Developing Skills for Innovation and a High Income Economy in Malaysia

A Technical Assessment of the Current Context and Future Workforce Requirements

Report Completed in Collaboration with ILMIA—Ministry of Human Resources of Malaysia

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ABBREVIATIONS AND ACRONYMS

CASEN	Caracterizacion Economica
CCI	Content, Communication and Information
CGE	Computable General Equilibrium
CVET	Continuing Vocational Education and Training
DOS	Department of Statistics
E&E	Electric and Electronic
ETP	Economic Transformation Program
EU	European Union
GNP	Gross National Product
ICT	Information and Communications Technology
ILMIA	Institute of Labor Market Information and Analysis
KAM	Knowledge Assessment Methodology
K4D	Knowledge for Development
LFS	Labor Force Surveys
MQA	Malaysia Qualification Agency
NER	National Employment Return
NKEA	National Key Economic Activities
NOSS	National Occupational Skill Standards
OECD	Organization for Economic Co-operation and Development
OG&E	Oil and Gas and Energy
PMR/SRP	Penilaian Menengah Rendah
RPA	Recognition of Prior Achievement
SABER	Systems Approach for Better Education Results
STPM	Sijil Tinggi Persekolahan Malaysia
SPM	Sijil Pelajaran Malaysia
TIMSS	Trends in International Mathematics and Science Study
TVET	Technical and Vocational Education and Training
UPSR	Ujian Penilaian Sekolah Rendah
US	United States
WFD	Work force Development

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EXECUTIVE SUMMARY

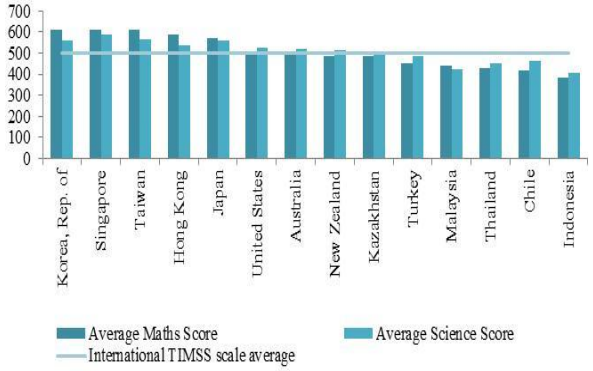
INTRODUCTION

The Government of Malaysia recognizes that to sustain the country's economic growth and fulfill the aspiration of becoming a high-income economy by 2020, it will need to make significant improvements to its human capital base.

In recent years, the Malaysian economy has been growing by over five percent (on average) despite increasing global competition, especially from neighboring countries. Such a dynamic economic environment requires an increasingly skilled workforce that can adapt quickly to changing needs. Indeed there have been notable improvements in the education level of the population. In 1990, half of all 25-35 year olds had no formal education or had only completed primary school; by 2011, about 75 percent of people in this age bracket had completed upper secondary school or higher levels.

Compared to other developing countries, Malaysia has very high coverage (near-universal) of primary education, but low (net) secondary enrollment rates (69 percent) than comparable economies (75 percent). At the tertiary level, enrollment rates are around 42 percent, higher than the average for upper middle income countries (32 percent) but still low compared to the OECD (76 percent) (World Bank, 2010). Despite progress over time, education quality (as measured by learning outcomes) lags behind other upper-middle and developed countries worldwide (Figure 1).

Figure 1: TIMSS Scores 8th Graders 2011



Source: Trends in International Mathematics and Science Study 2011

The Government's commitment to improving human capital is reflected in a number of recent policies, including the ambitious Economic Transformation Program (ETP). The ETP identifies 12 National Key Economic Areas (NKEAs) which are the industry sectors (and one region) likely to drive economic activity in Malaysia in the coming years. The shift from lower-skilled, lower-productivity work to high-skilled, high-productivity, knowledge-focused industry is at the heart of the NKEA strategy.

This study, conducted by the World Bank at the request of the Government, is motivated by the need to understand Malaysia's progress in facilitating the shift to a knowledge-focused economy. The assessment has three primary objectives related to the ETP's goal: to assess whether Malaysia's labor force has the right types of skills to facilitate the transition to a knowledge economy; to point out economic sectors, occupations, educational institutions, and other areas that must be improved to facilitate this transition; and to offer tested, practical policy solutions to address areas of weakness.

This study builds on previous consultations and research conducted in Malaysia in several ways:

1. It uses analytical tools to assess skill levels in Malaysia's labor market, focusing on both the skills of those supplying labor (workers) and the skills needs of those demanding labor (firms).

2. It uses econometric techniques to evaluate why skills mismatches are present in the Malaysian economy and to provide a detailed picture of the skills needs of the economically important NKEA sectors.
3. It uses a simulations approach to estimate the future skills needs of the Malaysian economy.
4. It draws on best practices from around the world and lessons from the quantitative analyses to offer evidence-based recommendations for policy action.

The analysis finds that given Malaysia's goals to become a knowledge economy and increase its growth rates in key economic sectors by 2020 the country faces a great human capital challenge. The challenge stems from specific deficiencies in the current *quality* of the skills of the workforce vis-à-vis a knowledge economy; and current insufficient *quantity* of available workers for the growth rates envisioned in key economic sectors. More specifically, the analysis finds that the **quality of skills of workers is insufficient to meet demands of a knowledge economy.** Despite increasing levels of post-secondary levels of education in the workforce, employers find that inadequate skills persist. Also, there is an **insufficient quantity of local labor supply to fill workforce requirements.** As projected, employment of Malaysian citizens is expected to increase from around 10.4 million (in 2010) to 12.7 million in 2020[1], assuming a 5 percent GDP growth per year.

Fortunately, there are many areas of strength, and clear avenues to address the challenges that remain, which make it possible for Malaysia to fulfill its human capital needs to achieve its goals. The key messages and findings from the comprehensive assessment are presented in this executive summary. They shed light on the priorities to focus on in order to meet the demands of a knowledge economy. The concluding section present highlights of proposed reforms and recommendations to address the priorities identified.

POLICY OPTIONS FOR THE GOVERNMENT TO CONSIDER

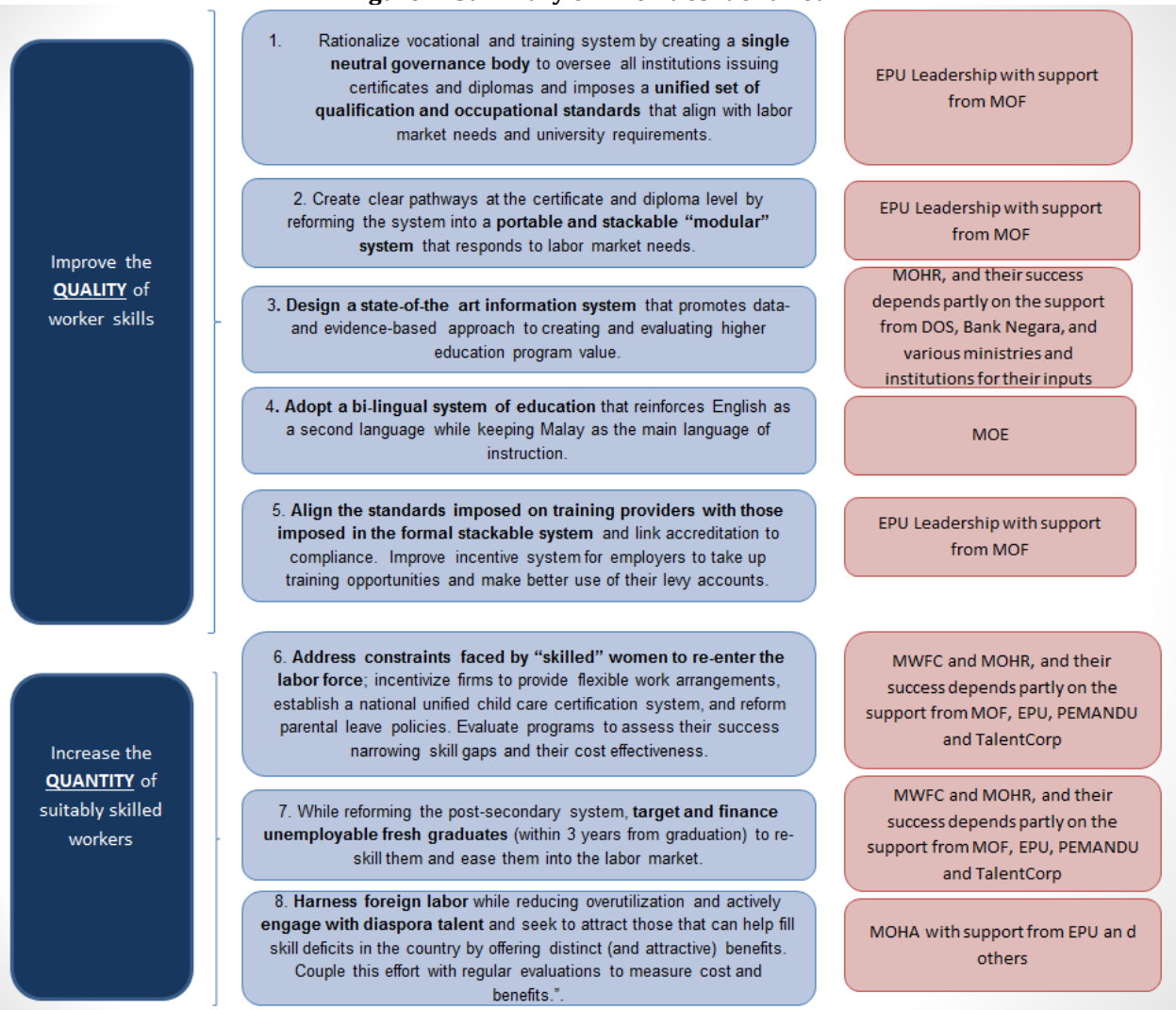
What emerges clearly from the analysis in this report is that the education and training system's focus should be on the development of a solid foundation for all three groups of skills: cognitive, social and behavioral, and technical. Foundational skills, imparted largely in early childhood education, primary and lower secondary education, play a critical role in the eventual quality of the workforce, and the government is currently undertaking various important initiatives and reforms to strengthen the skills of the future workforce. There are less large scale reforms and initiatives at the post-secondary level, on-the-job, and once employees exit the formal educational system.

Thus, this report focuses largely on the population that is in the workforce now, entering the workforce, or entering the post-secondary educational system. To that end, the recommendations (or Priorities) outlined here, and detailed in chapter 9 of the report, pertain to helping the government of Malaysia get closer to reaching its goal of becoming a higher income knowledge driven economy, with workers that are skilled and adaptable to an evolving labor market. All Priorities (Figure 2) are meant to address two overarching objectives: first, improve the quality of worker skills; and second, increase the quantity of suitably skilled workers.

It is important to note that some Priorities (and their respective action plan) are more likely to succeed when implemented together; for instance: Priorities 2 and 5 are partly dependent on Priority 1. These three Priorities require leadership from the Economic Planning Unit (with support from Ministry of Finance), to organize and design a viable system given the existing divisions in the post-secondary system. These Priorities also require that Ministry of Education and other line ministries actively participate in the design of the proposed system. Other priorities can be done in parallel by various ministries and institutions. Priority 4 is directly under the domain of the Ministry of Education. Priorities 6 and 7 involve various ministries and institutions, such as Ministry of Women, Family and Community, and Ministry of Human Resources, and their success depends partly on the support from Ministry of Finance, Economic Planning Unit, PEMANDU and Talent Corp. Priority 3 falls largely under the Ministry of Human Resources but depends on the support of Department of Statistics, Bank Negara, and various ministries and institutions for their inputs. Priority 8 falls largely under Ministry of Home Affairs with support from EPU and others.

[1] Including foreign labor (so the entire workforce), the total labor demand is expected to increase from 11.9 million (in 2010) to 15.3 million.

Figure 2: Summary of Priorities Identified



Source: Author's Illustration

First Objective: Improving the Quality of Worker Skills

Inadequate quality of worker skills stem partly from having a workforce development system that is not responsive to the dynamism of the economy and fast changing labor demands, and from deep rooted institutional failures. The analysis presented in all eight analytical chapters of the report highlight five critical market failures that hinder *the quality* of the current workforce; these are: 1) fragmentation in the workforce development system; 2) heterogeneity in the quality of training and education at all certificate and diploma levels and mis-alignment of training with market demands, both of which distort economic returns to education for post-secondary graduates; 3) limited information systems that can make the workforce system more responsive and synergistic; 4) deficient quality in the delivery of basic educational services (namely as it related to English language, math and science); and 5) sub-optimal utilization of job-related skill training opportunities. To address these market failures, the World Bank team (in consultation with various Malaysian stakeholders) has designed a set of five priorities (with a sub-set of corresponding actions).

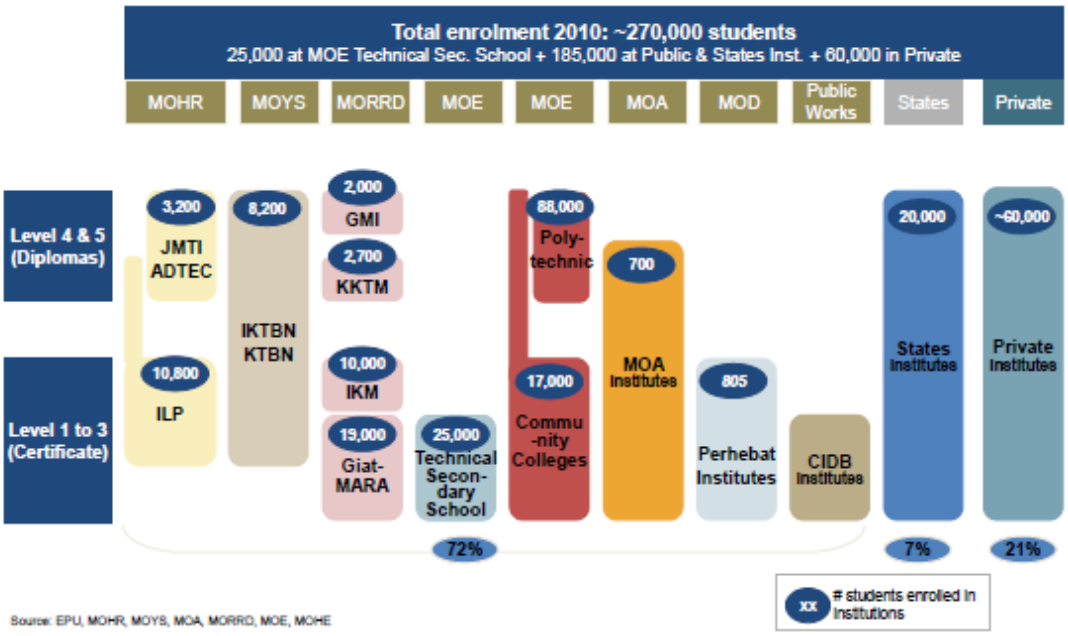
Priority 1: Rationalize the vocational and training institutional system to minimize fragmentation by creating a single governance body to oversee all the institutions issuing certificates and diplomas.

Also, the system should manage a unified set of qualification and occupational standards that align with labor market needs and university requirements.

Key Issue in Need of Addressing

Currently, the Malaysian workforce development (WfD) system (namely the certificate and diploma levels) is characterized by fragmentation and duplication of efforts which limits the overall effectiveness of the system to deliver quality services and content. The responsibility for WfD policy development and implementation falls across multiple institutions (Figure 3); at least seven, excluding a diverse set of private sector providers. And each one caters to a substantial set of students. A diverse supply of providers and competition among them is highly encouraged, especially in a country with a growing labor force and changing economic demands. But, Malaysia's diverse system does not currently *have* (or impose) a unified set of minimum standards that the labor market can validate, recognize and reward accordingly. Currently there is large variability in the quality of education and training provided by all these institutions, even for the same field and level of study; thus, it is difficult for employers to reward non-university post-secondary education and training in a manner that reflects the number of years of education and resources invested.

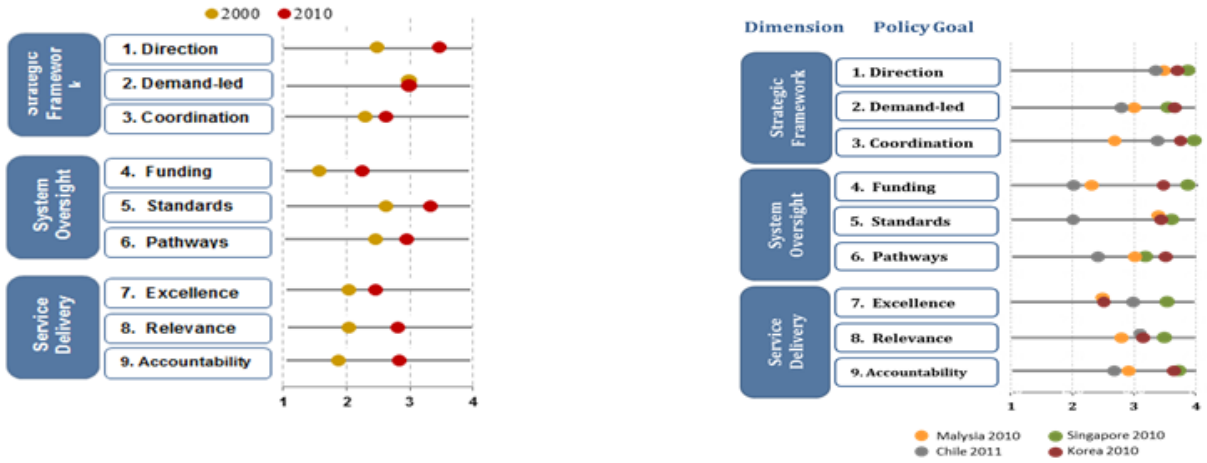
Figure 3: Current "Complex" System of Technical Vocational Education and Training



Source: Ministry of Human Resources, 2012

In fact, an in-depth assessment of the WfD shows that despite improvements (from 2000 to 2010) in formulating a strategic vision for WfD to support economic development and policies and institutions to support that vision, limitations in coordination in the overall WfD system results in insufficient attention paid to implementation and monitoring, program relevance and quality, funding efficiencies, and other dimensions in the WfD system, which result in efficiency and equity concerns. Figure 4 shows Malaysia's scores, in 2000 and 2010, on nine key system dimensions, and how it compared to benchmark countries around the world on the same dimension. Lack of coordination, funding efficiency, relevance and excellence remain areas of weakness. These policy areas are critical, curricula and programs need to remain relevant to the current and emerging skills demands in order to reduce skill mismatches.

Figure 4: Dimension Level Scores Over time and Compared to Other Countries



Source: Tan et al. 2013.

Proposed Actions under Priority 1

Action 1: *Create a single neutral governance body to oversee all institutions issuing a certificate, diploma, and advanced diploma.* A unified governance structure will limit the proliferation of institutions and providers, and ensure that the requirements at the certificate and diploma levels are aligned directly with those at the University level, governed under the Malaysia Qualification Standard (this links to Action 2).

The Australian Qualifications Framework, regulated under a Framework Council composed of national ministers responsible for tertiary education, training and employment, includes all levels of post-secondary and training education; from certificate I to Doctoral degrees (Figure 5).

Figure 5: Overview of the Australian Qualifications Framework

Australian Qualifications Framework

Australian Qualifications Framework Council

Level	Level 1	Level 2	Level 3	Level 4	Level 5
Summary	Graduates at this level will have knowledge and skills for initial work, community involvement and/or further learning	Graduates at this level will have knowledge and skills for work in a defined context and/or further learning	Graduates at this level will have theoretical and practical knowledge and skills for work and/or further learning	Graduates at this level will have theoretical and practical knowledge and skills for specialised and/or skilled work and/or further learning	Graduates at this level will have specialised knowledge and skills for skilled/paraprofessional work and/or further learning
Qualification Type	Certificate I	Certificate II	Certificate III	Certificate IV	Diploma

Level	Level 6	Level 7	Level 8	Level 9	Level 10
Summary	Graduates at this level will have broad knowledge and skills for paraprofessional/highly skilled work and/or further learning	Graduates at this level will have broad and coherent knowledge and skills for professional work and/or further learning	Graduates at this level will have advanced knowledge and skills for professional highly skilled work and/or further learning	Graduates at this level will have specialised knowledge and skills for research, and/or professional practice and/or further learning	Graduates at this level will have systematic and critical understanding of a complex field of learning and specialised research skills for the advancement of learning and/or for professional practice
Qualification Type	Advanced Diploma Associate Degree	Bachelor Degree	Bachelor Honours Degree Graduate Certificate Graduate Diploma	Masters Degree	Doctoral Degree

Source: Australian Qualifications website, 2013

Given Malaysia's complex WfD system, unification across all levels may not be feasible; however, to address the current fragmentation, it is imperative to establish a unified system to govern the non-university post-secondary level, encompassing levels 1 to level 6. The objective of the unified governance body should be to ensure that the system is organized and coordinated (between internal actors and with external stakeholders such as employers), provide credential consistency, and manage differences between disparate sector-based

institutional interests so that the system is well connected with the changing needs of the labor market and the university level of education.

Action 2: *Review the quality and occupational standards for post-secondary (non-university) levels to be more broadly applicable across the entire post-secondary system (except university), and how they are governed (under unified system of governance) to harmonize standards across system.* The new governance body should establish a unified set of quality standards that not only address the proliferation of qualifications issued by various providers, but also control the diversity in quality by improving the quality assurance under one national standard and one national regulating body. The new qualification system can use the current National Occupation Skill Standard (NOSS) as a starting point but make it more broadly applicable and enforceable; something that has been a challenge to date given that it is mainly geared to TVET education under the MOHR (and some private sector providers).

Harmonization should lead to clarity of the occupational standards and make them easier to enforce across institutions in Malaysia. Standards should be fed through the system at the institutional level, monitored through a rating system and enforced by the unified governance body to ensure homogeneity of quality across the system. Standards should be reviewed by the governance body with regularity, using a variety of labor market indicators to ensure fit with labor market needs. The new governance body should establish a unified set of quality standards that not only address the proliferation of qualifications issued by various providers, but also control the diversity in quality by improving the quality assurance under one national standard and one national regulating body.

The new unified standards should feed curricula re-design at the institutional level to ensure that standards are implemented and adopted throughout the system. The process of redesigning curricula should be highly structured so that standards are adequately applied and reflected in the fields of study and courses offered and that they remain relevant to labor market needs. Incentives of higher learning institutions will need to change by attaching funding and accreditation to innovation, excellence, and (private and public) competition for students.

The new governance entity can also prioritize critical fields of study that are directly aligned with labor market needs; for instance, skills needed for NKEA sectors and other core areas of the economy. The "neutral body" should continuously monitor the ability and capacity of institutions to meet skills demands, evaluate existing programs to assess their fit into the new system, and ascertain whether to enhance, maintain, or consider sun-setting the program. Employer requirements and industry certifications need to be examined and taken into account in the selection of programs within the priority fields of study.

