particularly useful. What examining a country's 'crystal of technological learning' can actually help with is answering the following type of questions:

(a) Is the country's national S&T learning likely to be fast enough compared to that of its major competitors? (Look at the overall size of the 'crystal" and compare it to those of selected other countries.)

(b) Is national technological learning constrained mostly by the lack of human capital/learning capabilities or by the lack of learning opportunities? (Compare the top of the "crystal' with its upper-left, upper-right, and lower-right segments.)

(c) Which additional learning opportunities might be available to the country but appear to remain relatively under-used? And

(d) How successful is this country in using its S&T capacity for its economic development? (Look at indicators 7 – 8 and their relationship.)

[112] Thus, data permitting, it could be quite illuminating to build 'dynamic crystals' of technological learning for consecutive periods in a country's history (e.g. with the interval of 10 or 20 years) along with 'regional' or 'sector-specific crystals' of technological learning prevailing in different regions or sectors of the national economy (e.g. extraction industries vs. manufacturing or export-oriented industries vs. domestic-oriented). Meanwhile, we were using statistical data from the UN specialized agencies averaged for the last 5 years available, usually for the period of 1997-2002.

Annex 4. Resource Diversification Matrix for Public Higher Institutions by Category and Source of Income

Category of income	Source of income				
	Government (national, state, municipal)	Students and families	Industry and services	Alumni and other philanthropists	International cooperation
Budgetary contribution					
General budget	X				
Dedicated taxes (lottery, tax on liquor sales, tax on contracts)	X				
Payroll tax			X		
Fees for instructional activities					
Tuition fees		X	X		
Degree / non-degree programs		X	X		
On-campus / distance education programs	X	X			
Advance payments		X			
Chargeback			X		
Other fees (registration, labs, remote labs)					
Affiliation fees (colleges)					
Productive activities					
Sale of services					
Consulting	X		X		X
Research	X		X	X	X
Laboratory tests	X		X		
Patent royalties, share of spin-off profits, monetized patent royalties deal			X	X	
Operation of service enterprises (television, hotel, retirement homes, malls, parking, driving school, Internet provider, gym)			X X X		
Financial products (endowment funds, shares)		X	X	X	
Production of goods (agricultural and industrial)	X	X	X	X	X
Themed merchandises					
Rental of facilities (land, classrooms, dormitories, laboratories, ballrooms, drive-through, concert halls, mortuary space)			X	X	
Sale of assets (land, residential housing)					
Fund raising					
			X	X	X
Direct donations			X	X	
Monetary grants	X			X	
Equipment	X		X	X	X
Land and buildings			X	X	
Scholarships and student loans		X	X		
Endowed chairs					
Indirect donations (credit card, percentage of gas sales, percentage of stock exchange trade, challenging grant)			X		
Tied donations (access to patents, share of spin-off profits)			X		
Concessions, franchising, licensing, sponsorships, partnerships (products sold on campus, names, concerts, museum showings, athletic events)		X	X		
Lotteries and auctions (scholarships)					
Loans					
Regular bank loans	X		X		X
Bond issues		X	X	X	

Source: Compiled by Jamil Salmi.

Annex 5. Monitoring Indicators for the Student Loan Program

- *Demand and Targeting Indicators*

⇒ Evolution of higher education enrollment rate
⇒ Coverage (number of beneficiaries over student population)
⇒ Proportion of new beneficiaries accepted over the number of applicants
⇒ Proportion of beneficiaries from low and medium income families
⇒ Gender distribution of students and beneficiaries
⇒ Geographical distribution of students and beneficiaries
⇒ Distribution of students and beneficiaries by academic program
⇒ Academic results of beneficiaries (compared to general student population)

- *Financial Indicators*

⇒ Arrears and default rates (by socioeconomic group, gender, tertiary institution, academic discipline, and amount of loan)
⇒ Affected portfolio as a proportion of total portfolio
⇒ Delayed payments as a proportion of affected portfolio
⇒ Actual interest rate and subsidy level
⇒ Loan recovery ratio
⇒ Administrative costs compared to overall portfolio (and distribution of main expense categories)
⇒ Cash flow projections
⇒ Evolution of real value of assets
⇒ Distribution of funding sources
⇒ Dependency on government resources
⇒ Mobilization of non-government resource
⇒ Return on investment (return on capital, return on assets)

- *Institutional Operation Indicators*

⇒ Management indicators (measuring the efficiency and quality of internal processes)
⇒ Satisfaction of beneficiaries
⇒ Turnover of personnel
⇒ Indicators of promotion of the student loan program (awareness of the program and understanding of the terms and obligations)

Source: Salmi, J. (2003). "Student Loans in an International Perspective: The World Bank Experience." LCSHD Paper Series number 44, Washington DC: The World Bank.