Priority 2: Create clear pathways at the certificate and diploma level by reforming the system to a portable and stackable modular system where career credentials responds to the labor market.

Key Issue in Need of Addressing

Much of the analysis shows that more education does not always translate into higher wages, especially at the certificate and diploma level, which vary widely in how they are recognized by the labor market. The economic returns to education analysis conclude that workers have incentives to obtain more education, but students cannot always make changes to their path—either vocational or academic—and their education is sometimes not fully recognized by other institutions or by the labor market.

An additional year of schooling up to Form 3 of lower secondary school yields an increase in wages for males and females. The rates of return to education increase from lower secondary to upper secondary, and get much higher at the post-secondary level, which likely reflects the diminishing market demand for low-skilled workers. But among all post-secondary education options, the wage increase associated with completing an additional year of vocational education is the lowest. In fact, investment in vocational education provides a much lower return than university education (and even pre-university studies). There are also large differences in the returns observed within each level of education, across the entire wage distribution, indicating that the labor market has difficulty discerning some credentials, especially at the certificate and diploma levels. To address such heterogeneity in quality of education at the post-secondary level, and ensure that workers/students have incentives to continue their education and training, the system will need to be reformed to provide employers with a reliable method for hiring and maintaining a skilled workforce and give workers a clear pathway for building a sustainable career with the opportunity for advancement.

Developed countries such as the U.S., Canada, and Germany have tested a system of issuing credentials that ensure that career development is always possible.

Proposed Actions under Priority 2

Action 1: Reform the pathways between post-secondary systems by reforming the system into portable and stackable modules that respond to labor market needs and university requirements. Reforms should focus on ensuring that all learning in the post-secondary system is recognized by the rest of the system to enhance student progression between levels, recognize multiple pathways that students take in the system (including short-courses), and support lifelong learning.

Reformat certificate, diploma and advanced diploma levels (levels 1 through 6) into a stackable occupational programming approach that offers self-contained modules that stack up across levels (from 1 through 5) but also transfer easily to universities, if the student takes the academic route. Such a system requires ex-ante articulation agreements with four year universities to be in place to ensure a smooth transition. There is some precedent for such as system at the community college in Malaysia but the modular system has not been widely implemented or evaluated for effectiveness, and it is unclear whether it is meant to be stackable.

By changing the current system into stackable modular approach students across all fields of study can have a clear career or academic progression path. **Portability** of credentials is critical; but to ensure they are recognized across the system each module must be verified and accredited under a unified qualification standard. **Stackability** can also be an effective model to meet the demands of students in need of basic skills and those seeking more advanced skills and lifelong learning. Stackable credentials allow students to earn shorter term credentials with clear labor market value that builds on into more advanced credentials that easily translate into higher wages. These stackable degrees or certificates ease the entrance into the workforce, and function as a "gateway" for attainment of more advanced skills. Students know what skill and credential they will have at every stage and what their earning potential is for every level. Another advantage is that by offering short term stackable modules students are motivated to continue acquiring more skills over their lifetime.

Priority 3: Design a state-of-the art information system for all key stakeholders to use and to have a data- and evidence-based approach to creating and evaluating higher education program value.

Key Issue in Need of Addressing

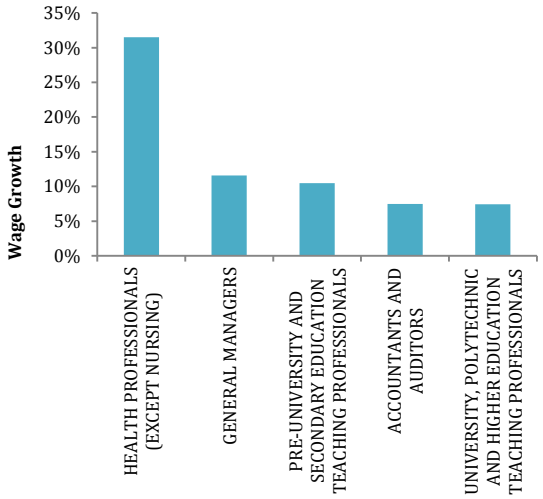
Like most growing economies, the Malaysian labor market is dynamic which make it complex for educational institutions to keep abreast of what skills are in demand and for students to know what career path and field of study will be best rewarded when they complete their schooling. The report includes a section that measures *labor imbalances,* which reveals information failures between stakeholders involved in the education and skills production system and the skills utilization processes (or labor markets). To reduce such labor imbalances the education and skills system need to have the information to adjust quickly when labor market needs change to prevent over or under producing certain skills, and exacerbating labor imbalances.

For instance, employers, educational institutions, and students can benefit from knowing that tertiary-educated workers in the Agriculture and Plantations sector are in high demand, or that , highly educated workers in the Construction sector have experienced a decrease in relative wages in the last three years. In the Manufacturing sector, some mismatches exist for tertiary educated workers. For instance, in high-value added Manufacturing, sectors in which the composition of the workforce is traditionally more high-skilled, the employment growth of high-skilled workers and their relative wage growth increases. Labor imbalances are more pronounced at medium levels of education for low-value added Services and at high levels of education for high-value added Services.

Information on the occupations that are in demand is also very relevant for future workers. For instance, knowing that between 2007 and 2010, health professionals (except nurses) experienced wage increases of nearly 32 percent would be important information for those choosing a career stream. Teachers at the pre-university/secondary and higher education levels experienced occupation-specific wage increases of around 10.5 percent and 7.4 percent, respectively, confirming the country's investment in the Education sector. On

the other hand, computing professionals faced difficulties getting higher wages, in part because they were not equipped with the skills required by employers (Figure 6).

Figure 6: Top Five High-skill Jobs by Occupation-Specific Growth, 2007-2010



Source: Authors' analysis based on Malaysian LFS 2007-2010

For workers not wishing to pursue higher education, it is also important to have a source of information that allows them to know where their skills would be demanded. Some low-skilled occupations are still needed; for instance, results show that seven low-skill occupations—including plant operators, trade workers, and a large number of elementary workers—experienced occupation-specific wage growth above 10 percent between 2007 and 2010.

Proposed Actions under Priority 3

Action 1: *Create an accessible and regularly updated labor market information system or "Workforce Dashboard" (WD) that allows stakeholders to make informed choices.* A WD can be critical for institutions to rationalize programs, modify curricula and update programs regularly. It also allows students to make better decisions on career choices and employers to have a clearer picture of the skills of the workforce. The data-driven approach allows program designers to consider both academic and labor market information, both which can be easily validated through engagement with stakeholders. Data and stakeholder input combined provide a powerful source for evidence based decision making in program rationalization.

Many developed countries have some version of a Workforce Dashboard. For example, the Australian Labor Force Information Portal, which is geared to give employers labor market information, and the United States' Occupational Outlook Handbook, which is geared to job seekers wanting occupational information (e.g. types of skills required for a specific job, wage rates). The U.K.'s National Statistics office has NOMIS, which is the official labor market statistic system, and the U.K.'s Center for Economic and Social Inclusion has a parallel system that relies heavily on mapping the information.

Action 2: *Establish a partnership (and align incentives) with the Department of Statistics for all data related inputs.* Such partnership is critical given DOS's role in data collection; and it should be established at the institutional level to ensure sustainable access to the data. DOS should be a key stakeholder of the WD.

Government should consider partnering with others in this effort. There are key functions that are better aligned with the comparative advantage of non-government agents. It makes economic sense to partner with private sector providers, academia, or others to undertake key functions such as up-keeping the technological platform, managing the content, marketing of the system, and evaluating program effectiveness, among others.

Figure 7: Example of a Workforce Dashboard Interface

Source: Author's Illustration

Priority 4: Adopt a bi-lingual system of education that reinforces English as a second language while keeping Malay as the main language of instruction.

Key Issue in Need of Addressing

The switch from English to Bahasa Malaysia as the language of instruction in 1970's yielded average positive results on wages, especially for ethnic Malays. It also positively impacted the quantity of people who sought further education and the quality of their learning. The 2003 language policy change (to impart math and science in English) had a negative impact on the mathematics achievement of 8th graders. In fact, relative to students in a comparable group of countries their performance deteriorated by 7.7 percent in mathematics and by 4.4 percent in science. One of the explanations is that most science and mathematics teachers are not proficient in English and are unable to impart high quality lessons in that language; in fact, a recent assessment of English language of teachers shows that only 28 percent scored in the proficient range, the rest require up-skilling or require full training (PEMANDU, 2012).

On the other hand, employers report that workers have limited mastery of English language skills and English language skills are critical to their economic success. It is clear from the analysis that employers need workers, especially skilled workers, to possess English language skill but they also need workers to have mastery of foundational (cognitive, technical and non-cognitive) skills. Thus, it is critical for the government to manage its language policy so as to avoid negatively affecting the quality of skills that students (and future workers) obtain while in the formal educational system. For instance, teaching core subjects in a non-mother tongue language in which students and teachers are not proficient can yield negative learning outcomes, and without proper preparation to update the foreign language skills of the teaching staff the problem can be exacerbated.

Proposed Actions under Priority 4

Action 1: *Adopt a bi-lingual (English-Malay) system of education, where English complements (rather than substitutes) Malay*. In the proposed approach, all core subjects should be imparted in Malay, the language mastered by most teachers, while also offering a complementary set of English language courses designed to help students develop and master English as a second language. All students should be able to pass examinations designed to measure aptitude, at various educational levels, to ensure proficiency in English upon graduation.

Action 2: *Invest adequate resources in the development of English language skill of teachers and administrators.* Reinforce the system of externships abroad and various programs of language development for young teachers. The English skilling system should be continuous, throughout the career of educators.

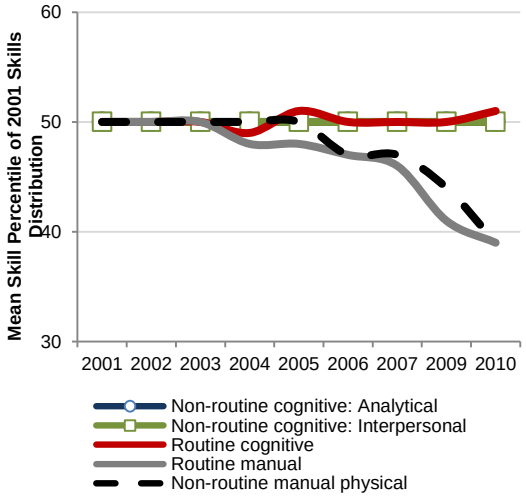
Priority 5: Align the standards imposed on training providers with those imposed in the formal stackable system. Also, link accreditation to compliance. Improve incentive system for employers to take up training opportunities and make better use of their levy accounts.

Key Issue in Need of Addressing

Various issues arise from the analysis which indicate that there is a need to promote (incentivize) on-the-job training and to ensure that such training yields positive results on productivity. Three key points worth highlighting; first, there is a stagnation in the content of jobs in Malaysia over the last years; second, the bulk of employers do not invest in training their workforce to meet their skill deficiency demands; and three, some types of worker provided training do not yield measurable results on worker/firm productivity. Even though jobs in Malaysia are more reliant on cognitive skills than manual skills, at the national level, jobs have not transitioned to a more intensive use of the non-routine cognitive (analytical) and non-routine cognitive (interpersonal) skills in the last years. This is worrisome because these skills are associated with advanced production processes and higher productivity.

Figure 8 demonstrates these phenomena (with an upward sloping line means that a skill category is becoming more dominant, while a downward sloping line means that a skill category is becoming less dominant). Overall, younger workers tend to hold jobs that are more complex than older workers; however, Malaysians with university degrees and diploma/certificate have not necessarily seen their jobs increase in complexity, or requiring more non-routine cognitive and interpersonal skills, in recent years. This trend likely indicates that job characteristics have not changed in the last years and they remain more basic than desired in a knowledge economy or workers do not have the level of skills necessary to take on more challenging jobs, and employers are not investing in training them.

Figure 8: Evolution of Skills in Malaysia: Mean Skill Percentile – All Malaysians



Source: Author's calculations using Labor Force Survey data for various years

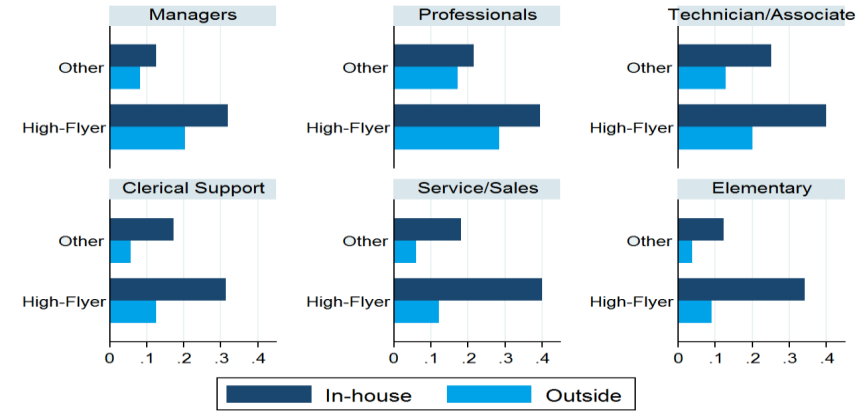
At the economic sector level, the use of non-routine (cognitive) skills are increasing in both high- and low-value added Manufacturing, while all skills are either stagnating or declining in Services. This mixed picture is notable: the finding that none of these sectors is experiencing a clear increase in non-routine skills and a clear decrease in manual skills is a sign that further efforts are needed to transition economic sectors to knowledge-based production. A comparison with other countries reinforces the message that Malaysia is shifting away from routine skills but that its progress in developing cognitive skills has been less favorable. Malaysia is performing less well in developing non-routine cognitive (analytical) and non-routine cognitive (interpersonal) skills than its level of economic development would imply.

Training provided (and often financed) by employers is one way in which some firms deal with skill deficiencies. In Malaysia employer provided training ranges from on-the-job training, apprenticeships, and

specialized outside (public or private) training. Unfortunately, training is not commonplace among small and medium firms, and even among large firms, those that engage tend to already be more innovative than the rest of the firms in the sector and the economy. Figure 9 shows that innovative, export oriented, and more global firms (here referred to as "high flyers") do much more training than all other (the majority) firms in the economy. The incentives for high flying firms to invest in training are likely clearer given that they face global competition and often make use of more sophisticated technology that requires constant change. Unfortunately, the majority of firms do not face the same incentives or prefer to keep utilizing old technology.

Also, much of the training investment is used to train the professional and technical occupations, and very little formal training is offered to the medium and lower skilled workers, which make up the majority of the workforce.

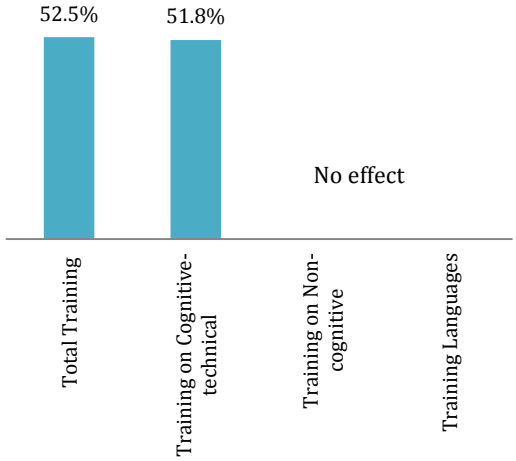
Figure 9: High Flyers Invest More in Training than the Majority of Firms in the Economy



Source: NER 2011

In general the analysis shows that the returns to training appear to be quite large; however, an in-depth look at the results shows that cognitive technical yields positive result while training in non-cognitive skills does not yield measurable changes on labor productivity. Also, there are clear differences in the effect of off-site training and at-work training; off-site trainings leads to substantially higher productivity gains compared to in-house training. Figure 10 shows that the returns to training (cumulative expenditures per worker in the three years preceding 2010, the year value-added per worker is measured) workers in courses that impart cognitive-technical skill increases labor productivity while the same is not true for training on non-cognitive skills and English language.

Figure 10: Impact on Training and Labor Productivity



Source: Authors' analysis based on Economic Census 2010

Proposed Actions under Priority 5

Action 1: *Align the standards imposed on training providers, and like their accreditation, with the national occupational qualifications standards so that they are part of the stackable system*. Increase the incentives of workers to seek skills upgrading by linking their training to the educational system and offering them stackable credentials which are linked to the formal diploma and certificate and university system. Such an approach ensures that trainees (or students) receive credentials of economic value by allowing them to stack the credits, add them to their formal training and get them recognized by the formal education system.

Evidence shows that training programs must meet the expectations and needs of employers and trainees (employees) in order to be effective. Employers who invest in training need to see immediate results in order to continue investing. The same is true for workers; when they view their training as relevant to their jobs, they are more likely to seek training, even if self-financed. This is even more likely in a stackable system where trainees get credit for the training received.

Action 2: *Design information and incentives for distinct groups of employers to engage in training their workers.* Employer-provided training (on or off the job) is one way to tackle skills deficiencies and overall mismatches. Chapter 5 shows that training positively impacts worker productivity and firm performance in high flyer firms. But many firms do not see training as a cost effective option. A comprehensive plan needs to be put in place to provide information to employers about the potential benefits of training, which include productivity gains and employee commitment, and shed light on which training schemes and types of skills provide the best returns on investment.

In this effort, enhance the role of HRDF and other levy account systems and leverage their overall "well established" system and course offerings to enhance employer provided training. Further analysis is needed to assess the effectiveness of distinct schemes currently provided by HRDF and other levy systems to introduce new ones, which have shown to be effective in other countries with similar contexts.

Improving the Quantity of Suitably Skilled Workers

A growing economy not only requires a better skilled workforce but it also requires a sufficient pool of willing workers of various skill levels. Even in a knowledge economy, key economic sectors and sub-sectors, such as agriculture, hotels and restaurants, wholesale and retail, necessitate a plentiful pool of workers to do routine manual tasks such as fruit picking, janitorial services, product assembly and distribution, among others.

The analysis projects that local employment demand is expected to increase from around 10.5 million to 12.7 million. And the estimate rises substantially, from 11.9 million people to 15.3 million people, when foreign labor is included in the estimate of the expected total workforce in 2020.

To meet such an increase in labor demand, the following three Priorities and corresponding actions address existing market failures that inhibit the full participation of the working age population and present obstacles to employing foreign labor. The key issues are: 1) many unfilled jobs and long vacancy periods for key posts, especially among the most productive employers; 2) high inactivity rates among tertiary educated graduates, especially female; 3) high unemployment rates among tertiary educated youth; and 4) limited information on the role (and impact) of foreign workers (mainly in the low-skilled category) in the economy and over-dependence of foreign labor in some economic sub-sectors.

Priority 6: Address constraints faced by "skilled" women to re-enter the labor force, by incentivizing firms to provide flexible work arrangements, establishing a national unified child care certification system, and reforming parental leave policies. Evaluate these programs to assess their success narrowing skill gaps and their cost effectiveness.

Key Issue in Need of Addressing

The analysis shows that Malaysians out of the labor force are a potential source of labor that should be tapped to help achieve the country's economic objectives. A large number of people are out of the labor force, especially women: the labor force participation rate of the entire population is 62.4 percent, of men is 77.6

percent, and of women is 46.8 percent. Although most of those out of the labor force have lower levels of education, almost 500,000 Malaysians between the ages of 25-35 with at least SPM/SPMV education are potentially employable in low- or mid-skilled professions. In particular, the majority of tertiary-educated economically inactive individuals are women with a certificate/diploma or a degree in Services. Given that the Wholesale and Retail and Tourism sectors have been identified as 2 of the 12 NKEAs, designing policies aimed at unlocking the potential of this unused source of labor supply is extremely important. In fact, a recent study shows that Malaysia could experience a 23 percent increase in output per capita if women's labor force participation were the same as men, and if the share of women entrepreneurs were the same as men's (Cuberes and Teignier, 2012).

Proposed Actions under Priority 6

Action 1: *Promote flexible work arrangements and establish a national unified system of child care quality certification to attract women back into the labor force. Rigorously evaluate the effectiveness of these initiatives to assess their success narrowing skills gaps*. Flexible work arrangements, improved child and elderly care, and retraining programs are three examples that have been shown to be effective in attracting women back into the labor force in other contexts. In the recent past the government of Malaysia introduced a double tax deduction incentive for training expenditures that were spent to re-employ women after a career break. The government also introduced incentive grants for the establishment of childcare centers and establishment of child-minder training programs. A subset of activities are currently being tried in Malaysia; unfortunately, there is little information on the take-up rate of some these incentive programs, on their effectiveness to attract women back to the labor force, and on their effectiveness to ease skills shortages. Thereby, as the government continues to experiment with such programs, and given their relative high costs, its important to assess if these initiatives yield the results expected, and whether they are cost effective in the longer term.

Action 2: *Reform parental policies to reduce the burden on employers while not reducing the current (relatively low) benefit level*. Parental leave is an area of policy where Malaysia differs greatly from OECD countries in that it places the cost burden solely on the (woman's) employer and offers shorter leave periods, which makes women workers more costly to employers. The government should introduce alternative modes of financing where the financial burden is shared in contributory funds, or fully removed from employers by embedding it into a social insurance scheme.

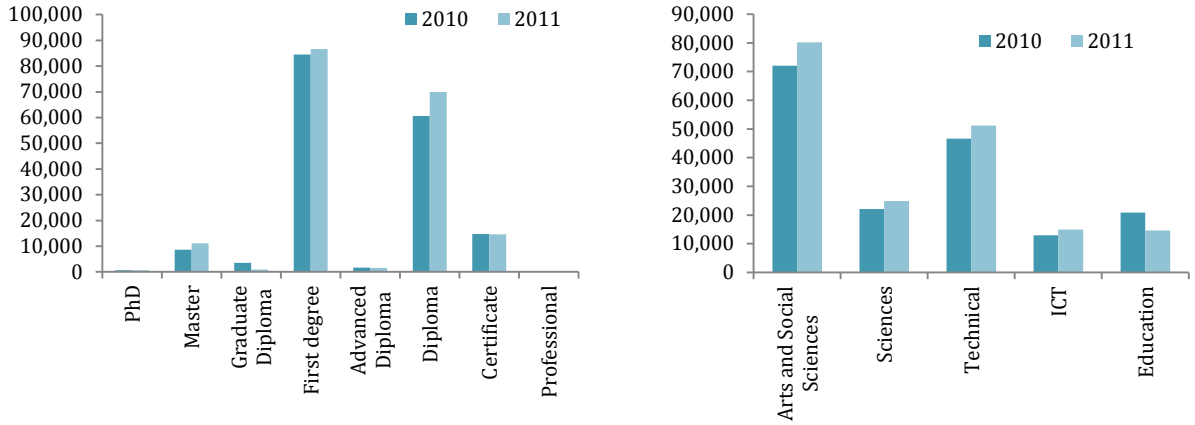
Priority 7: While reforming the post-secondary system, target and finance unemployable fresh graduates (within 3 years from graduation) to re-skill them and ease them into the labor market.

Key Issue in Need of Addressing

Quality higher education systems should be able to produce employable graduates; however, around the world, TVET, college and university graduates are finding it increasingly more difficult in recent years to find permanent employment. In Malaysia this issue is also at the forefront of policymaker's issues of interest. The general view is that university degrees and tertiary certificates/diplomas do not guarantee immediate access to a job, let alone a good job. Analysis using the National Tracer data of Malaysian graduates in 2010 and 2011 (in national High Learning Institutions upon graduation) provides a snapshot of various labor market outcomes of recent graduates.

In 2010 and 2011, about 174,000 and 185,000 graduates, respectively, provided information on their labor market prospects upon graduation. Most of them had completed a University Degree or Diploma, but some had completed graduate studies and vocational certificates (Figure 11). In both years, the fields of study most commonly chosen were arts and social sciences (slightly above 40 percent), and these were followed by various technical fields (27 percent).

Figure 11: Number of Graduates by Type of Higher Education (left) and 1-digit Field of Study (right)



Source: Tracer Study 2010 and 2011

The purpose of the National Tracer Study Survey was to get information on the employment status of these graduates upon (or shortly after) graduation. Descriptively, it is clear that students in some fields of study have easier access to the labor market than others. For instance, almost one-third (30 percent) of Certificate holders were unemployed when they responded to the survey. On the other side of the spectrum, graduates with Education as their field of study had the largest share of employment rates among all respondents. Interestingly, and slightly worrisome, well over 20 percent of graduates in the Science and ICT fields had not secured employment when they responded to the survey.

The information collected allows for a simple analysis of the key determinants of what contributes to graduate employment in the labor market. Results shows that a graduate in a Sciences field is 1.4 percent more likely to be employed than a graduate in Arts and Social Sciences with comparable characteristics, i.e. age, gender, education level, state of residence, type of education institution. On the other hand, graduates in the fields of Education are the most likely to be employed (9.2 percent more than Arts and Social Science graduates). The level of education of the graduate plays an important role in determining the work status of the person. With the exception of graduates awarded a certificate or a diploma, all other educational levels (namely, Master, PhD, Professional) have a higher probability of having secured a job upon graduation or soon after than graduates with a Bachelor level .

Proposed Actions under Priority 7

The three actions proposed here relate to incentivising employers to take on recent graduates through subsidizing employment (as part of re-training), providing graduates with resources to re-skill in fields better aligned with labor market needs, and improving the information infrastructure in employment related services. The first approach is currently being implemented in a small scale while the second one has not been tried in Malaysia yet. **Both should be thoroughly evaluated to determine their effectiveness before launching them full scale**. Neither approach is inexpensive, so determining their cost-benefit after the initial trial basis is critical to their longer-term sustainability.

Action 1: In the short term, expand the "Graduate Employability Management Scheme (GEMS) (or some of its features) to help unemployable graduates transition into the labor market. Before expanding the program, undertake a thorough evaluation to assess the effectiveness of the program its' cost-benefit, and to make necessary reforms. The evaluation will also help determine the features of the program that are scalable and effective to address graduate un-employability in the short-to-mid-term. This program is currently only offered to graduates of 27 years of age or below, with difficulty finding employment. Age criteria can be revised to target a broader set of recent graduates in fields of study facing difficulty in the labor market and undergoing curricula reform.

Action 2: *Another short term solution can be provided through Individual Training Accounts (ITA).* ITAs provide training vouchers to new graduates in any field, and recent (within 3 years) graduates whose degrees face particular recruitment difficulties. The objective of these training accounts is to provide tuition assistance to facilitate the transition of graduates (or young workers) into good paying jobs in key economic sectors by providing free tuition to public or private vocational institutions, colleges, universities or approved (by HRDF) training providers.

Action 3: Improve employment search related services. The best way to promote quality is the promotion of competition among providers of information to the public. Thereby, ease the participation of private sector employment search related services, while at the same time enhancing the quality of related services provided by public entities, and considering private-public partnerships to enhance employment related services targeted to graduates.

Priority 8: Harness foreign labor while reducing overutilization and actively engage with diaspora talent and seek to attract those that can help fill skill deficits in the country by offering distinct (and attractive) benefits.

Key Issue in Need of Addressing

Foreign workers (low to mid skill): A companion report to this report which focused on the role of foreign (low skilled) labor in the Malaysian economy found that the Malaysian economy needs foreign labor to fulfill current and future workforce requirements. The findings from that report are confirmed by the projection analysis undertaken in this report which find that including foreign labor (so the entire workforce), the total labor demand is expected to increase from 11.9 million (in 2010) to 15.3 million, assuming a 5 percent GDP growth per year; this means that 2 million workers, especially in lower skilled jobs, will likely be foreign. The relatively small local population base has contributed to a situation of relatively high employment and tight labor markets. Moreover, movement of people to urban areas has led to acute labor shortages in resource (e.g. plantation) sectors. Also, Malaysians rapidly increased their education levels and are not attracted to work in the agriculture and construction in favor of service sector employment in the public and private sectors.

Diaspora (and to an extent, foreign talent): Data from key destination countries such as Australia and the United States show that Malaysians (their spouses and their children) living abroad typically have high levels of education and are skilled in the fields of study (and professions) in demand in Malaysia (e.g. science, ICT). Many of them have achieved great success in their professions and are world experts in their fields; in fact, Malaysia has many examples. Unfortunately, many of these talented diaspora are not engaged with the country or planning to return, partly because they are unaware of opportunities or lack incentives to do so. Evidence from around the world shows that diaspora who have achieved success abroad typically have the ability to form and lead networks of experts in their fields, serve as role models to aspiring experts, and can more easily (and credibly) facilitate reform in their home country. They also typically have an intrinsic motivation to help their home country, by relocating or embarking in work that can make improvements while also raising their own profile (MPI, 2013).

Proposed Actions under Priority 8

Action 1: *Reform Levy system to better manage the utilization of foreign workers; move to an active rather than passive levy system.* The reform should focus on the pricing mechanism of foreign labor; it should be designed to actively discourage the over utilization of foreign labor in economic sectors with excess local labor supply while facilitating the entry of foreign labor in critical (quantity and quality) gap areas in the economy, which cannot be met in the short term with local labor supply.

Compare to caps on the number of visas issued, it is more efficient to implement different levy levels for each sector/occupation to finely manage and direct the inflow of immigrants. Levy levels should be set at lower levels in sectors and regions where domestic labor supply is limited and foreign workers are absolutely needed for the survival of the firms. Levy levels can be set in the form of tax-type fees that would be paid to the Government along with all the other taxes on a regular basis. Levies also provide more flexibility to the employers than caps by allowing them to plan ahead for their workforce needs more effectively and flexibly.

In Singapore and the Persian Gulf levies are increased as the ratio of the foreign workers on the payroll of the firms increases, which forces firms to adjust their overall workforce composition carefully.

Action 2: *Regularly evaluate the impact of foreign labor in specific sub-sectors to determine their economic contribution and to ensure that foreign labor remains necessary to fill labor gaps.* Migration programs should be fine-tuned towards the specific needs of the modern economy and respond swiftly as the underlying labor demand/supply conditions change. Naturally, these need to be determined in coordination with the employers of such workers, while paying close attention to labor market developments and making sure domestic workers are not disadvantaged. Labor markets in a dynamic economy continuously evolve, implying that new occupations are created while others become obsolete. The role of evidence-based analysis, for example a pro-active use of the WD, is fundamental to monitor the constantly changing labor market needs.

Action 3: *Actively engage with diaspora talent and seek to engage and/or attract them to fill skill deficits in the country by offering distinct (and attractive) benefits. Couple this effort with regular evaluations to measure cost and benefits.* The core message from this Action is to put in place mechanisms that allow the diaspora to be part of the country; in other words, making efforts and investments so that the diaspora skills are part of the stock of the country's skills. But again, to properly achieve this, a country must put in place concerted policies to keep their diaspora engaged. It is important to note that this does not mean necessarily to relocate all of the skilled diaspora back to Malaysia, this would be a futile effort and maybe even counterproductive; instead, the country should strive to keep diaspora engaged in order to benefit from their skills in one way or another, brain circulation as it is referred to in the migration literature.

There are many ways in which diaspora can be engaged; three distinct activities are: 1) create (and/or strengthen) a designated institution that facilitates entry points for diaspora engagement, 2) facilitate the establishment of formal and informal networks of collaboration, and 3) actively seek (and incentivize) talent that fills existing skills gaps to relocate back home. All three are complementary and will likely reinforce each other.

First, the Malaysian government created the Talent Corporation to optimize all Malaysian talent everywhere, attract and facilitate global talent, and build networks of top talent. Apart from direct connections between people, the creation (and strengthening) of a *designated institution* such as the Talent corporation to *facilitates entry points* (and advocate) for diaspora engagements has been a critical step in the right direction. For instance, the Talent Corp works with the Ministry of Home Affairs to reduce the time and burden to obtaining a visa for a foreign spouse of a returnee. But for this institution to continue to be relevant to Malaysia's growth agenda, it needs to continue establishing close ties with partners such as line ministries. An example, the Ministry of Education and Health need to work with Talent Corp to help validate the credentials of the returnee so that they can integrate into the labor market quickly. Ministry of Home Affairs needs to continue reforming its rules for work permits and visas for diaspora and its family to reduce migratory burdens. Ministry of Trade can work with Talent Corporation to make sure barriers to investments by a Malaysian from abroad are minimized. On the side of private sector and academia, Talent Corp can facilitate the formation of networks and the identification of specific joint projects that keep the diaspora engaged and contributing to the Malaysian economy.

Second, the establishment of *networks* has proven to be effective keeping diaspora engaged by India, Mexico, Taiwan, Scotland and Chile. But these countries have done it differently, with distinct levels of effort and success. The level of effort depends on how formalized and institutionalized the networks are; the most formal one rely heavily on the ability of the government to facilitate the engagement between diaspora and local institutions and partners (e.g. private sector, academia and others and promote the formation of specific joint (Malaysians and Malaysians abroad) projects that make improvements in the chosen area of work while strengthening cross boundary collaboration. Even though this level of formalization seems desirable, it carries the risk of stifling creativity by introducing too many rules, and being captured by special interest groups. Thus, it may be best for the government to ensure open channels for collaboration exists, by reviewing the regulatory environment and removing potential legal obstacles to the establishment of cross-boundary collaboration, while not participating directly. Table X shows three distinct levels of engagement and a recent publication by Kuznetsov (2013) provides specific examples for each of these countries.

Third, effective diaspora engagement begins at home with identification of skills gaps. Occupations and economic sectors in which the demand for skills outpaces the supply of skills are prime targets to be filled by members of the diaspora: if these gaps are left unfilled, economic growth can suffer. Identifying skills gaps involves a range of different techniques. Close engagement with the business community is critical to determine where business leaders think job growth will be. In the same way, educators can share insights into the educational backgrounds of graduating and soon-to-graduate students. Economic modeling can use past and current trends to forecast which economic sectors and occupations will prosper and which will decline. The analysis of skills gaps permits targeted outreach to members of the diaspora who are in most demand and who are most important to sustained economic growth. This focused approach also allows for incentives to be tailored to the type of diaspora member being sought out: the incentives needed to draw a high-skilled worker in the Oil and Gas sector back to Malaysia are likely quite different from those that would lead a less-skilled worker to return.

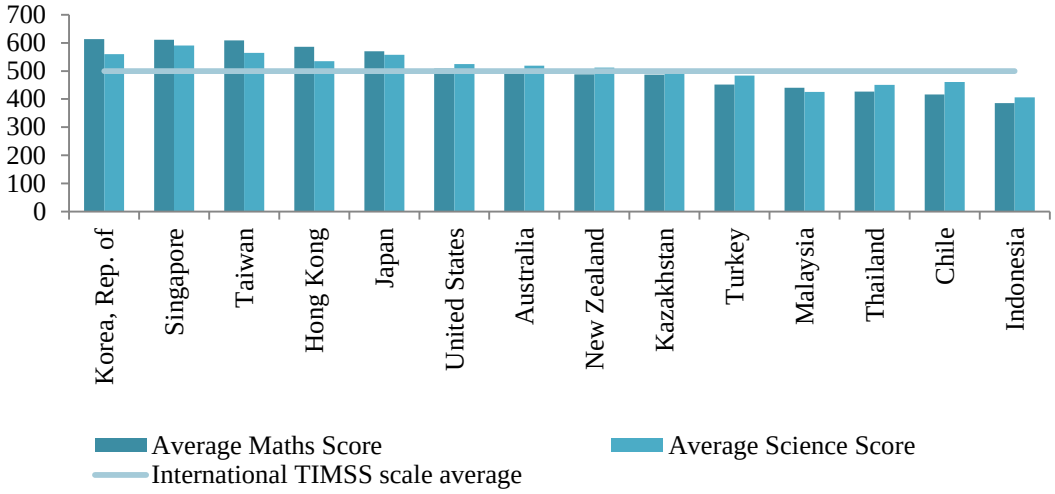
Going forward, for the institution to continue functioning properly it will be necessary to continue investing in information gathering, to ensure that it has an increasingly clearer picture of where the skills gaps are in Malaysia (this relates to the Workforce Dashboard), where the Diaspora is located, what skills sets they have, and whether they are interested in staying engaged and/or relocating. Also, it will be imperative for the government (Talent Corp and others engaged in diaspora related activities) to evaluate the effectiveness of its programs designed to attract the diaspora in order to ensure that the costs incurred merit the benefits to the economy.

Chapter 1: Introduction

1.1 Introduction

1. The Government of Malaysia recognizes that in order to sustain the country's positive economic growth and fulfill its aspiration to become a high-income economy by 2020, Malaysia will need to make significant improvements to its human capital base. In recent years, the Malaysian economy has grown by over five percent on average despite increasing global competition, especially from neighboring countries. This dynamic economic environment requires an increasingly skilled workforce that can adapt quickly to changing needs. Compared to other developing countries, Malaysia has very high coverage (near-universal) of primary education, but low (net) secondary enrollment rates (69 percent) than comparable economies (75 percent) and countries in the Organization of Economic Cooperation and Development (OECD). At the tertiary level, enrollment rates are around 42 percent, higher than the average for upper middle income countries (32 percent) but still low compared to the OECD (76 percent) (World Bank, 2010). The quality of education, however, as measured by learning outcomes, lags behind other upper-middle and developed countries worldwide (Figure 1).[2]

Figure 1: TIMSS Scores International Comparisons, 8th graders 2011



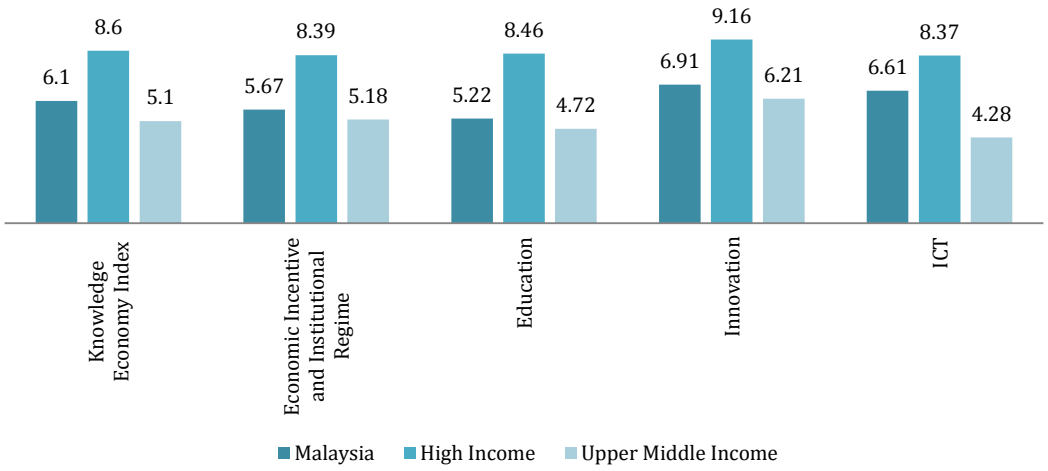
Source: Trends in International Mathematics and Science Study 2011

2. An international comparison indicates that Malaysia still lags in some areas in its efforts to become a more knowledge-focused economy. The World Bank has developed a Knowledge Economy Index that allows countries like Malaysia to measure their progress and

[2] In the most recent Trends in International Mathematics and Science Study (TIMSS, 2011) Malaysian 8th graders performed in par with children from Thailand and Turkey in Mathematics, and below them in Science. It performed far below neighboring Singapore, Korea, Hong Kong and other OECD countries. A similar pattern was observed in the Programme for International Student Assessment (PISA) in 2009. It should be noted that student scores in large urban areas of Malaysia were much higher than the average national scores, indicating that people in rural areas greatly underperformed compared to their urban peers and require special attention to improve educational quality.

benchmark themselves to other countries with similar aspirations. The Index includes measures such as information and communications technology (ICT), innovation, education levels, economic incentives, and institutional quality. On a scale from 1 (lowest) to 10 (highest), Malaysia achieved a score of 6.1 in 2012, well below high-income economies (with a score of 8.6), but above comparable upper middle-income countries (5.1). Malaysia performed better than the group of upper-middle income countries in ICT, but its score in the area of Economic Regime was much lower than that of high-income economies (Figure 2).

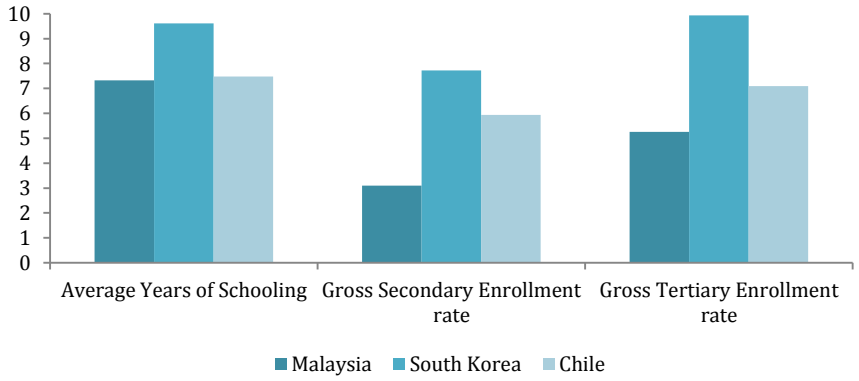
Figure 2: Knowledge Economy Index, 2012



Source: World Bank, Knowledge for Development (K4D), KAM 2012

3. Education is a key component of the Knowledge Economy Index—its role in the economy, its evolution over time, and whether the levels/rates are adequate for a knowledge economy compared to benchmark countries. While primary education is important in shaping people's ability to learn and developing key cognitive and non-cognitive skills, secondary and tertiary education levels provide specific technical training and skills that in many cases underlie technological innovation. Evidence from around the world shows that in order for a country (like Malaysia) to progress from mid- to high-income, it needs to make drastic improvements in terms of both quality and quantity of education, especially at the secondary and tertiary levels where enrolment rates lag well behind benchmark countries like Chile and South Korea (Figure 3).

Figure 3: Education Dimension, International Comparison (most recent year)

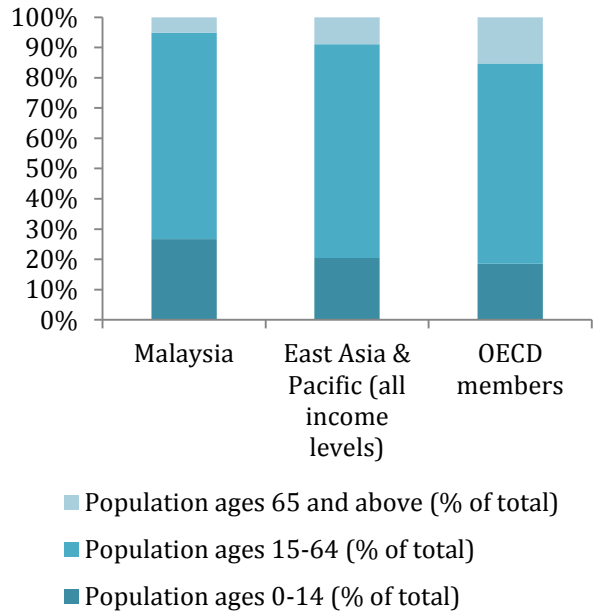


Source: World Bank, Knowledge for Development (K4D), KAM 2012

Note: Average Years of Schooling are calculated for 2010, secondary and tertiary school enrolment for 2009.

4. Although Malaysia enjoys some demographic advantages that can help meet labor demand, improving the quality of skills will be critical for reducing supply and demand skill mismatches. Despite lower-than-desired skill quality levels, in 2012, the number of jobs increased by 2.4 percent while the unemployment rate remained as low as 3.0 percent. Such increases in labor demand can be supported given Malaysia's relatively favorable demographic conditions, with a higher proportion of working-age population (ages 16-64) compared to the OECD (and just lower than the regional rate), increasing labor participation of previously absent segments of the population (namely women), and a more youthful population[3] than OECD and other Asian countries (Figure 4). However, demographic gains alone cannot help meet *all* labor market demands. Mismatches in the supply of and demand for skills are exacerbated by technological change and changes in skill requirements, with a shift from basic cognitive skills toward more technical skills.

Figure 4: Population Composition by Age as a Percentage of Total Population



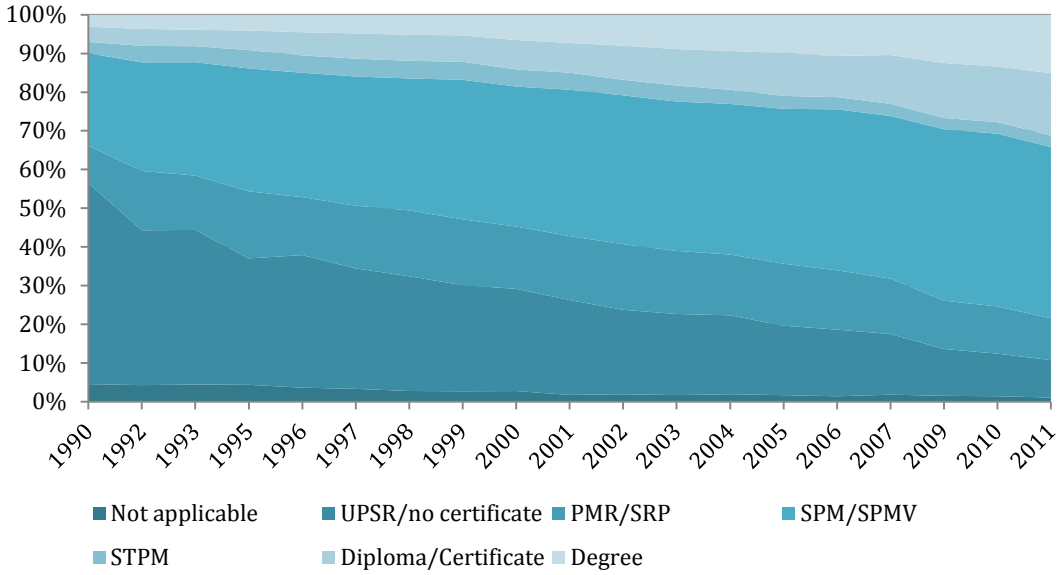
Source: World Development Indicators

5. To help inform policies to address these issues, it will be important to identify the particular skill deficiencies and mismatches faced by employers. Employers in Malaysia generally complain that there are not enough workers to do low-skill work, and that semi- and high-skilled workers are not equipped with skills to meet their needs. However, it is not always clear *which* skills employers find scarce or what exactly they mean when they say there is a *lack of skills* in Malaysia. In terms of education levels, in the last two decades, the core Malaysian labor force (ages 25-35) has become more formally educated, which has led to dramatic improvements in foundational skills such as literacy and numeracy. As shown in Figure 5, in 1990, half of all 25-35 year olds had no formal education or only completed primary school; by 2011, about 75 percent of people in this age bracket had completed upper secondary school or higher levels. While such improvements in foundational skills

[3] In Malaysia, about 27 percent of the total population is 14 years old or younger, compared to around 20 percent in the East Asia and the Pacific region and around 19 percent in the OECD.

are critical for improving efficiency in the workforce, technical and non-cognitive skills (or soft skills) are equally critical for workers to be more adaptable to a fast-changing economic environment.