Annex 6. Which Allocation Mechanism is more Effective?

Policy objectives pursued

- improving access and equity
- improving external efficiency
- improving internal efficiency and sustainability

Improving access and equity

- traditional age students
  - increased cost sharing with more student grants, scholarships and/or loans to offset adverse effects of higher fees
  - income contingent student loan repayments
  - input-based formula
- disadvantaged students
  - expanded need-based grants and scholarships
  - pay institutions premiums for enrolling and graduating disadvantaged students (contracts)
- lifelong learning opportunities
  - grants and scholarships
  - student loans
  - tax benefits for workers enrolled in tertiary programs
  - lifelong learning vouchers
  - savings accounts

Improving external efficiency

- improving quality
  - competitive funds
  - merit-based scholarships
- increasing relevance
  - formula with differential weights for high priority fields
  - competitive funds
  - grants and scholarships in priority fields
  - student loans in priority fields
  - loan forgiveness for students in public service jobs

Improving internal efficiency and sustainability

- cost containment
  - funding formula based on normative costs
- improving throughput
  - output-based formula
  - pay for results
  - performance contracts

Source: Salmi, J. and A. Hauptman. 2006. "Innovations in Tertiary Education Financing: A Comparative Evaluation of Allocation Mechanisms". Washington DC: The World Bank.

Annex 7. Indicators used by international ranking exercises

Table 1 - *A comparison of benchmarks in international league tables*[113]

Indicator	Asiaweek	The Times	Financial Times	US News & World
Academic Reputation				
Academic Reputation Survey (assessed by CEOs of institutions)	□			□
Academic Reputation Survey (assessed by employers)				□ #
Mean Teaching Quality Assessment subject scores		□	□	
Student Selectivity				
Number of first year students accepted/total applicant	□		□	□
Enrollees/accepted students	□			□
Students in the top 1% of high school class or 'A' or equivalent in national entrance test	□			
First year students in top 10% of highs school class				□
Median score of the first year students in the national or university entrance exam	□	□	□	□
% of overseas students			□	
Retentions				
Average % of first year students over a 3 year period returning for new academic year				□
Average % of graduating class earning degree in 6 years of less				□
Teaching Resources				
Teachers with graduate degrees	□			
Proportion of professors with highest degree in their field				□
Median pay	□			□
Per teacher university spending	□			
Class size	□			□
Student teacher ratio	□	□	□	□
% of teaching staff full-time				□
Research				

[113] Source: *Benchmarking: A manual for Australian universities*. Department of Education, Training and Youth Affairs.

Citations per teacher in international academic journals (Journal Citation Index)	□			
Published articles per teacher in Asian academic journals	□			
Research funding	□			
Income for research/FTE			□	
Teachers with doctorates	□			
Graduate students	□			
% of postgraduate students (research)			□	
% of postgraduate students (taught)			□	
Average Research Assessment Exercise score per member of staff				
Financial Resources				
Income from industry/FTE			□	
Total spending	□			
Total spending per student	□			
Library spending per student	□	□	□	
- Facilities spending		□		
- Computer spending per FTES			□	
- Access to the internet	□			
- Access to e-mail	□			
Alumni Satisfaction				
- Average % of alumni donating over a 2 year period				□
Graduate Outcomes				
- Difference between the 6 year actual and predicted graduation rate for a given year				□
- First degree graduates and leavers taking up employment or further study as a % of those with known destinations		□	□	
- First degree qualifiers with >= upper second class honors degrees as a % if all first degree honors graduates		□	□	

*# for Graduate Schools only

A comparison of indicators used by Shanghai Jiao Tong University (SJTU), Times Higher Education Supplement, and Asiaweek

INDICATOR	SJTU	THES	ASIAWEEK
Quality of Education:			
- Alumni winning Nobel Prize or Fields medals	□		
Quality of Faculty:			
- Faculty winning Nobel Prize or Fields medals	□		
- Highly cited researchers in 21 broad categories	□		
Research Output			
- Articles published in Nature and Science	□		
- Articles in citation indices	□	□	□
Size:			
- Academic performance relative to size	□		
- Peer review score (reputation)		□	□
- International faculty		□	
- International student		□	
- Faculty/student		□	□
Student selectivity:			
- 1st year students accepted compared to applicants			□
- Enrollees compared to accepted students			□
- Median score of 1st year students in entrance exam			□
*Extra 2 points given where system severely restricts # of applicants			
Faculty resources:			
- Full-time teachers with PhD			□
- Full-time teachers with Master's and PhD			□
- Median pay			□
- Per teacher university spending			□
* Extra 2 points for non-monetary benefits			
Research:			
- Publications in peer reviewed journals			□
- Papers in international conferences			□
- Published books			□
- Research funding			□
- Graduate students			□
Financial resources:			
- Total spending per student			□
- Library spending per student			□
- Internet bandwidth			□
- Public computers and connection points			□
- Lab spending for science and technology universities			□

List of indicators and their weighting used in the ranking of Canadian universities by Maclean's magazine.[114]

Maclean's ranks universities in three categories: Medical/Doctoral, Comprehensive, and Mainly Undergraduate. The performance measures vary between 22 and 24, according to peer grouping.

Student body	**(22% to 23%)**
Average student entering grade	11%
Proportion with 75% or higher	2%
Student retention	2%
Proportion who graduate	2%
Out of province (1st year)	1.5%
International (1st year)	0.5%
International (graduate)	1%
Student awards	3%
Classes	**(17% to 18%)**
Class sizes (1st and 2nd year level)	7%-7.5%
Class sizes (3rd and 4th year level)	7%-7.5%
Classes taught by tenured faculty	3%
Faculty	**(17%)**
Faculty with Ph.D.s	3%
Awards per full-time faculty	3%
Social Sciences and Humanities Grant[115]	5.5%
Finances	**(12%)**
Operating budget	3.3%
Scholarships and bursaries	4.3%
Student services	4.3%
Library	**(12%)**
Total library holdings[116]	1%
Holdings per student	3%-4%
Acquisitions	4%
Expenses	4%
Reputation	**(19%)**
Alumni support	3%
Reputational survey	16%

[114] *Source: Maclean's. Special Edition. November 14, 2005.*
[115] Social Sciences and Humanities Research Council, the Natural Sciences Research Council, and the Medical Research Council are all Federal research funding agencies. Some provinces such as Quebec have identical bodies at the provincial level.
[116] Medical/doctoral only.

Annex 8. Rankings of Business Administration Schools in Selected Asian Countries
(Malaysia, China, India, Korea, Pakistan, Philippines, Singapore, Thailand)

Asia Week (2000)[117]	Asia Inc. (2002)[118]
1. Indian Institute of Management— Ahmedebad (India)* www.iimad.ernet.in	2. Indian Institute of Management— Ahmedebad (India)* www.iimad.ernet.in
2 NUS Business School (National University of Singapore)* www.nus.edu.sg	3. NUS Business School (National University of Singapore)* www.nus.edu.sg
3 Asian Institute of Management (Philippines) www.aim.edu.ph	5. Asian Institute of Management (Philippines) www.aim.edu.ph
5 Indian Institute of Management— Bangalore (India)* www.iimb.ernet.in	9. Indian Institute of Management— Bangalore (India)* www.iimb.ernet.in
6 College of Business Administration (Seoul National University, Korea) http://cba.snu.ac.kr	10. Nanyang Business School (Nanyang Technological University, Singapore)* www.ntu.edu.sg
7 Sasin Graduate Institute of Business and Administration (Chulalongkorn Univ., Thailand) www.sasin.chula.ac.th	11. Indian Institute of Management— Calcutta (India)* www.iimcal.ac.in
9 Nanyang Business School (Nanyang Technological University, Singapore)* www.ntu.edu.sg	13. China Europe International Business School (CEIBS) (China) www.ceibs.edu
13 China Europe International Business School (CEIBS) (China) www.ceibs.edu	14. Sasin Graduate Institute of Business and Administration (Chulalongkorn Univ., Thailand) www.sasin.chula.ac.th
14 School of Management (Asian Institute of Technology, Thailand)* http://www.som.ait.ac.th	15. Chicago Graduate School of Business (Singapore) www.gsb.uchicago.edu
18 Graduate School of	17. Yonsei University (Korea)

[117] **Asia Week Methodology**: Largely based on peer review. In addition, international MBA institutions like Wharton School in the U.S. and 130 top corporations in Asia also contributed feedback. The weighted factors considered were: academic reputation (20%) and a combined consideration of more than 30 objective attributes, such as student selectivity, faculty resources and linkages with corporations and government, comprised the remaining 80%. A largely subjective, reputation based review.