Figure 5: Education Distribution of Malaysian Workers (25-35 year olds)



Source: DOS – LFS 1990-2010

6. The Government recognizes that addressing these issues is critical not only for promoting economic growth but also for making economic growth more inclusive. Although workers face favorable labor market conditions, in terms of low unemployment and high economic diversification, evidence indicates only modest gains in labor productivity and increasingly uneven earnings across Malaysia. The perception is that economic benefits gained from increased prosperity are not being distributed evenly and that skills inadequacy (at all levels) is limiting the human capacities of Malaysians, especially compared to workers in developed neighboring countries like Singapore and Hong Kong.

7. The Government's commitment to improve human capital is reflected in a number of recent policies, including the ambitious Economic Transformation Program (ETP) which was launched in 2010.[4] Among other things, the ETP sets out to "enhance investments in human capital…to support an economy based on high-skilled labor, knowledge and innovation."[5] The aim is to help Malaysia shift from lower-skilled, lower-productivity work to higher-skilled, higher-productivity, knowledge-focused industries. The ETP also identified 12 national key economic areas (or NKEAs)[6] to drive growth. All strategic plans in Malaysia, including those related to human resource planning, (should) aim to facilitate the functioning of these economic sectors.

[4] Among other things, the ETP sets out that Malaysia will become a high-income nation—defined as per capita income of RM48,000 (USD15,000)—by 2020.
[5] Economic Transformation Programme, 2010 (p. 62).
[6] The original ETP identified these as: the Greater Kuala Lumpur/Klang Valley; Oil, Gas, and Energy; Financial Services; Wholesale and Retail; Palm Oil; Tourism; Electronics and Electrical; Business Services; Communications Content and Infrastructure; Education; Agriculture; and Health Care. While the list of NKEAs is not static, the NKEAs are areas that Malaysia has prioritized as crucial to its transition to a high-income economy.

8. More recently, in late 2012, the Government launched the Malaysia Education Blueprint 2013-2015 to support the transformation of the national educational system to enable Malaysian students to excel and compete with the best in the world. The new strategy has 11 goals which include, among others: improving access to quality education, ensuring that all students are proficient in English, making radical changes to the teaching profession, leveraging ICT to scale up learning, making various improvements to institutional functions to positively change the interaction between key stakeholders, increasing the transparency and accountability of the system, and maximizing student outcome efficiency.

9. In light of the country's stated vision for 2020[7], strategic direction, and ambitious goals, the Government—through the Institute of Labor Market Information and Analysis (ILMIA) in the Ministry of Human Resources—requested World Bank assistance in assessing the adequacy of the current workforce in terms of education and skills. Based on the results of the assessment, ILMIA also asked the World Bank to identify specific human capital needs to inform a clear future plan of action for all educational and skills-forming institutions.

10. To that end, the World Bank team formulated a framework for this assessment that takes into account the Government's Vision to become a developed country and a knowledge economy. The team completed a comprehensive set of analytical pieces that investigate key areas outlined in the framework—namely, interactions between stakeholders in the education, skill, and labor markets in order to gain insight into the strengths and weaknesses of these markets, and ultimately address the Government's request.

1.2 Analytical Framework: Knowledge Economy

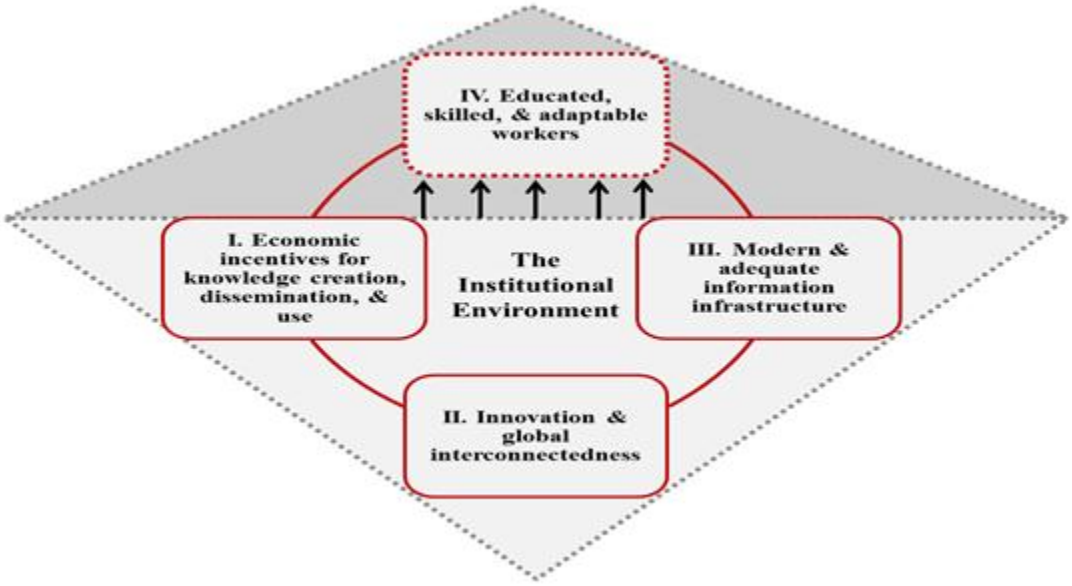
11. The Knowledge Economy—which utilizes knowledge as the key engine of economic growth—is at the center of the analytical framework used for this assessment. This framework reflects Malaysia's goal to become a knowledge-focused, developed country, which is at the core of all its strategies. The country is keen to follow an economic model based on talents, innovation, and knowledge (ETP, 2010). Therefore, all matters related to education and skills formation and utilization are studied through the Knowledge Economy lens.

12. A Knowledge Economy has four pillars, three of which fall within the institutional context, while the fourth derives its strength from the other pillars. In the context of skills, the first three pillars (economic incentives for knowledge creation and dissemination, innovation and global connectedness, and a modern and adequate information infrastructure) relate to the institutional environment necessary for the dual processes of skills production and skills utilization to occur. Skills providers such as governments, private training institutions, and employers are matched with skills users such as parents, youth, and workers. This "matching" involves feedback mechanisms between providers and users to facilitate knowledge exchange about the other's needs. The fourth pillar, which is an educated, skilled, and adaptable workforce, is the result of the skills production process and is one of the inputs for the skills utilization process. As shown in Figure 6, the "institutional environment" pillars establish the conditions necessary to support the fourth pillar.

[7] Wawasan 2020 or Vision 2020 was introduced in 1991, jointly with the Sixth Malaysia Plan. The vision calls for the nation to achieve industrialized nation status by the year 2020.

Improving the institutional environment alone, however, may not be sufficient for supporting the fourth pillar of an educated, skilled, and adaptable workforce. In the best case scenario, the "output" of the skills production process is workers who possess not only good training but also the right training for the Knowledge Economy's current needs. However, the skills production process does not always produce mid- and highly educated, skilled, adaptable workers. If economic incentives for acquiring more knowledge and higher skills are not adequate, the result may be low- and inadequately skilled workers, even when most pillars in the institutional environment are supportive of a knowledge-based skills production process. Thus, reforms and initiatives to address weaknesses must focus on incentives for the "traditional" skills actors—skills providers, skills users/absorbers, and skills demanders—in addition to improvements to the institutional environment.

Figure 6: Four Pillars of a Knowledge Economy



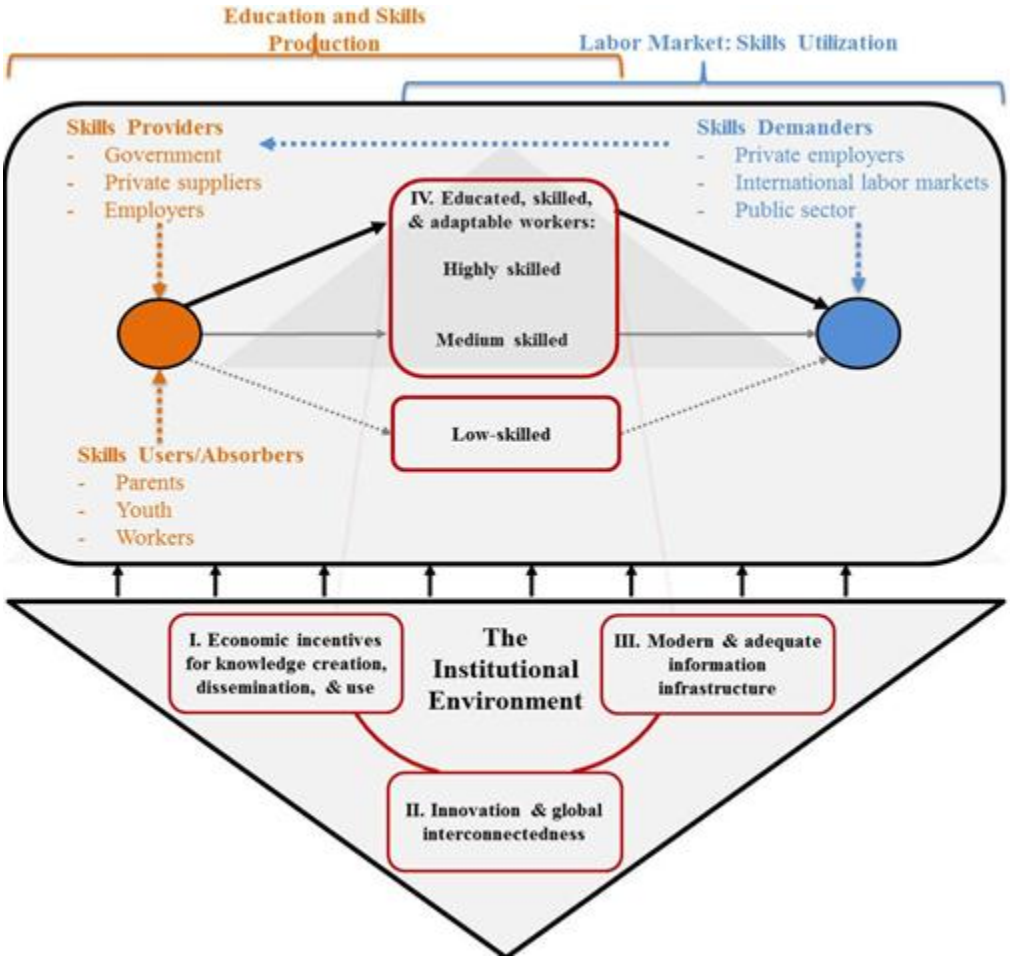
Source: Adapted from World Bank 2012.

13. All workers, of all skill levels, serve as the "inputs" to the skills utilization process. Figure 7 illustrates the interaction between actors; there is a core interaction between skill providers and skill users (which include students as well as parents). The orange circle represents where these two meet. There are three types of students being formed by the formal education/skill system—high-, medium- and low- skilled, and the thickness of the arrows represents the intensity of their interaction with the system. For instance, the dark black arrow indicates that highly skilled people had a higher level of exposure to the education system.

14. The right hand side of the framework represents the labor market, where skills are utilized. Skills demanders, which are mainly employers, are matched with graduates of all education/skill levels, and their interaction is represented in the framework in the blue circle. In a Knowledge Economy, the graduates (formerly skill users or absorbers) are a product of a knowledge-focused institutional environment, and the quality of the skills they obtained reflects how well the systems interact. In other words, the system needs to continually adapt to changing needs in order to function; it is thus critical for the right-to-left blue dotted arrow, which represents feedback on skills demanded by employers (or skills demanders) to institutions of learning (or skills providers), to function.

15. The framework assumes that market failures lead to mismatches in the supply and demand of skills. These market failures can result from specific breakdowns in the creation, adaptation, dissemination, and use of knowledge. All critical stakeholders (e.g., government, public and private education and training institutions, employers) play a distinct role in exacerbating/remedying such failures. The framework also recognizes that even if the supply and demand of skills are well-matched, they may not be well suited to a Knowledge Economy. Thus, this assessment proposes recommendations for improving the interaction between the labor markets, the markets for education, skills and training, and their institutional environment to promote the creation, adaptation, dissemination, and use of knowledge.

Figure 7: Analytical Framework for Skills Production and Utilization in a Knowledge Economy



Source: Author's illustration

16. Within this context, the report has eight chapters that assess the different parts of the framework. Each chapter assesses potential weaknesses in its particular area of focus, and Chapter 9 proposes a plan of action to address these weaknesses. The chapters are listed here:

- Chapters 2a: Description of the Malaysian Workforce and the Labor Market

    - Pillars: 2 and 4.
    - Framework: Skills demanders and Educated, skilled, and adaptable workers "blue circle".
- Chapter 2b: Measurement of the Evolution of Skills and Utilization in the Labor Market.
    - Pillar: 2
    - Framework: Feedback between skills demanders and skills providers, "blue arrow".
- Chapter 3: Returns to Education (Levels) and Returns to Skills (Cognitive, Technical and Non-Cognitive
    - Pillars: 1, 2 and 4.
    - Framework: Skills providers and skills users/absorbers, "orange circle".
- Chapter 4: Measuring Labor Imbalances by Education and Occupation
    - Pillars: 1 and 4.
    - Framework: Skills demanders and Educated, skilled, and adaptable workers "blue circle".
- Chapter 5: Demand for Skills in Key Economic Sectors, Including the Identification of the Amount and Impact of Training on Productivity.
    - Pillars: ALL
    - Framework: Skills providers and skills users/absorbers, "orange circle".
- Chapter 6: Measurement of the Impact of English Language as a Mode of Instruction on Learning.
    - Pillars: 1, 2 and 4.
    - Framework: providers and skills users/absorbers, "orange circle".
- Chapter 7: Future Human Resource Requirements: CGE Simulation Results.
    - Pillars: 3 and 4
    - Framework: Feedback between skills demanders and skills providers, "blue arrow".
- Chapter 8: Assessment of skill Forming Policies, Benchmarking with Other Countries.
    - Pillars: 1, 2, and 3.
    - Framework: Skills providers and skills users/absorbers , "orange circle".
- Chapter 9: Policy Recommendations.

1.3 Data Sources

17. This assessment benefited from the availability of various data sources, all complementary and rich in content. The main sources are (i) the Malaysian Labor Force Surveys (LFS), (ii) the Malaysian Economic Census, (iii) the National Employment Return (NER) Survey, and iv) two years of Tracer data of graduates from post-secondary education in 2010 and 2011. It should be noted that although the data are very informative, they were not directly designed for this study so they represent the best of all potentially imperfect options available.

18. The study used the LFS for analysis of the Malaysian workforce based on individual-level data (supply side). The Department of Statistics has been collecting yearly data for an extended period of time, but this analysis focused on years 1990 through 2011. These data are collected from a sample of all workers via household surveys, but the sampling is such that workers living in communal or group housing are not captured.

19. For the establishment-level analysis (demand side), the assessment used Economic Census data from 2005 and 2010 and NER Survey data from 2011. The Economic Census, conducted every five years by the Department of Statistics, collects data from all formally registered firms and allows for a comprehensive analysis of each sector for which data is

available. However, the information available is limited, since only a restricted set of variables is shared. The NER Survey, conducted by the Ministry of Human Resources every few years, collects information on a smaller number of establishments, i.e. a sample of employers registered in the Labor Market Database. It provided crucial detailed information for the analysis, for example on skills requirements, deficiencies, and training.

20. It should be noted that important differences in sampling between establishment data and labor force data could lead to differences in the results of the analyses. Unlike the labor force data that are collected from a sample of all (formal and informal) workers via household surveys, the establishment data are collected from all (for the NER, a sample of) the establishments that are formally registered. Thus, the LFS captures both formal and informal Malaysian workers, whereas the establishment-level information is likely to miss the information on informal employment. Another important difference between these data sources is that the LFS is unable to collect data from workers not living in single dwellings, living in plantations, or living in communal housing, thus likely undercounting the number of foreigners in certain sectors (namely agriculture and manufacturing). By contrast, the establishment data (both Economic Census and NER) convey information on all formal firms in all sectors, thus accounting for all workers in those establishments regardless of their living arrangements. The establishment data therefore provide a more accurate count of Malaysians working in sectors previously missed by the LFS.

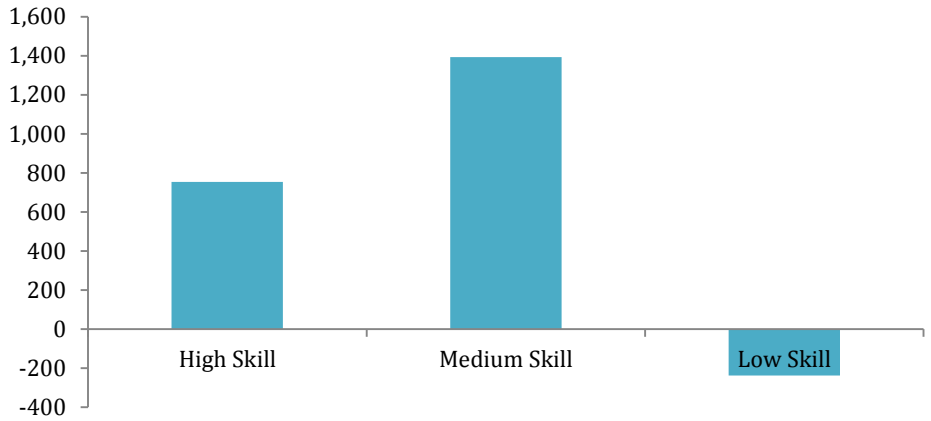
Chapter 2: Description of the Malaysian Workforce and the Labor Market

2.1 Introduction

21. Jobs that require workers to perform complex tasks are characterized by a more educated and skilled workforce. Based on the skill content required by different job families, the remainder of the report classifies occupations into the following categories: High-skilled (Managers and Professionals), Mid-skilled (Technicians, Clerical and Service workers), and Low-skilled (Agricultural, Craft, Plant and Elementary workers).

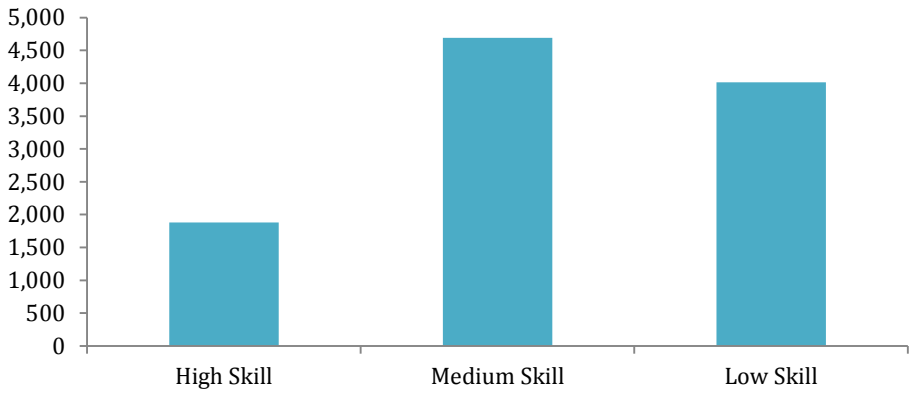
22. Using these classifications, Figure 8 shows clearly that job creation in Malaysia has been heavily slanted toward high- and mid-skilled occupations since 2001. This is consistent with the Government's objectives and their overall emphasis on knowledge. However, the largest share of the workforce is still concentrated in low- and mid-skilled occupations, where demand has grown the least (Figure 9). A takeaway from these two figures is that to keep up with the rising demand in the high- and mid-skilled job categories, it is imperative that skill producers (i.e. educational institutions) continue to address the needs of the labor market.

Figure 8: New Net Jobs Created Between 2001 and 2011 By Skill Level (In Thousands)



Source: DOS – LFS 2001-2011

Figure 9: Number of Jobs in 2011 By Skill Level (In Thousands)



Source: DOS – LFS 20

23. This chapter takes stocks of quality (namely of education levels and skills) and quantity (distribution of workers across industry) of the existing workforce. This characterization is critical to identify potential inefficiencies in the interaction between the education and skill production system in Malaysia's labor market.

24. Given that the Economic Transformation Program has a strong focus on a particular set of economic sectors and sub-sectors—known as the National Key Economic Activities (henceforth referred to as NKEAs)—and occupational categories (high-skilled), the principal objective of this chapter is to characterize the workforce to identify inefficiencies in the production of skills vis-à-vis the needs of NKEA sectors (and occupations of interest). The findings of the analysis will help inform policy recommendations that may lead to reduced mismatches between skills supply and demand for a knowledge economy.

2.2 Educational Composition of the Current Workforce

Individual Level Analysis: Educational Composition by Economic Sector

25. As per the ETP, the traditional sources of economic growth are slowing down; therefore, greater attention must be placed on the twelve NKEAs and also on expanding opportunities for people working in slowing sectors to be able to shift to growth sectors. Table 1 show that Malaysian workers did not experience radical shifts across economic sectors between 2007 and 2011. Although most Malaysians are still presently employed in the Agriculture and Service sectors (non-exporting sectors), the bulk of employment in 2007 and 2011 was concentrated in the Wholesale and Retail, Agriculture, Construction, Public Administration, and Accommodation and Restaurant sectors. There has been a slight decline in the percentage of people employed in Agriculture, while the opposite trend is true for the Business Services sector.