[118] **Asia-Inc. Methodology**: Combination of subjective and objective measurements. With the weighted factors as follows: Peer-reputation ranking (20%); School and faculty quality (45%), includes size of faculty, % with PhDs, student/faculty ratios, etc.; and Student quality (35%, includes size of student body, international diversity, selectivity/GMAT scores, etc.

Asia Week (2000)[117]	Asia Inc. (2002)[118]
Management (Korea Advanced Institute of Science and Tech.)	www.yonsei.ac.kr/~gmba/index.html
23 Lahore University of Management sciences (Pakistan) www.lums.edu.pk	17. India Institute of Management, Lucknow www.iiml.ac.in
24 College of Business Administration (University of the Philippines)	21. Asian Institute of Technology (Thailand) www.ait.ac.th
28 Birla Institute of Technology and Science (India)	23. Peking University, Guanghua School of Management (China) www.gsm.pku.edu.cn
29. Graduate School of Business (De La Salle University, Philippines)	23. National Institute of Development & Administration (Thailand) www.nida.ac.th
32 Faculty of Business and Accountancy (University of Malaya)	25. Lahore University of Management Sciences (Pakistan) www.lums.edu.pk
34 T.A. Pai Management Institute, Manipal (India)	
37 Narsee Monjee Institute of Management Studies (India)	Antai (Aetna) School of Management (Shanghai Jiao Tong University, China)*
38 International Management Institute (India)	
41 Bharathidasan Institute of Management (India)	
42 Malaysian Graduate School of Management (Universiti Putra Malaysia)	
43 University Science Malaysia School of Management (Malaysia)	
44 College of Economics and management (Chungnam National University, Korea)	
46 Mahanakorn University of Technology (Thailand)	
48 B.K. School of Business Management (Gujarat University, India)	
49 College of Graduate Study in Management (Khon Kaen University, Thailand)	
50 SZAB Institute of Science and	

Asia Week (2000)[117]	Asia Inc. (2002)[118]
Technology (Pakistan)	

*indicates selection as an Asia-Best Business School by Asia-Inc., 2005.

Asia Week Methodology: Largely based on peer review. In addition, international MBA institutions like Wharton School in the U.S. and 130 top corporations in Asia also contributed feedback. The weighted factors considered were: academic reputation (20%) and a combined consideration of more than 30 objective attributes, such as student selectivity, faculty resources and linkages with corporations and government, comprised the remaining 80%. A largely subjective, reputation based review.

Asia-Inc. Methodology: Combination of subjective and objective measurements. With the weighted factors as follows: Peer-reputation ranking (20%); School and faculty quality (45%), includes size of faculty, % with PhDs, student/faculty ratios, etc.; and Student quality (35%, includes size of student body, international diversity, selectivity/GMAT scores, etc.

Annex 9. Recent "Excellence" Initiatives

Country	Number of Target Institutions and Eligibility Criteria	Resources Allocated	Investment Horizon
Germany Excellence Initiative 2006 [119]	40 graduate schools 30 Clusters of Excellence (universities and private sector) 10 Top-level research universities	$2.3 billion in total	Five year funding Two rounds: 2006, 2007
Brain Korea 21 Program [120]	• Science and Technology: 11 Universities • Humanities and Social Sciences: 11 Universities • Leading Regional Universities: 38 Universities • Professional Graduate Schools in 11 Universities	$1.17 billion in total	7 years Two rounds in 1999
Korea Science and Engineering Foundation (KOSEF) [121]	1) Science Research Centers (SRC) /Engineering Research Centers (ERC): up to 65 centers 2) Medical Science and Engineering Research Centers (MRC): 18 Centers 3) National Core Research Centers (NCRC): 6 Centers funded in 2006	1) $64.2M / year 2) $7M / year 3) $10.8M / year	1) up to 9 years 2) up to 9 years 3) up to 7 years All 3 programs launched in FY 2002 or FY 2003
Japan Top-30 Program (Centers Of Excellence for 21st Century Plan) [122]	31 Higher Education Institutions	$150 million / year (Program Total: 37.8B Yen)	5 year funding Launched in 2002 3 rounds: 2002, 2003, 2004
Japan Global Centers of Excellence Program [123]	50 – 75 Centers funded per year (5 new fields of study each year)	50 – 500 Million Yen per center per year (~$400,000 – $4M)	5 years Launched in 2007