Table 1: Distribution of Malaysian workers by economic sector

SECTOR	2007	2011
Wholesale-retail	17.2%	17.7%
Agriculture	12.7%	9.8%
Construction	8.3%	8.1%
Public administration	7.9%	7.7%
Accommodation and restaurants	7.4%	7.7%
Education	6.6%	7.3%
Business services	5.5%	6.9%
Logistics	4.7%	5.2%
Mfg meas-med-com	4.1%	4.3%
Other services	3.6%	3.1%
Metal-machinery-equip	3.6%	2.8%
Mfg chem-rub	2.9%	2.6%
Health	2.9%	4.0%
Finance	2.3%	2.3%
Mfg paper-furn	2.2%	2.0%
Mfg food-bev-tob	2.2%	2.5%
Mfg textile	1.7%	1.4%
Mfg wood	1.2%	0.6%
Mfg transp equip	1.0%	1.0%
Post and telecom	0.8%	1.2%
Utilities	0.6%	0.7%
Mining	0.4%	0.7%
Real estate	0.4%	0.6%

Source: DOS – LFS 2007-2011

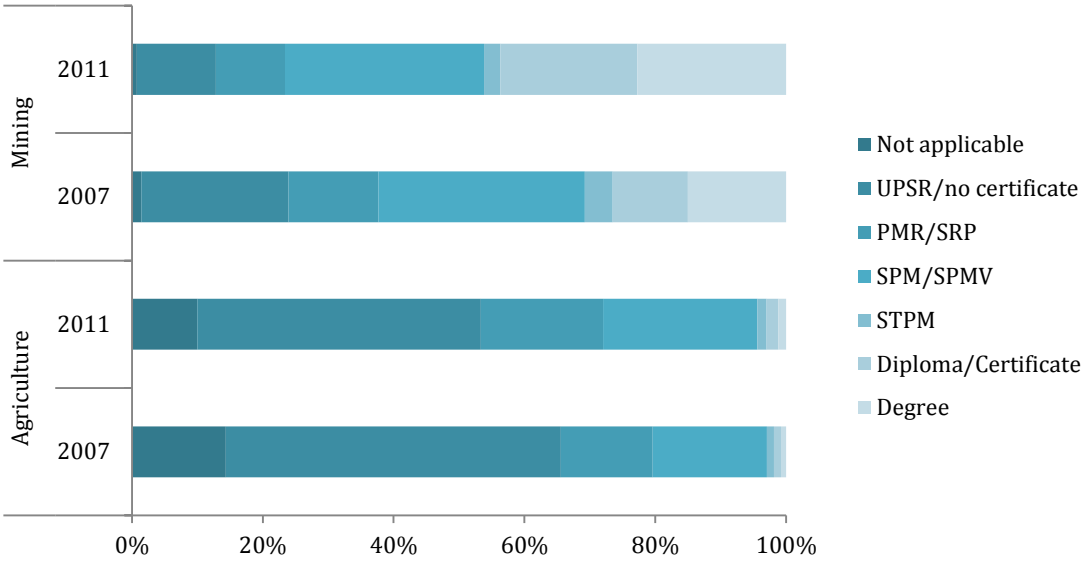
26. Increasing shares of workers across industries have higher levels of education, in line with the country's economic objectives and the knowledge-economy framework outlined. Malaysia's education system consists of the three traditional education tiers: primary, secondary, and tertiary education. Each tier is categorized as follows for the purposes of this report. The primary tier lasts six years with a starting age of seven. Primary school graduates are given an *Ujian Penilaian Sekolah Rendah* (UPSR) aptitude test. The primary tier is followed by three years of lower secondary school, after which the *Penilaian Menengah Rendah* (PMR) test is taken, and two years of upper secondary school, after which the *Sijil Pelarajan* Malaysia (SPM) test is taken. Together, these comprise Forms 1 through 5[8]. A full description of the Malaysian education system can be found in Annex 2.

27. As previously stated, and as shown in Figures 10 through 13, the workforce has become more educated between 2007 and 2011 and the share of workers holding a certificate/diploma or a degree almost doubled during that period. Figure 10 shows that this pattern even applies to traditionally low-value added sectors like Agriculture and

[8] Basic education is provided free of charge from primary through upper secondary school, and there are special programs for disadvantaged groups.

Mining, where increased use of technology now requires higher levels of education and more sophisticated skills. The agriculture sector is still mostly dominated by workers with at most primary education, but over time, for the sector to be (locally and globally) competitive, it will need to shift its production model towards more mechanization and capital-intensity. This will in turn increase demand for workers with higher levels of education to perform technical, professional, and managerial tasks. Managers and professionals are also increasingly needed in the mining sector.

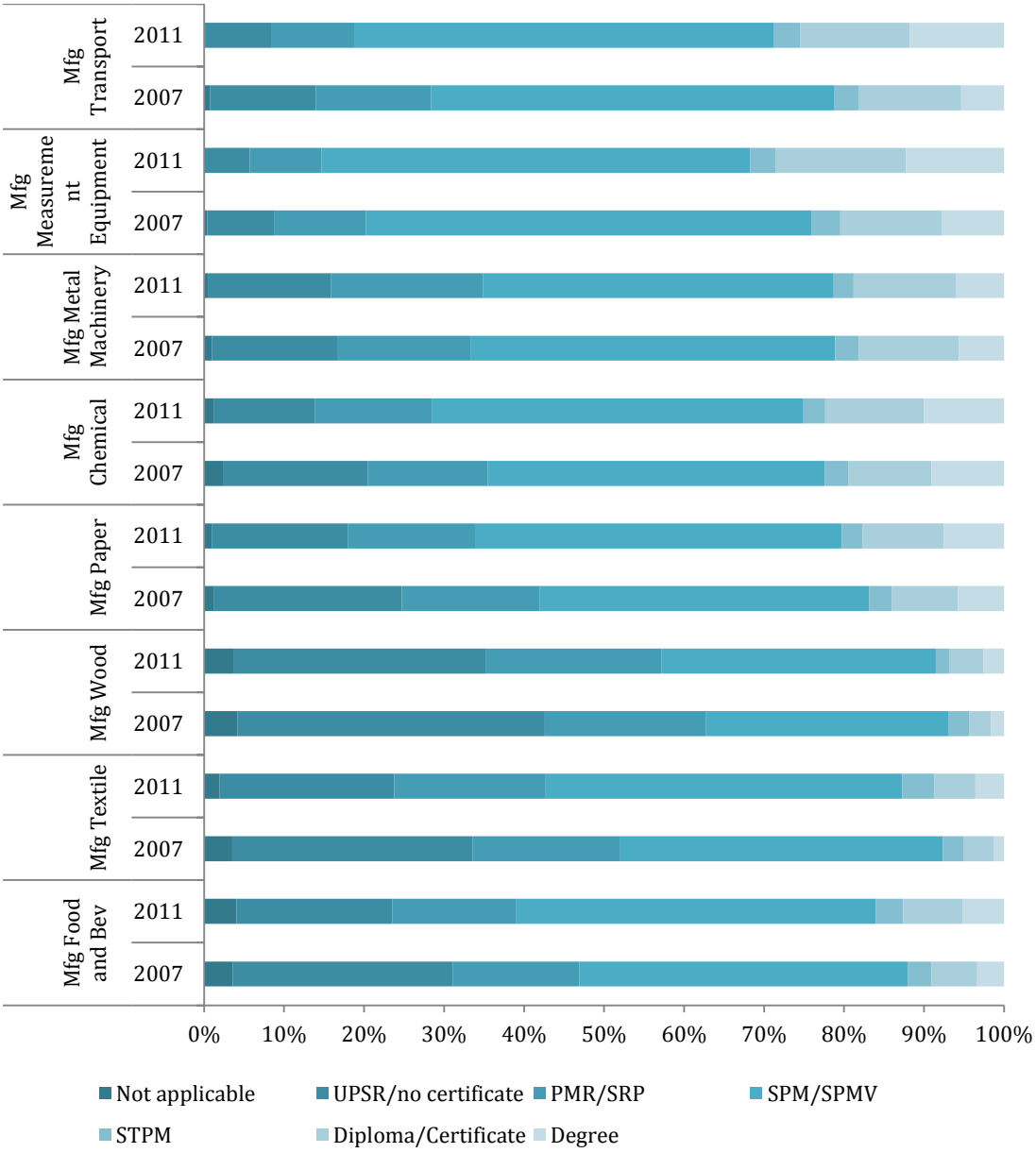
Figure 10: Changes over Time in Education by Industry: Agriculture and Mining



Source: DOS – LFS 2007-2011

28. Overall, most workers in the Manufacturing sector have secondary education levels (Figure 11). But when the *sector* is broken down by sub-sectors it is clear that there is large variability in the education levels within. For instance, the Textile and Wood products sub-sectors employ large shares of workers with low education levels; only around seven percent hold a vocational certificate/diploma and four percent hold a university degree. On the other hand, the Measurement and Precision Instruments or Chemicals sub-sectors have high shares of workers with tertiary education levels, both vocational (28 percent) and university (22 percent). Despite these differences, all subsectors experienced increasing demand for higher education levels between 2007 and 2011.

Figure 11: Changes over Time in Education by Industry: Manufacturing

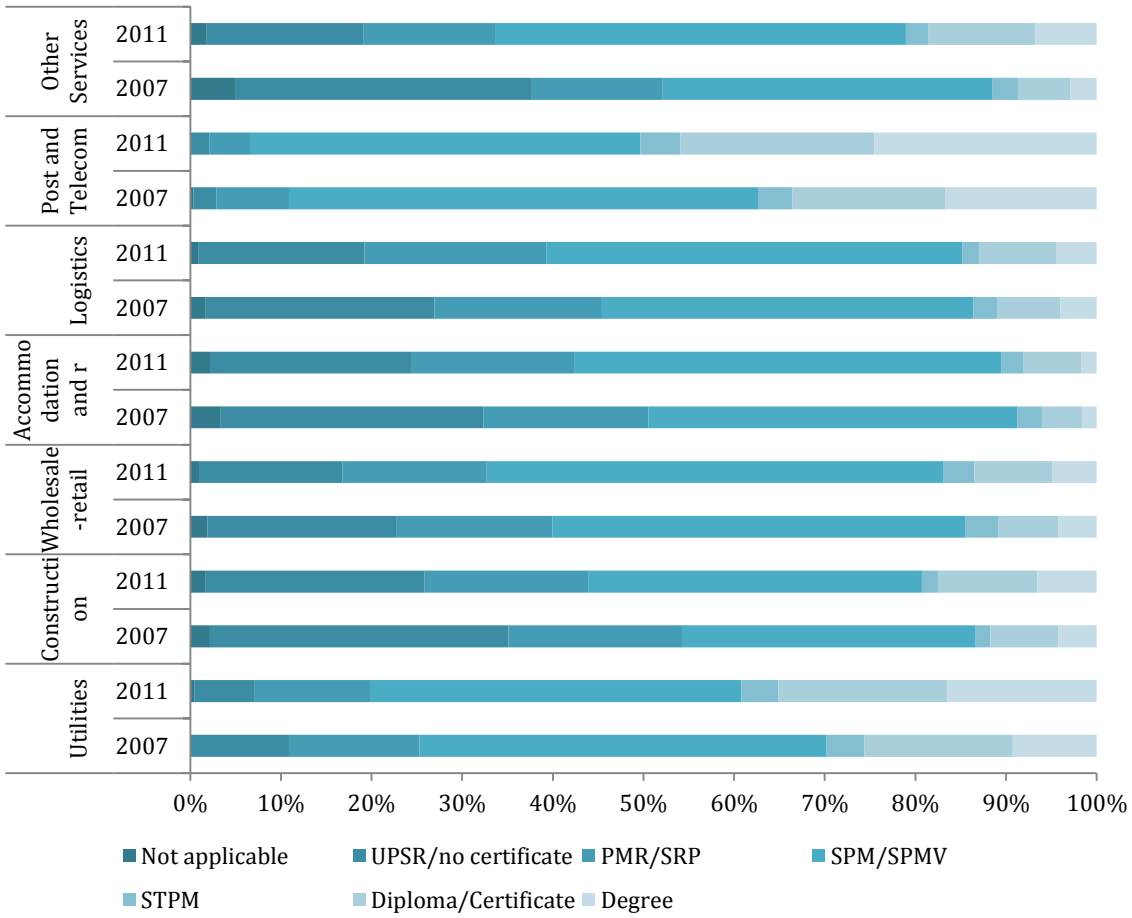


Source: DOS – LFS 2007-2011

29. The Services sector also encompasses a heterogeneous set of sub-sectors, with very distinct skill requirements. To properly characterize this sector it is important to break it down into low-to-mid-value-added sub-sectors and high-value-added sub-sectors. Among the Service sub-sectors producing lower and middle value-added products, Accommodation and Restaurant has the lowest share of degree holders, while the Post and Telecom sub-sector has the highest share of degree holders. As part of Malaysia's growth strategy, two of the twelve NKEAs identified are the Tourism (Accommodation and Restaurant) and Wholesale and Retail sub-sectors. The Tourism sub-sector had the lowest share (eight percent) of certificate/diploma and degree holders within the Service sector in 2011, indicating that it is still mostly dominated by mid-to-low skill tasks. In addition, between 2007 and 2011 the only change noted in the composition of the workforce was a reduction of workers with primary education (or less) and an increase of SPM/SPMV holders. In the Wholesale and

Retail sub-sector, the educational level of the workforce was slightly higher in 2011 than in 2007; however, tertiary educated (vocational and academic) workers still made up only 15 percent of the total (Figure 12).

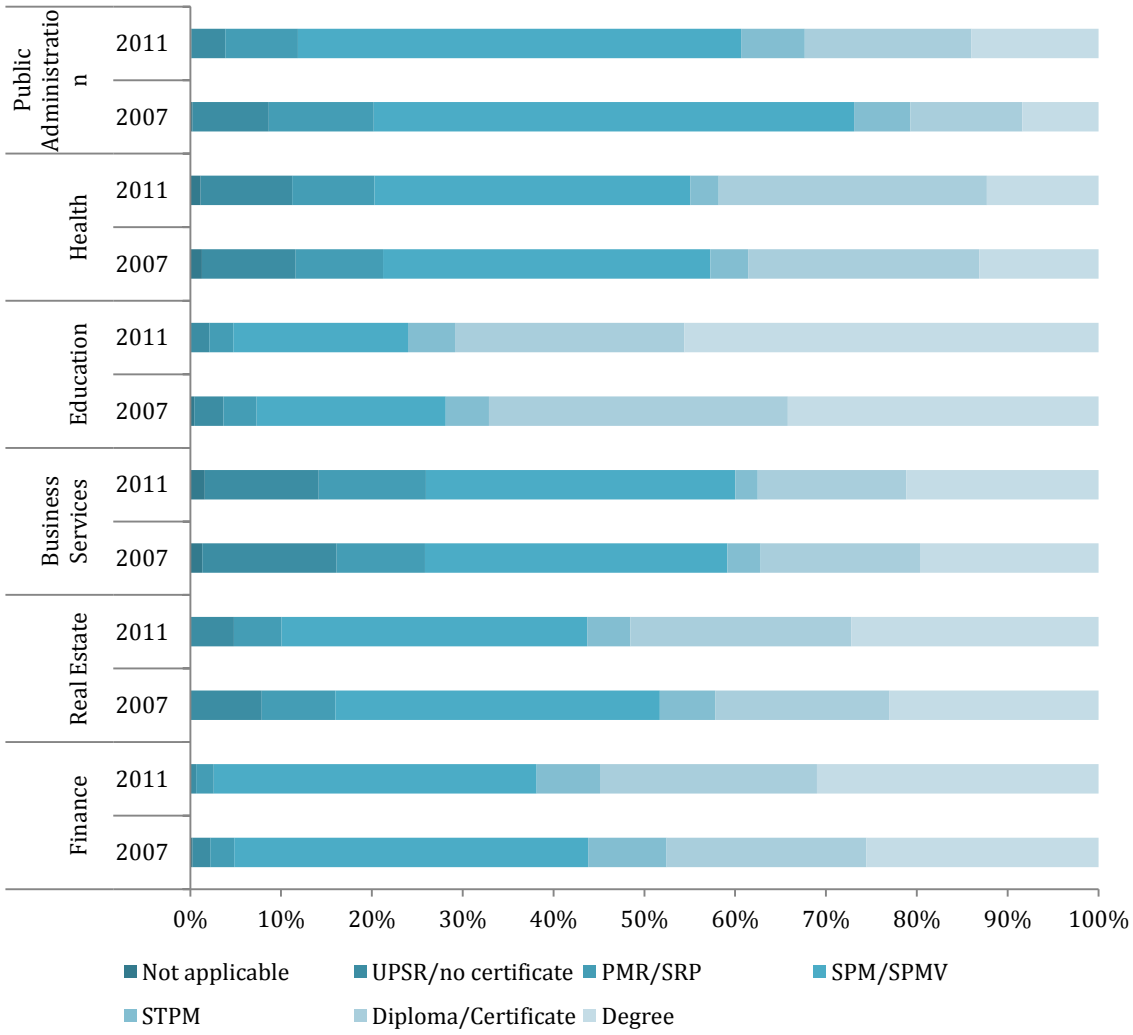
Figure 12: Changes over Time in Education by Industry: Low-mid-value-added Services



Source: DOS – LFS 2007-2011

30. As in the manufacturing and resource sectors, higher value-added service sectors are the potential drivers of growth in Malaysia. The Education and Finance sub-sectors have the highest shares of certificate and diploma holders in the service sector. Healthcare, Education, Business and Financial services are also NKEAs whose growth is crucial to Malaysia's economic objectives. In Education and Finance, the vast majority of workers have pursued further studies after obtaining the SPM/SPMV certificate, and this is increasingly evident over time. In Health and Business Services, however, the share of certificate/diploma and degree holders remains well below 50 percent and the composition of the workforce has changed only slightly over time (Figure 13).

Figure 13: Changes over Time in Education by Industry: High-value-added Services

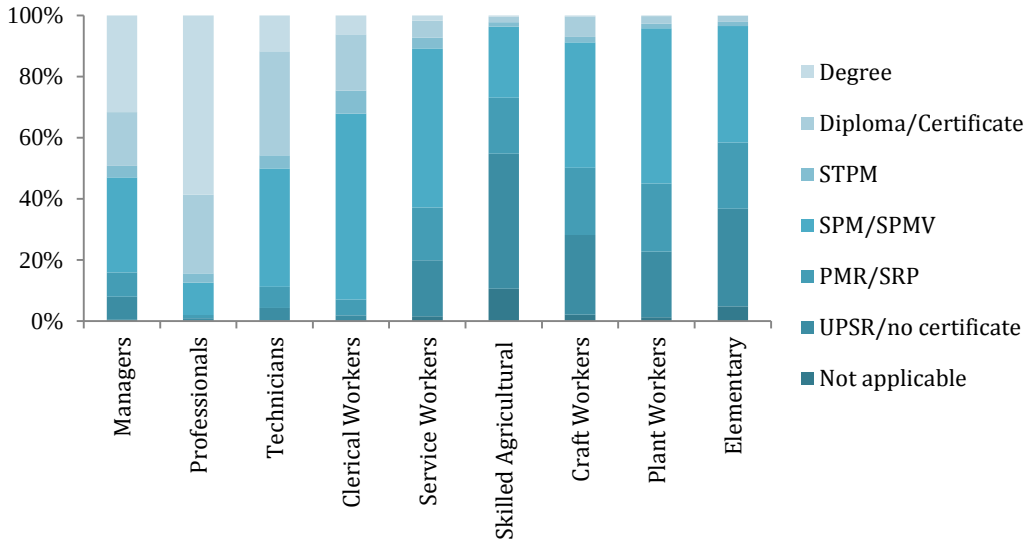


Source: DOS – LFS 2007-2011

Individual Level Analysis: Educational Composition by Occupation

31. High-level training is required for occupations in which workers apply specialized knowledge. In 2011, nearly 60 percent of Malaysians working as professionals held an academic degree, while 35 percent of technicians had a vocational certificate or diploma. Just over half of the managers had completed post-secondary education, while for Skilled Agricultural, Craft, Plant and Elementary workers, the share with at most primary education was substantial, ranging from 23 percent for Plant workers to 56 percent for Agricultural workers (Figure 14).

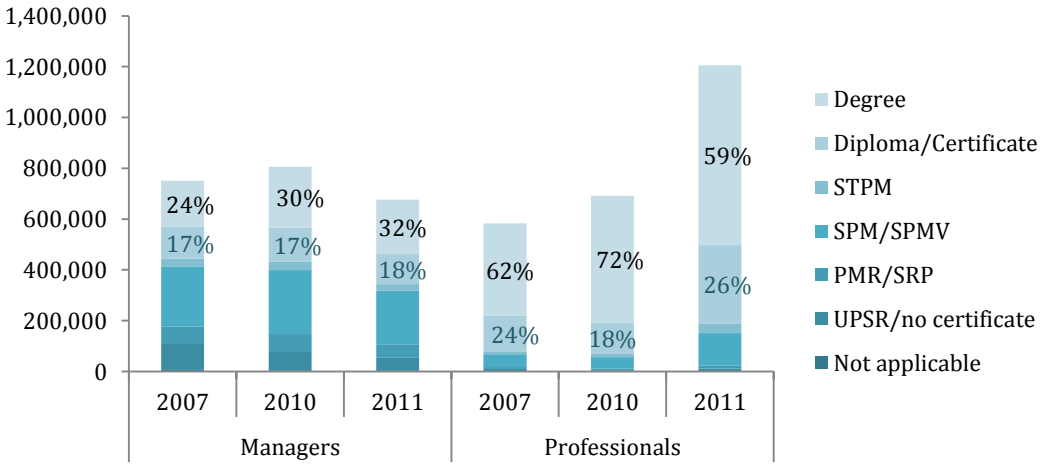
Figure 14: Education Distribution by Occupation in 2011



Source: DOS – LFS 2007-2011

32. In the high-skilled category, larger shares of managers have higher levels of education, while the experience is more mixed for professionals. An analysis of workers in high-skilled occupations sheds light on the characteristics of jobs envisioned in the ETP. Just as the data shows that larger shares of managers have tertiary (both vocational and academic) education, it also shows a decline in the total number of managers. For professionals, after an increasing proportion held a university degree between 2007 and 2010, there was a decrease from 72 to 59 percent between 2010 and 2011. This is a drastic reduction, but is mainly due to increased (likely due to a reclassification of people into the category) numbers of professionals with lower education levels, rather than to a decrease in the absolute numbers of professionals holding a degree (Figure 15).