[119] http://www.dfg.de/en/research_funding/coordinated_programmes/excellence_initiative/
[120] http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN015416.pdf; http://www.bk21.or.kr/datas/english_ver.htm
[121] http://www.kosef.re.kr/english_new/programs/programs_01_04.html
[122] http://www.jsps.go.jp/english/e-21coe/index.html
[123] http://www.jsps.go.jp/english/e-globalcoe/index.html; http://www.jsps.go.jp/english/e-globalcoe/data/application_guidelines.pdf; http://www.jsps.go.jp/english/e-globalcoe/data/review_guidelines.pdf

Country	Number of Target Institutions and Eligibility Criteria	Resources Allocated	Investment Horizon
European Commission, Framework Programme 7 (FP7) [124]	TBD – determined by structure of Research Proposals (RFPs)	Based on number of RFPs with a "centre of excellence" structure The overall FP7 budget is EUR 50.5 Billion covering 2007-2013 [125]	Launched in 2007 2007-2013
China 211 Project [126]	100 higher education institutions	$18 billion in 7 years ($400M to funding World Class Research Departments)	Launched in 1996
China 985 Project [127]	34 research universities	28.3B Yuan	1999 – 2001
Chinese Academy of Sciences (CAS) Institutes[128]	Mathematics and physics 15 Chemistry and chemical engineering 12 Biological sciences 20 Earth Sciences 19 Technological sciences 21 Others 2		
Canada Networks of Centers of Excellence [129]	23 currently funded Networks of Centers of Excellence 16 previously funded Networks	C$77.4 million per year since 1999 C$47.3 million a year in 1997-1999 C$437 million in total in 1988-1998	Operating since 1988 Permanent program since 1997
UK Funding for Excellent Units [130]	Universities with the highest marks after the Research Assessment Exercise	$8.63 billion disbursed after 2001 RAE	5 years for Research Council funded Centers [131] Two rounds: 1996 and 2001 2008 RAE Scheduled [132]

[124] http://ec.europa.eu/research/era/pdf/centres.pdf
[125] http://cordis.europa.eu/fp7/what_en.html#funding
[126] http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN015416.pdf
[127] http://www.oecd.org/dataoecd/9/45/37800198.pdf
[128]http://www.itps.se/Archive/Documents/Swedish/Publikationer/Rapporter/Arbetsrapporter%20(R)/R2007/R2007_001%20FoU-finansiarer.pdf
[129] http://www.nce.gc.ca/
[130] http://www.hefce.ac.uk/research/funding/
[131] http://www.rcuk.ac.uk/research/resfunding.htm

Country	Number of Target Institutions and Eligibility Criteria	Resources Allocated	Investment Horizon
Chile Millennium Science Initiative [133]	Groups of Researchers:	3 Science Institutes: $1 million a year for 10 years; 5-12 Science Nuclei: $250 thousand a year $25 million in total in 2000-2004	Every 5 years for nuclei and every 10 years for institutes
Denmark (Globalization Fund)	Funds to be allocated to research universities on a competitive basis	$1.9 billion between 2007 and 2012	Launched in 2006
NEPAD / Blair Commission for Africa (Proposed) [134]	1) Revitalise Africa's institutions of higher education 2) Develop centres of excellence in science and technology, including African institutes of technology	1) US$500 million a year, over 10 years 2) up to US$3 billion over 10 years	
Taiwan Development Plan for University Research Excellence [135]	Selection and financial support of internationally leading fields	$400M	4 years

Elaborated by Natalia Agapitova, Michael Ehst and Jamil Salmi (last update 9 March 2007)

[132] http://www.rae.ac.uk/
[133] http://www.msi-sig.org/msi/current.html
[134] http://www.eurodad.org/articles/default.aspx?id=595
[135] http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN015416.pdf

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