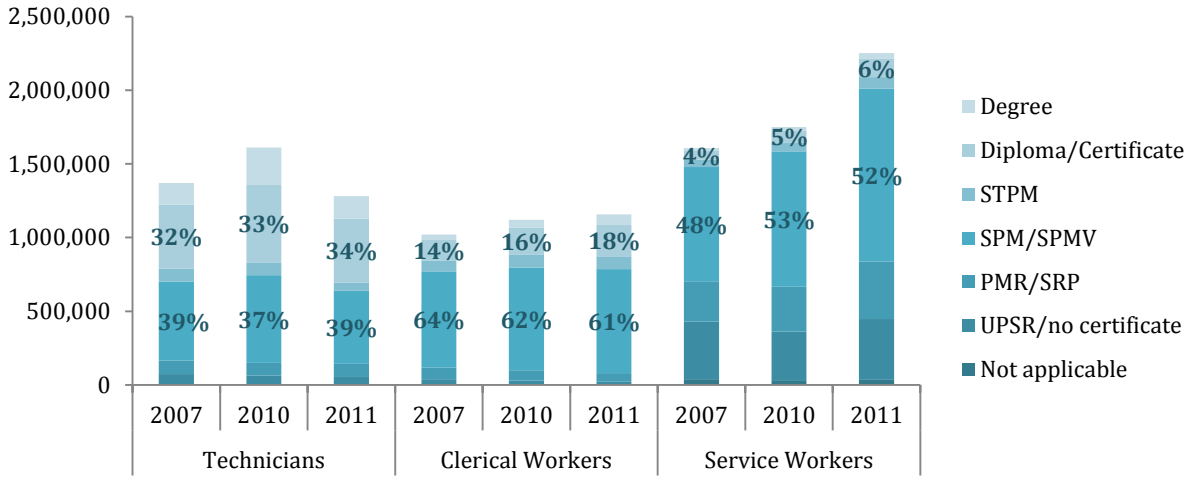
Figure 15: Education by Occupation: Workers in Skilled Occupations



Source: DOS – LFS 2007-2011

33. There is significant variation in the workforce composition of *mid-skilled occupations*. Figure 16 shows that demand for workers in these occupations has increased over time, except for Technicians whose numbers suddenly dropped in 2011. Technicians are also the group of workers among whom vocational education is most common (around one third of the workforce). For Clerical and Service occupations, SPM/SPMV holders are by far the majority (around one third and one half of the workforce, respectively). However, for both of these groups the number of certificate/diploma holders has also increased over time.

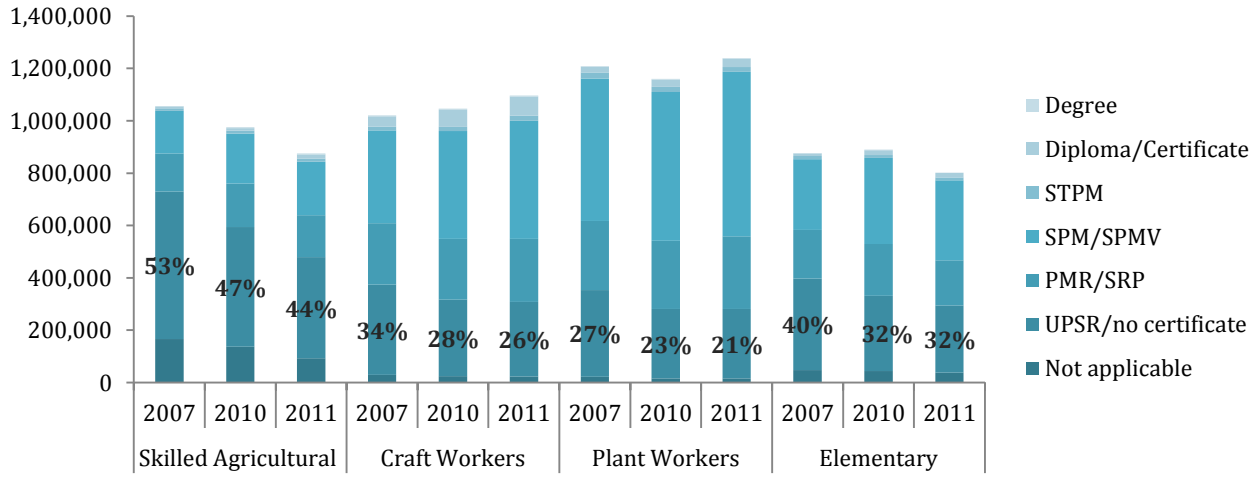
Figure 16: Education by Occupation: Workers in Mid-skilled Occupations



Source: DOS – LFS 2007-2011

34. Between 2007 and 2011 all *low-skilled occupations* demanded higher levels of education, although workers employed in Agricultural, Craft, Plant and Elementary jobs generally required performance of mechanical and physical tasks that do not require high levels of technical training. Figure 17 shows that a large share of workers in these occupations completed primary education. However, in line with the objective to shift the economy to a more sophisticated production model, the share of workers holding at most an UPSR certificate has decreased over time.

Figure 17: Education by Occupation: Workers in Less-skilled Occupations

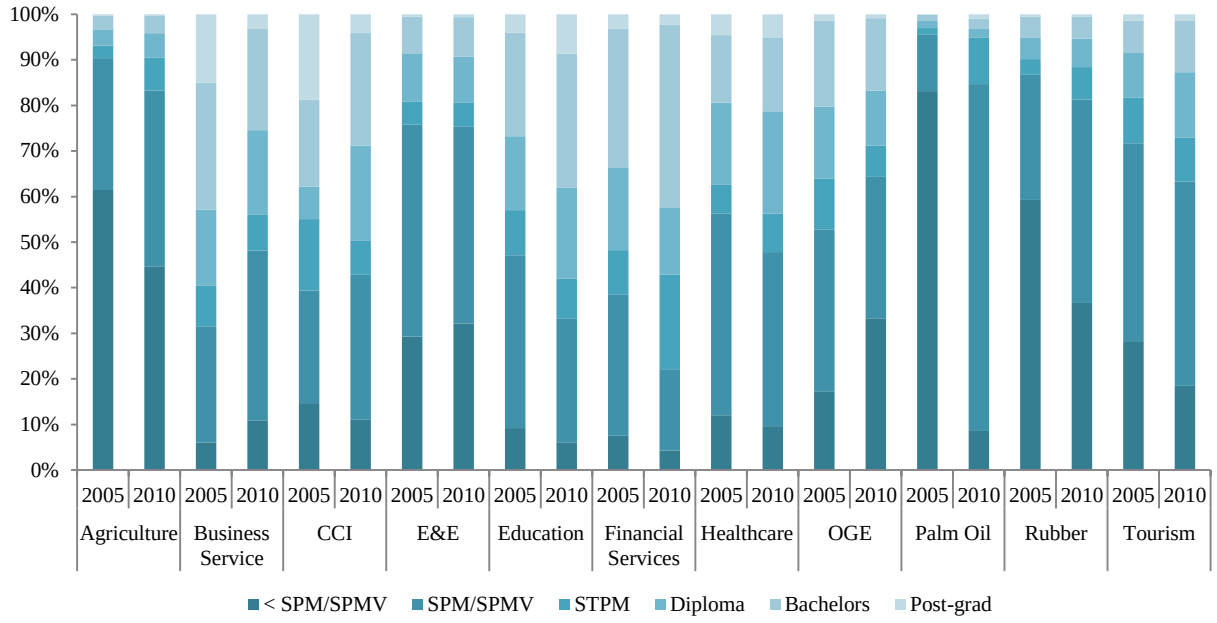


Source: DOS – LFS 2007-2011

Firm-Level Analysis: Educational Composition of Workers at the Firm-level in the NKEAs

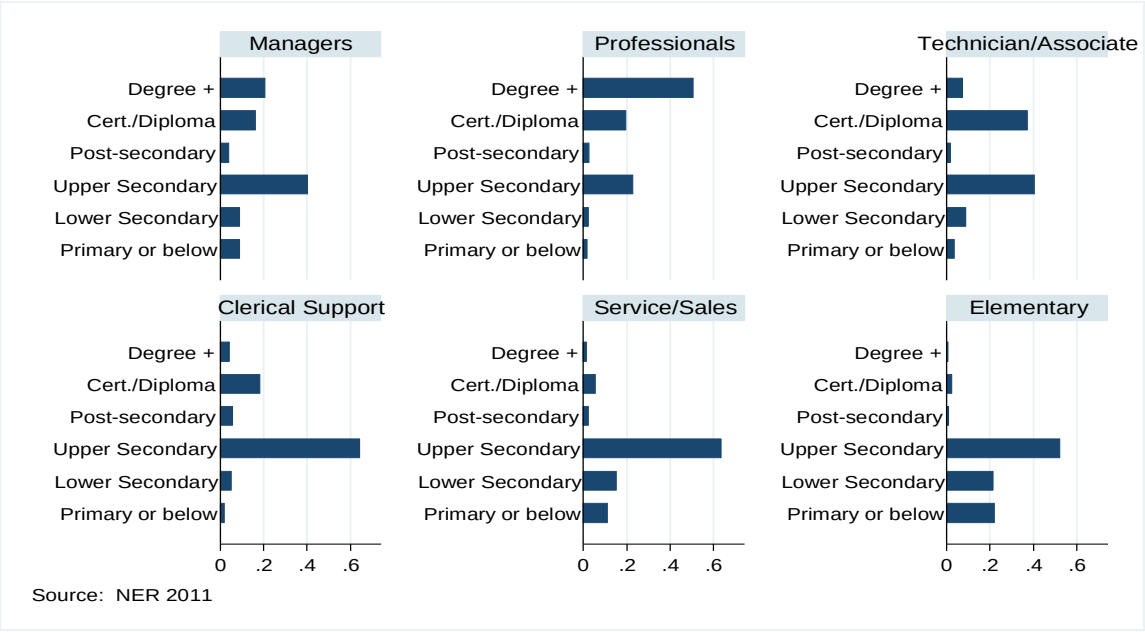
35. A closer look at educational composition in the NKEA sectors using firm-level data also confirms that Malaysia's workforce is becoming more educated over time. Most NKEA firms across economic sub-sectors experienced a shift in the educational attainment of the workforce from lower secondary to upper secondary and tertiary education. This is particularly true for Financial Services, Education, Palm Oil, and Tourism (Figure 18).

Figure 18: Educational Structure of NKEAs



Source: DOS, Economic Census 2005 and 2010

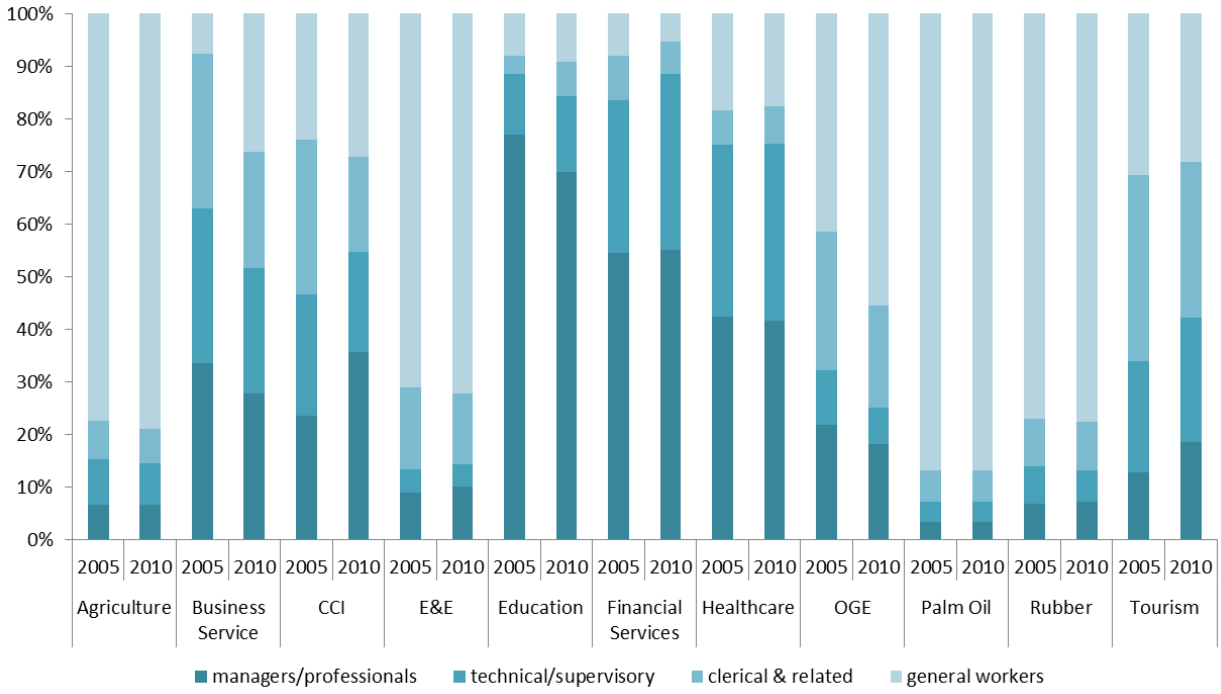
Figure 19: Education by Occupation of NKEAs



36. In NKEA sectors, most Malaysian professionals hold at least a Bachelor degree, while a certificate or diploma is more common among technicians. Data from the NER (in contrast to the Economic Census) shows the distribution of education of workers by occupational category (Figure 19). As seen in the economy-wide LFS data, in the NKEA sectors tertiary education is highest among professionals, and much less prevalent among managers and technicians, of which the latter has the largest share of workers with vocational certificates.

37. Changes in the occupational structure of firms in the NKEA sectors do not always match changes in their educational profiles. Managers and professionals are increasingly in demand in the tourism sector, though at present it has one of the least educated worker profiles of the NKEAs (Figure 20). Education, Health, and Financial Services employ the largest share of professionals within NKEAs, each with a significantly different educational attainment profile.

Figure 20: Occupational Structure of NKEAs

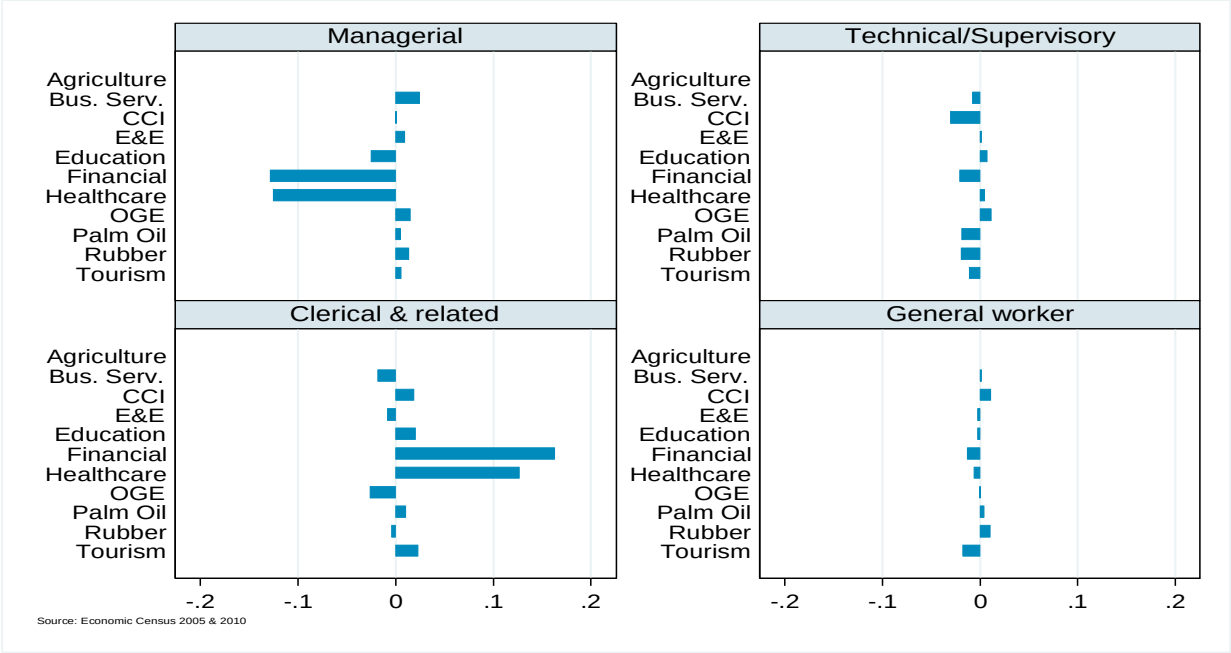


Source: DOS, Economic Census 2005 and 2010

38. Despite being the largest employers of managers and professionals, the Financial and Healthcare sectors are shifting away from managerial staff and toward clerical workers. The same is true of the Education sector, but to a much lesser degree. In eight out of eleven NKEAs, there was a decrease or no change at all in the share of technical/supervisory workers (see Figure 21).

39. These trends in occupational structure reveal some interesting divergences with respect to education and occupation. These divergences provide evidence that higher levels of education are needed even in less-skilled occupations. However, they also suggest that an insufficient number of high-skilled jobs is being created to match the number of highly educated graduates, and employers may feel that even highly educated workers are not skilled for work in those occupations. For instance, despite the shift in occupational profile within the Financial sector (away from high-skilled managers/professionals and toward mid-skill clerical workers) (Figure 21), the sector has also seen the largest shift in the educational profile (to higher levels) of its workers.

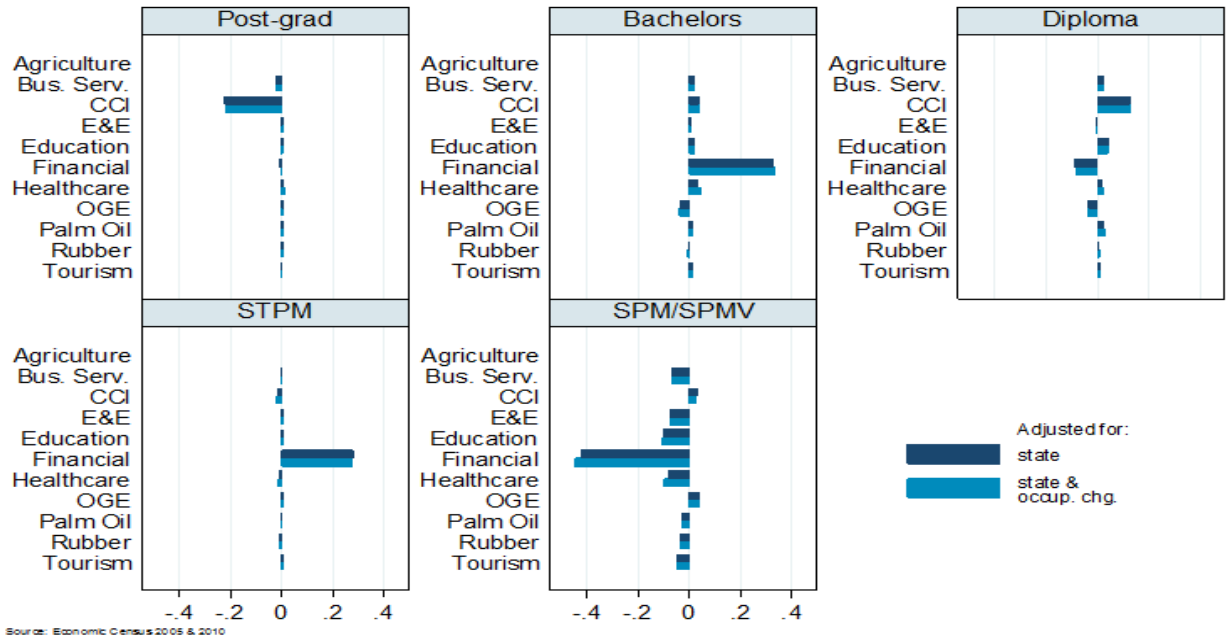
Figure 21: Within-Firm Changes in Occupational Structure: 2005-10



Source: DOS, Economic Census 2005 and 2010

40. As shown in Figure 22, there was a substantial increase in workers with bachelors and STPM, with a simultaneous decrease in workers with only SPM/SPMV in the sub-sector. Likewise, there appears to be a shift away from technical diplomas in the Financial sub-sector (possibly in favor of workers with bachelor degrees). In other words, although the skills profile of the workforce in the Financial sub-sector has increased, these new and more educated workers are taking jobs in less-skilled occupations.

Figure 22: Within-Firm Changes in Educational Structure: 2005-10



Source: DOS, Economic Census 2005 and 2010

2.3 Beyond Education Levels: The Skills Content of the Current Workforce

41. While an examination of educational levels provides important insights into the skill level of Malaysia's workforce, recent methodological innovations permit a more nuanced evaluation of the composition of these skills and how this composition has changed over time. This approach illustrates the "skills content" of the Malaysian economy, or the prevalence of certain types of skills among the Malaysian workforce. More specifically, this approach measures whether jobs in Malaysia are moving toward or away from a knowledge economy.

42. The main message from this section is that at present, the economy is more heavily reliant on the cognitive skills associated with higher-income economies than on the manual skills associated with less-developed countries and, encouragingly, that its reliance on lower level manual skills has declined over time. However, the intensity with which the economy produces cognitive skills has stagnated over the same period, an area that will be addressed in the policy recommendations chapter.

Methodology

43. Malaysian occupations are categorized according to their intensity in five broad skill categories: non-routine cognitive skills (analytical); non-routine cognitive skills (interpersonal); routine cognitive skills; non-routine manual skills; and routine manual skills[9]. These categories broadly reflect the range of skills present in an economy, paying particular attention to the types of skills relevant to the development process as economies shift from less to more sophisticated modes of production. Non-routine cognitive (analytical) and non-routine cognitive (interpersonal) skills are most often associated with knowledge economies, while manual skills are more typical of less-developed ones.

44. More specifically, each occupation is assessed based on two factors. First, a "skill content level" is determined for each occupation in each of the five skill categories. This skill content level is based on the importance (or "intensity") of a subset of skill requirements that are unique to each skill category.[10] The skill categories and the skill requirements from which their skill content levels are derived are described in Table 2. For example, occupations that require workers to operate machinery would score higher in the routine manual skills category than in the non-routine cognitive (analytical) category (but would receive scores in all five categories). Second, the share of people in each occupation is assigned to each occupation for each year analyzed in order to weight the score in each skill category by its prevalence in the economy.

[9] The methodology in this section build directly on a technique developed by Autor, Levy, and Murnane (2003) and elaborated in Acemoglu and Autor (2010),

[10] For more detailed information on how these scores are created, please refer to the Annex.

Table 2: Skills Categories Used in Skills Content Analysis[11]

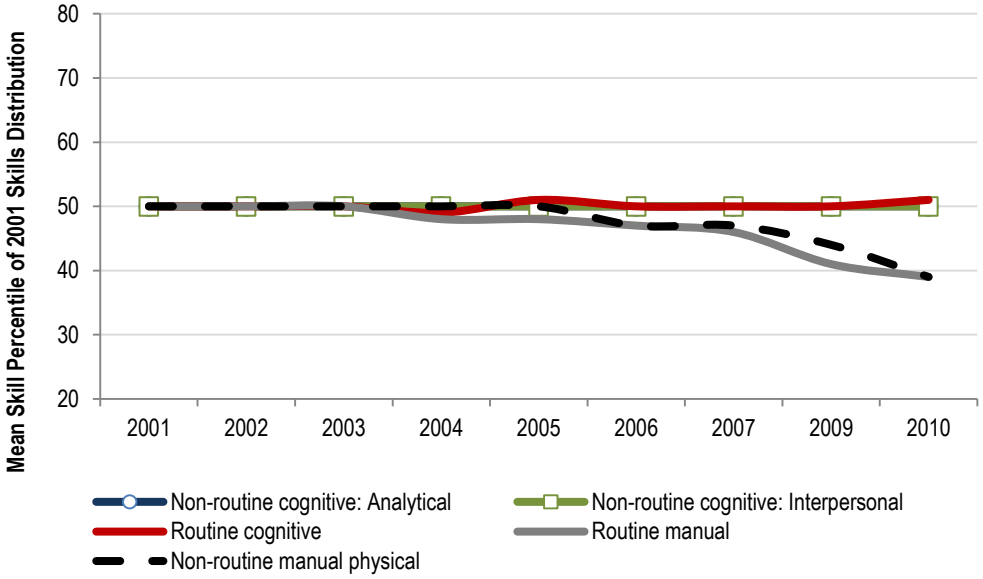
Skills Category	Definition	Skills Requirements	Example
Non-routine cognitive (analytical)	Thought processes requiring the absorption and processing of and decision-making based on abstract information	• Analyze data/information • Think creatively • Interpret information from others	• Computer programmers • Teachers • Lawyers • Doctors • Nurses
Non-routine cognitive (interpersonal)	Personality traits that underlie behaviors such as teamwork, reliability, discipline, and work effort	• Establish and maintain relationships • Guide, direct, and motivate subordinates • Coach/develop others	• Team-based work environments • Services with direct client contact
Routine cognitive	Ability to carry out repetitive, non-physical tasks	• Repeat same task • Be exact or accurate • Handle structured vs. unstructured work	• Call center operators • Bookkeepers
Non-routine manual	Ability to vary and react to changing circumstances on a continuous basis	• Operate vehicles, mechanized devices, or equipment • Spend time using hands to handle, control or feel objects, tools, or controls • Manual dexterity • Spatial orientation	• Operators of heavy equipment in agriculture, industry, or construction • Trades such as electricians
Routine manual	Repetitive movements requiring physical abilities	• Adopt to a pace determined by the speed of equipment • Control machines and processes • Spend time making repetitive motions	• Labor-intensive agricultural production (e.g. manual harvesting) • Specific trades (e.g. brick layers) • Construction workers • Specific machine operators (e.g. textile workers) • Assembly lines (e.g. electronic equipment)

The Skills Content of the Malaysian Economy

45. The skills content analysis reveals that the economy is increasingly less reliant on manual skills than cognitive skills. However, there has been no complementary transition to more intensive use of cognitive skills – whether non-routine and analytical or non-routine and interpersonal – which are associated with advanced production processes such as those observed in OECD countries. Figure 23 shows how this evolution has occurred.

[11] The table is adapted from Aedo et al., 2013.

Figure 23: Evolution of Skills in Malaysia: Mean Skill Percentile – All Malaysians

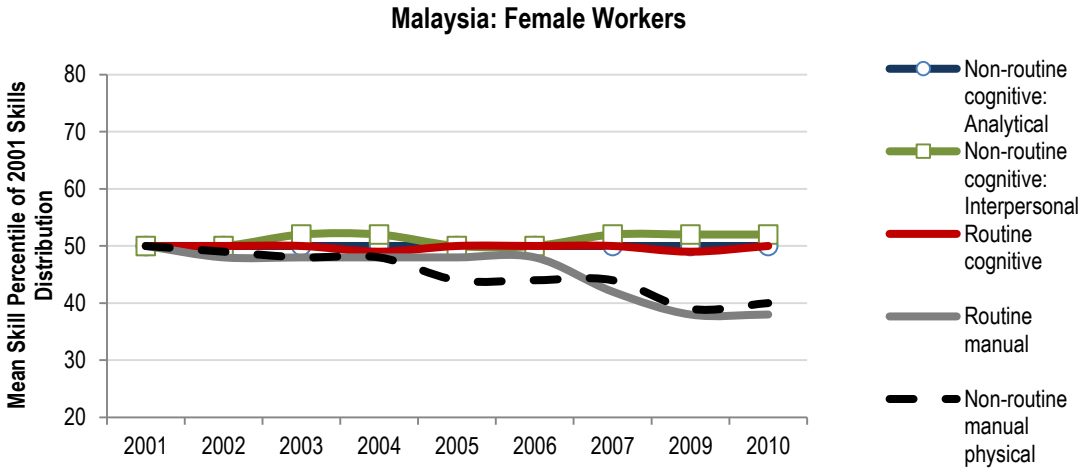


Source: Author's Calculation using LFS, Various Years.

46. Using 2001 as the base year, Figure 23 shows how the skill content of a typical worker either increases or decreases. In the base year, the workforce is divided into halves, one with low skill content and the other with high skill content. An upwardly sloping line means that a typical worker has a skill content level higher than most workers did in 2001. That is, this typical worker's skills are becoming more dominant. A downwardly sloping line means the opposite: the typical worker in a given year has a skill content level lower than most workers in 2001, indicating that the typical worker's skills are less prevalent or dominant.

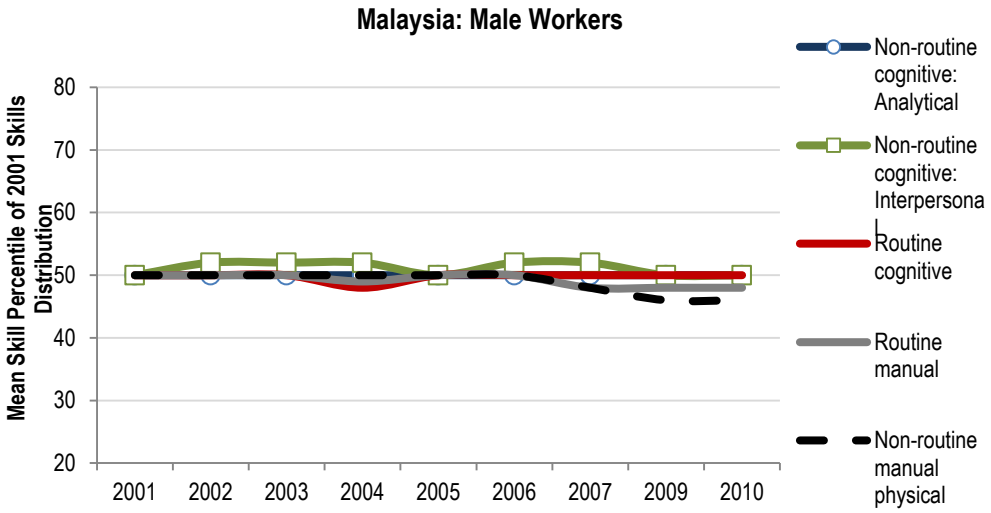
47. In Figure 23, both non-routine manual physical and routine manual skills are becoming less dominant, a sign of lower dependence on the type of manual skills typical of a less-developed economy. While non-routine cognitive (analytical), non-routine cognitive (interpersonal), and routine cognitive skills have not declined, they have also not become more dominant. This pattern is more apparent for female than male workers, as illustrated in Figure 24 and Figure 25.

Figure 24: Evolution of Skills in Malaysia: Mean Skill Percentile – Female Workers



Source: Author's Calculation using LFS, Various Years.

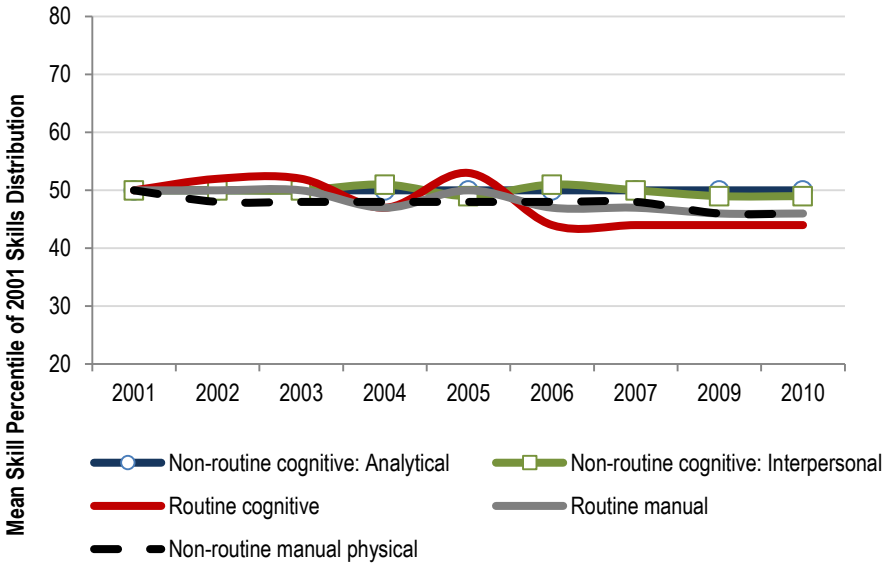
Figure 25: Evolution of Skills in Malaysia: Mean Skill Percentile – Male Workers



Source: Author's Calculation using LFS, Various Years.

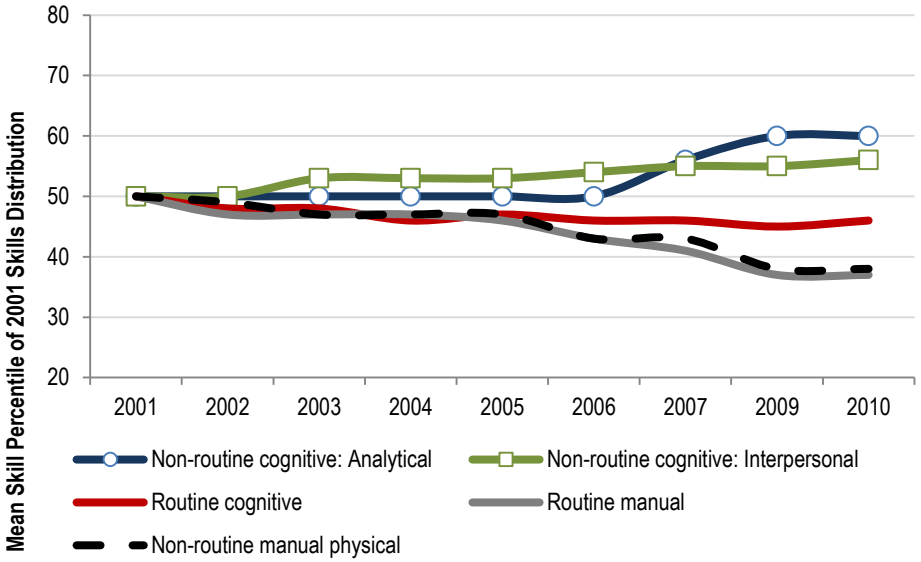
48. An interesting and promising trend emerges when the population born before 1965 (45 years and older in 2010) is compared with the population born after 1974 (35 years and younger in 2010). Figure 26 shows a pattern similar to that described above, with manual skills declining (in addition to routine cognitive skills) and non-routine cognitive skills remaining constant. Figure 27, in contrast, shows that the non-routine skills important to knowledge economies are becoming markedly more dominant while manual skills are becoming much less significant. These trends suggest that despite the stagnation in non-routine skills seen among the entire Malaysian economy, younger Malaysians use these skills more intensively than their older counterparts.

Figure 26: Evolution of Skills: Mean Skill Percentile – Malaysians born before 1965



Source: Author's Calculation using LFS, Various Years.

Figure 27: Evolution of Skills: Mean Skill Percentile – Malaysians born after 1974

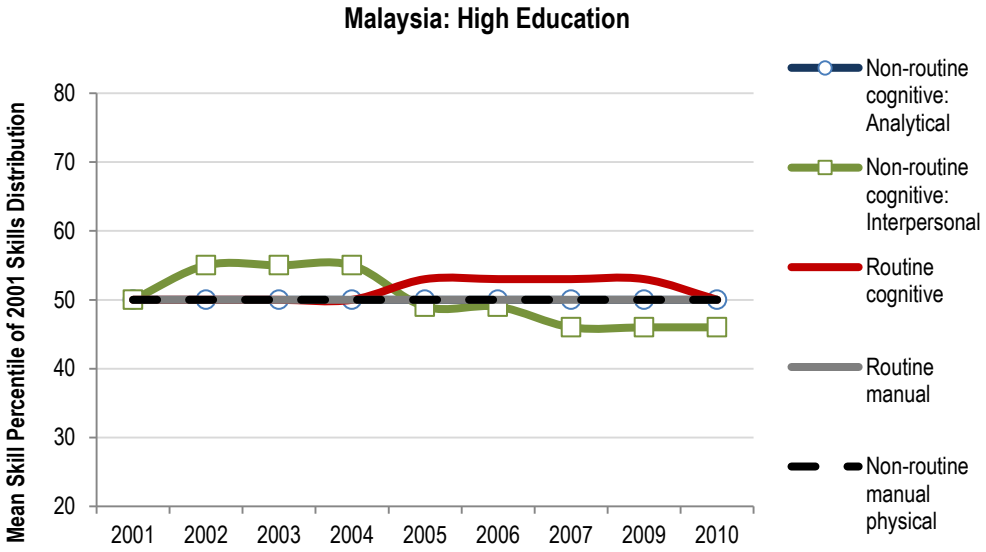


Source: Author's Calculation using LFS, Various Years.

49. Notably, intensification in the use of cognitive skills has not occurred among Malaysians with university degrees, as might be expected. Malaysians with university degrees have actually experienced a decline in the use of non-routine cognitive (interpersonal) skills while the other skills categories have stagnated (Figure 28). This trend is even more striking among Malaysians with diplomas or certificates (TVET level), which have experienced a worrisome decline in the use of non-routine cognitive skills and intensification in the use of manual skills (and routine cognitive skills) (Figure 29). For Malaysians with SPM/SPMV or STPM education, routine skills and non-routine cognitive (analytical) skills have declined. For Malaysians with primary education, skills in all categories have remained mostly flat, indicating that there has not been much change over

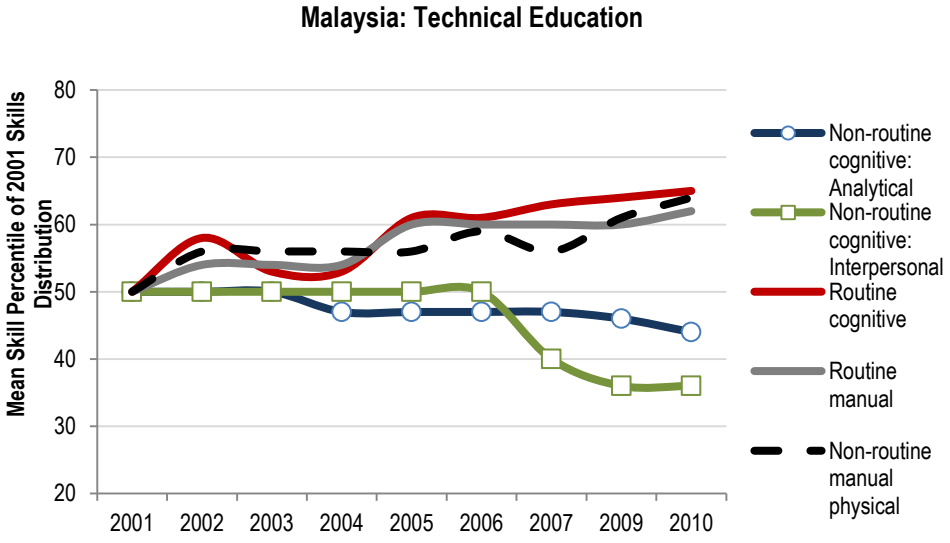
the last ten years in the skills of these workers and/or the types of jobs/tasks they perform (see Annex 2 for Figures related to these two groups).

Figure 28: Evolution of Skills: Mean Skill Percentile –University Degree (or higher)



Source: Author's Calculation using LFS, Various Years.

Figure 29: Evolution of Skills: Mean Skill Percentile – Malaysians holding a Diploma/Certificate



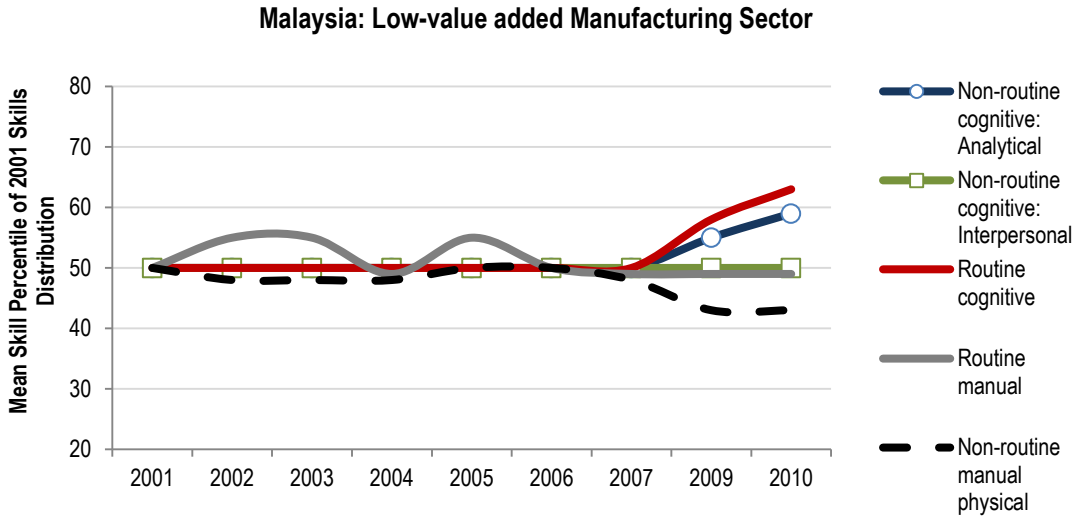
Source: Author's Calculation using LFS, Various Years.

50. Encouragingly, there is less stagnation in cognitive skills in several key economic sectors[12]. In both high- and low-value added Manufacturing non-routine cognitive (analytical) skills

[12] For economic sectors the following classification is used: Agriculture and Mining, Low-value added Manufacturing (Mfg food-beverage-tobacco, Mfg textile, Mfg wood, Mfg paper-furniture),

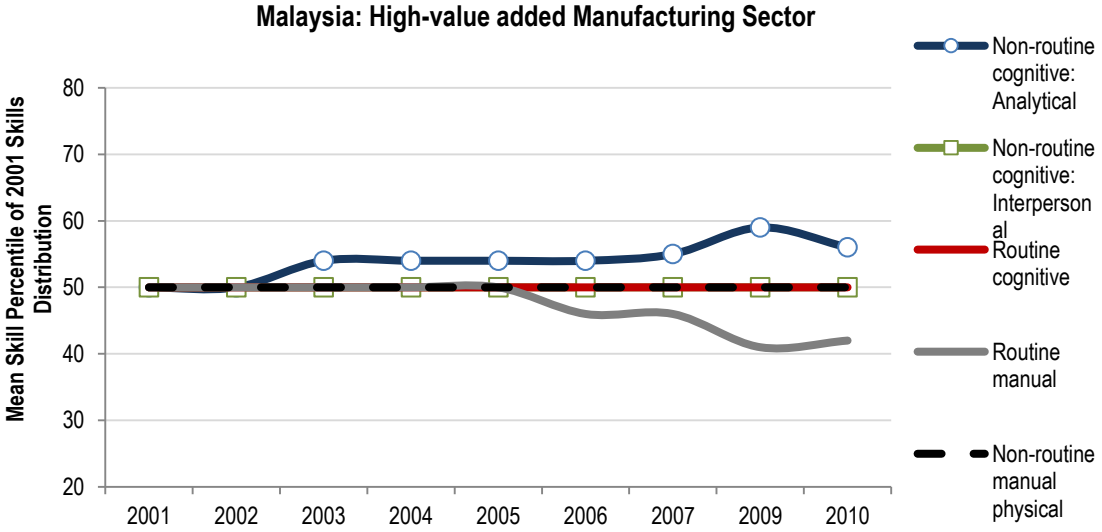
are becoming increasingly dominant while non-routine manual physical skills are declining in low-value added Manufacturing (Figure 30), and routine manual skills are declining in high-value added Manufacturing (Figure 31).

Figure 30: Evolution of Skills: Mean Skill Percentile – Low-value added Manufacturing



Source: Author's Calculation using LFS, Various Years.

Figure 31: Evolution of Skills: Mean Skill Percentile – High-value added Manufacturing

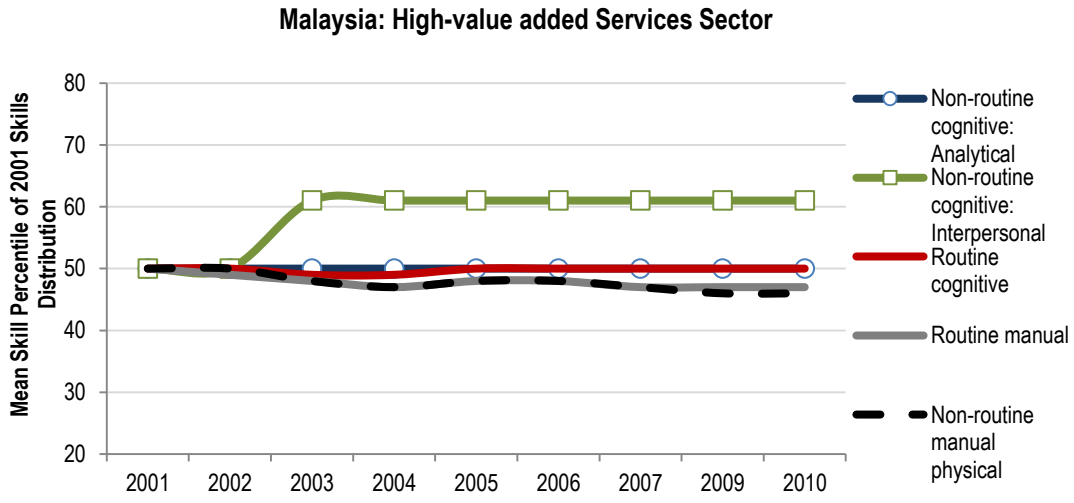


Source: Author's Calculation using LFS, Various Years.

High-value added Manufacturing (Mfg chemical-rubber, Metal-machinery-equipment Mfg measurement-medical-communication, Mfg transport equipment), High-value added Services (Post and telecom, Finance, Real estate, Business services, Education, Health, Public administration), Low-value added Services (Utilities, Wholesale-retail, Accommodation and restaurants, Logistics, Other services), and Construction.

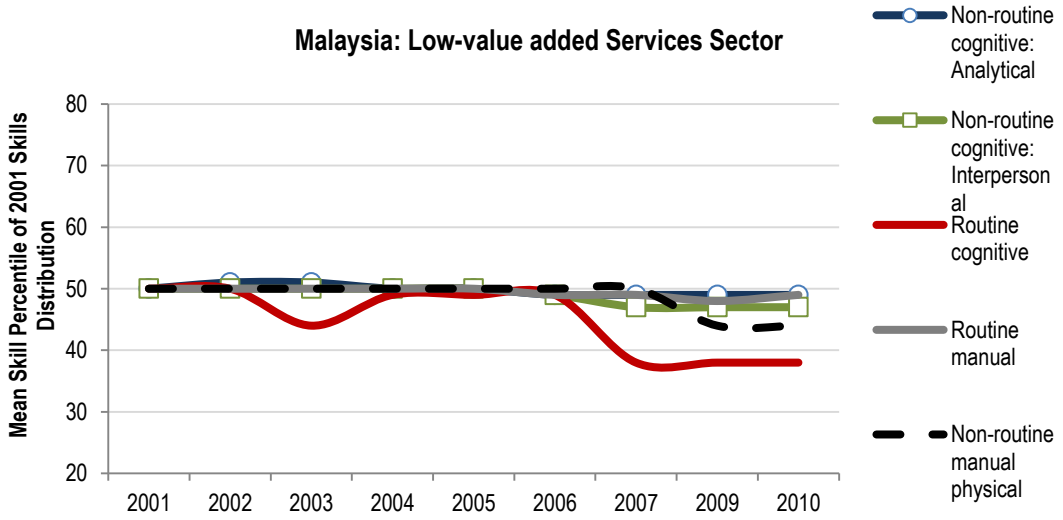
51. In the high-value added Services sector, non-routine cognitive (interpersonal) skills are becoming more dominant. This is expected in a growing knowledge based economy (Figure 32). The same is not true of low-value added Services (Figure 33), however, where all skill categories are either stagnating or declining.

Figure 32: Evolution of Skills: Mean Skill Percentile – High-value added Services



Source: Author's Calculation using LFS, Various Years.

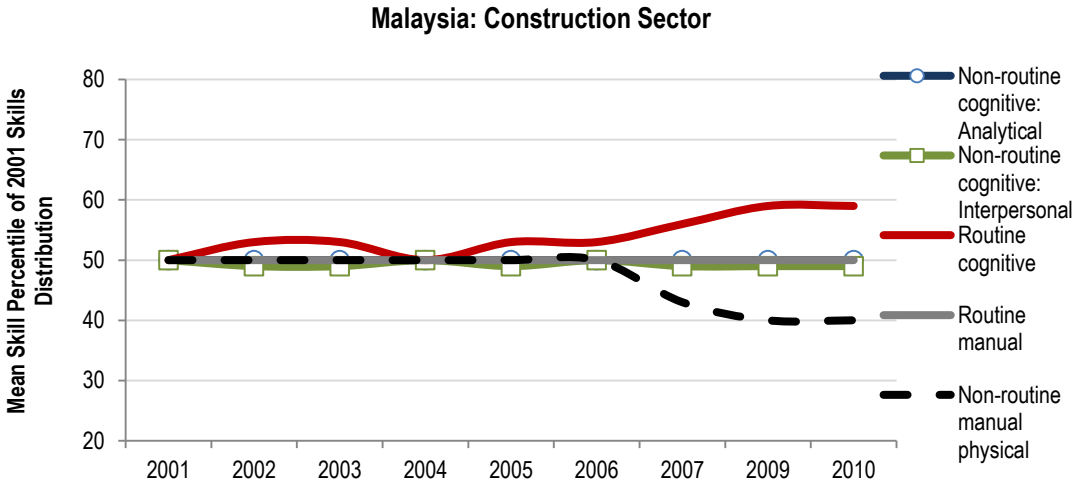
Figure 33: Evolution of Skills: Mean Skill Percentile – Low-value added Services



Source: Author's Calculation using LFS, Various Years.

52. Routine cognitive skills, which require thinking that is repetitive in nature, are becoming more dominant in Construction, while non-routine manual physical skills are becoming less important (Figure 34). Notably, though, none of these sectors is experiencing a clear increase in either type of non-routine skills, nor a clear decrease in either type of manual skills, as expected from a knowledge-based economy.

Figure 34: Evolution of Skills in Malaysia: Mean Skill Percentile – Construction

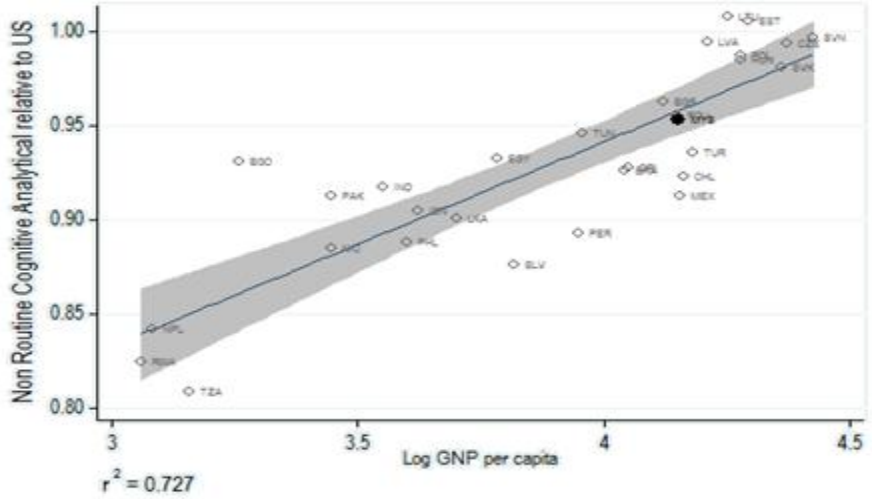


Source: Author's Calculation using LFS, Various Years.

53. Tracing Malaysia's skills content over time shows a clear shift away from routine manual skills towards more routine cognitive skills. Progress in developing non-routine cognitive skills (these are required for innovation in key professions/occupations such as researchers, doctors, lawyers, managers) has been less favorable. Compared to other countries with similar GNP per capita to the US (which serves as a benchmark country) it is clear that more progress in the development of non-routine cognitive skills (especially interpersonal) is needed to sustain and overcome its current level of development.

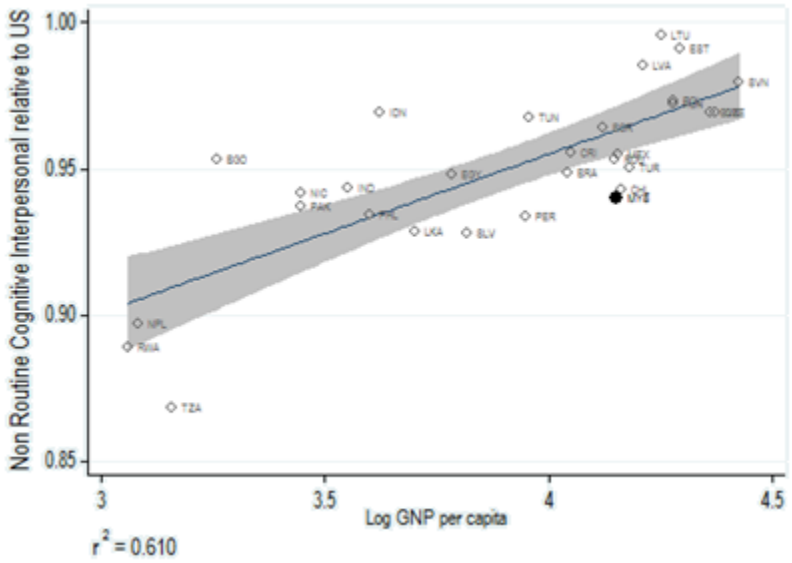
54. Specifically, Figure 35 shows that for its level of development, Malaysia has low (shown by placing right below the best-fit line) non-routine cognitive analytical skill levels and even lower non-routine cognitive interpersonal skills (Figure 36). These are critical skills for innovation, adaptability and competitiveness, and correspond closely to the fourth pillar of the framework—skilled, educated, adaptable workers. The findings thus suggest specific areas where improvements are needed in order to strengthen the fourth pillar of the framework.

Figure 35: Non-routine Cognitive Analytical skills and GNP per capita



Source: Author's Calculation using LFS from various countries. Also, see Aedo et. Al 2013.

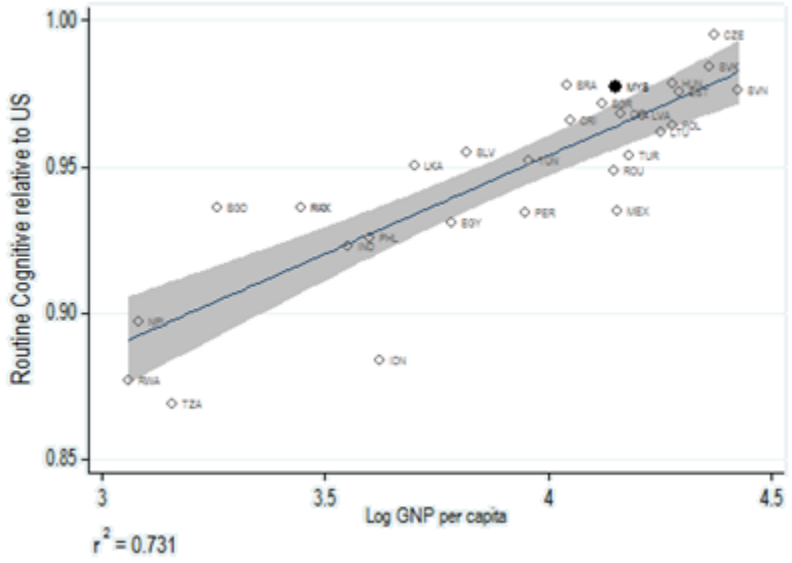
Figure 36: Non-routine Cognitive Interpersonal skills and GNP per capita



Source: Author's Calculation using LFS from various countries. Also, see Aedo et. Al 2013.

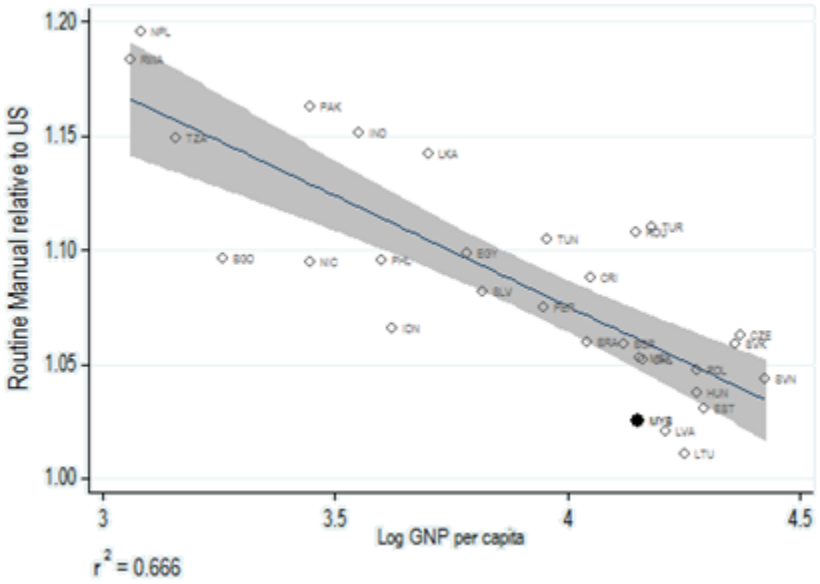
55. Malaysia has had more success than some other countries in developing routine cognitive skills among its workforce; these are the skills that bookkeepers and shopkeepers, for instance, use regularly (Figure 37). As emphasized above, Malaysia has been able to shift away from its reliance on manual skills; data show that workers use routine and non-routine manual skills less intensively than its level of economic development would imply (Figure 38 and Figure 39).

Figure 37: Routine Cognitive skills and GNP per capita



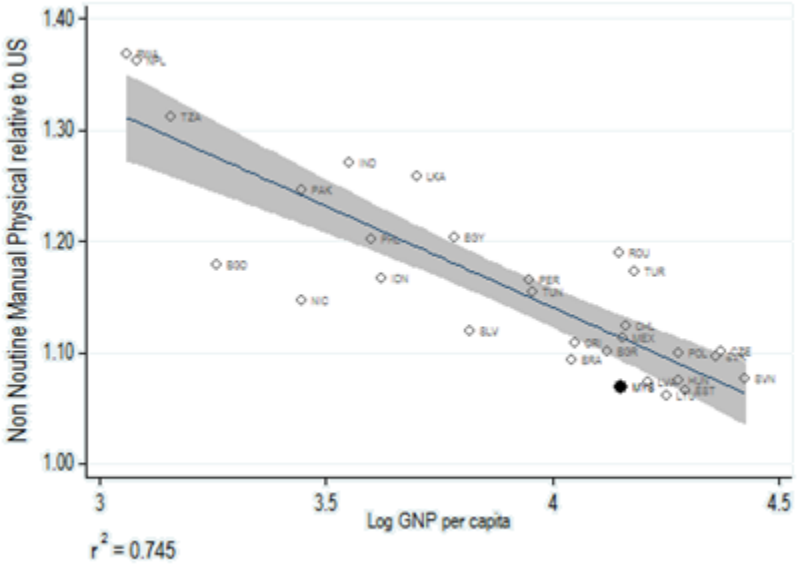
Source: Author's Calculation using LFS from various countries. Also, see Aedo et. Al 2013.

Figure 38: Routine Manual skills and GNP per capita



Source: Author's Calculation using LFS from various countries. Also, see Aedo et. Al 2013.

Figure 39: Non-Routine Manual skills and GNP per capita



Source: Author's Calculation using LFS from various countries. Also, see Aedo et. Al 2013.

56. Figures 40 to 43 illustrate the *evolution* of skill content in Turkey, Poland, and Chile (the equivalent chart for Malaysia is also reproduced). Chile stands out as a model, but Malaysia also stands out for a rigorous decline in its reliance on manual skills. All four countries have experienced a substantial decline in non-routine manual physical skills and all but Turkey have experienced a decline in routine manual skills. Progress in the shift to cognitive skills has been modest in Malaysia, Turkey and Poland. Chile is notable for its intensification of

non-routine cognitive (analytical), non-routine cognitive (interpersonal), and routine cognitive skills, simultaneous to its decreasing reliance on manual skills. Given Chile's and Malaysia's comparability in terms of size, economic structure, and level of development, there are some lessons to be learned from the Chilean example, to be discussed in further detail in the policy recommendations chapter.

Figure 40: Evolution of Skills in Malaysia: Mean Skill Percentile

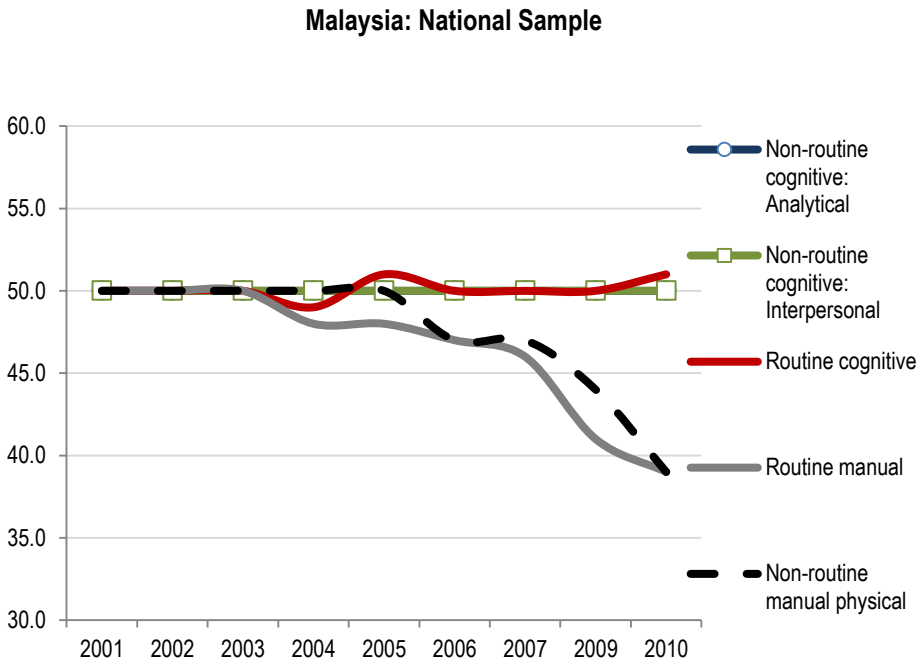


Figure 41: Evolution of Skills in Turkey: Mean Skill Percentile

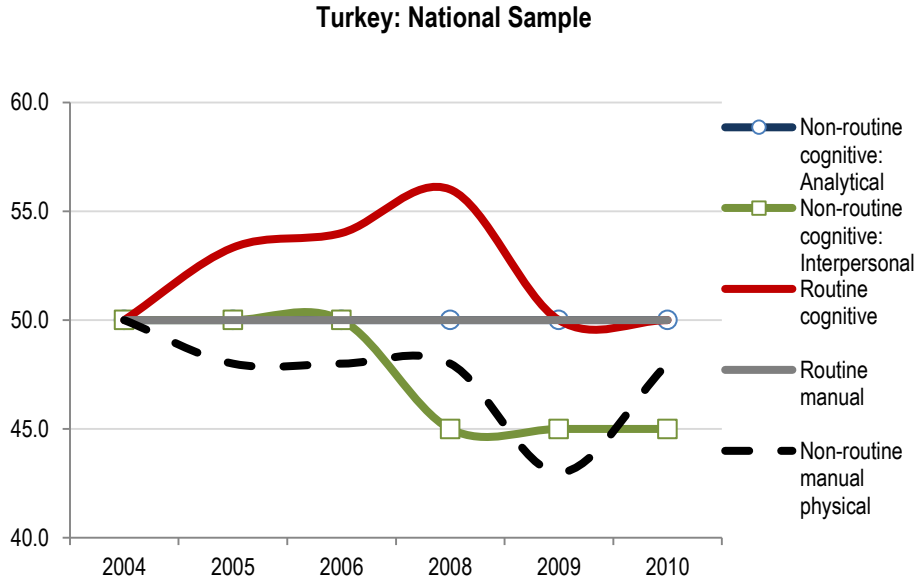


Figure 42: Evolution of Skills in Poland: Mean Skill Percentile

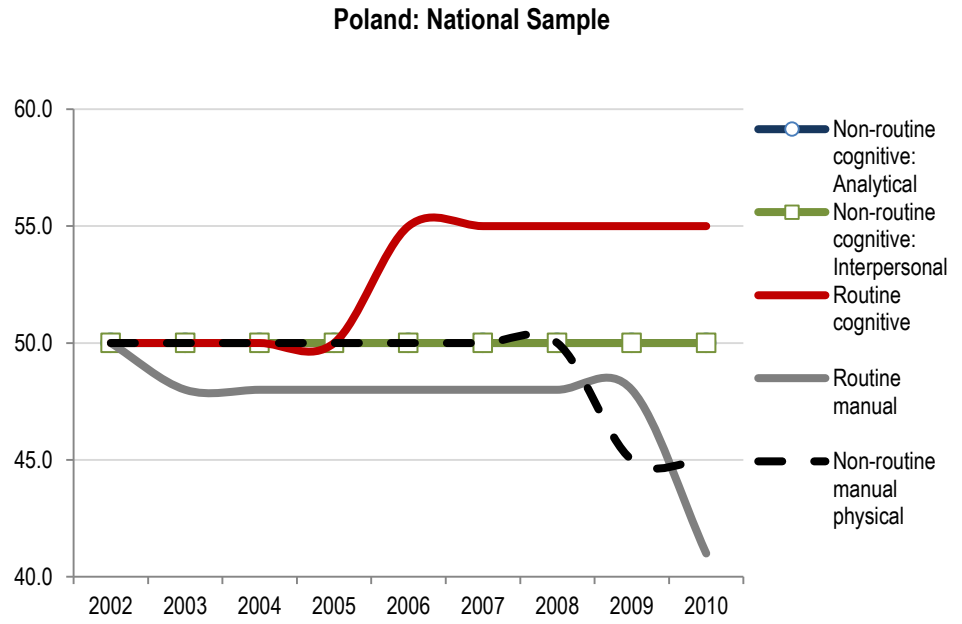
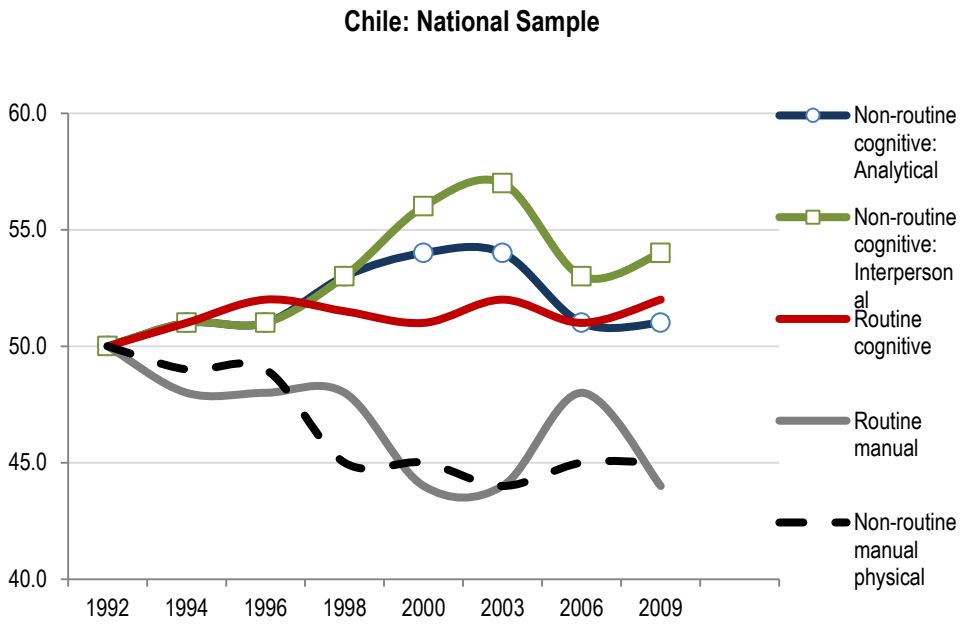


Figure 43: Evolution of Skills in Chile: Mean Skill Percentile



Sources: Malaysia Labor Force Survey; Turkey, Household Labour Force Survey; Poland, EU Labour Force Survey; Chile, Encuesta Nacional de Caracterizacion Economica (CASEN).

2.4 Characterizing the Pool of Part-Time, Non-Working, and Inactive "Potential" Workforce

57. While the previous sections in this chapter characterized how well the *current* workforce is positioned to meet the skill demands from employers, this section focuses on those who could *potentially* fill labor needs. In particular, the section focuses on: i) people who are *out of the labor force* (not working and not looking for a job); ii) people who are *unemployed* (not working but looking for a job); and iii) people who are *underemployed* (working less than 30 hours, but willing to work more). Within the first group, the analysis distinguishes between two subgroups: a) people *out of the labor force because they are students*; and b) people *out of the labor force because they are inactive*.

58. This section explores in greater detail the breakdown for each of these three groups to determine whether they could potentially fill some of the skills gaps and shortages identified. The main takeaway from this section is that there are many suitable potential workers who are not currently active (or active but not full-time). This is particularly true of women with tertiary degrees in a service related field of study and unemployed youth with tertiary education, who could be targeted to fill unmet skill demands. On the other hand, the underemployed population represents a significantly smaller segment of the Malaysian economy than previously assumed, and as such offers limited potential.

Methodology

59. This section relies on statistical and econometric analysis to measure the probability of being inactive, unemployed, or underemployed. The estimation of the probability (or probit regression model) of distinct labor market outcomes allows for the identification of the impact of education and field of study on the aforementioned labor market outcomes. In other words, the estimation takes into account the field of study and education level of the individual to see if patterns of negative labor market outcomes can be identified among people in certain fields of study. More details of the estimation approach can are found in Annex 2.

Labor Force Participation

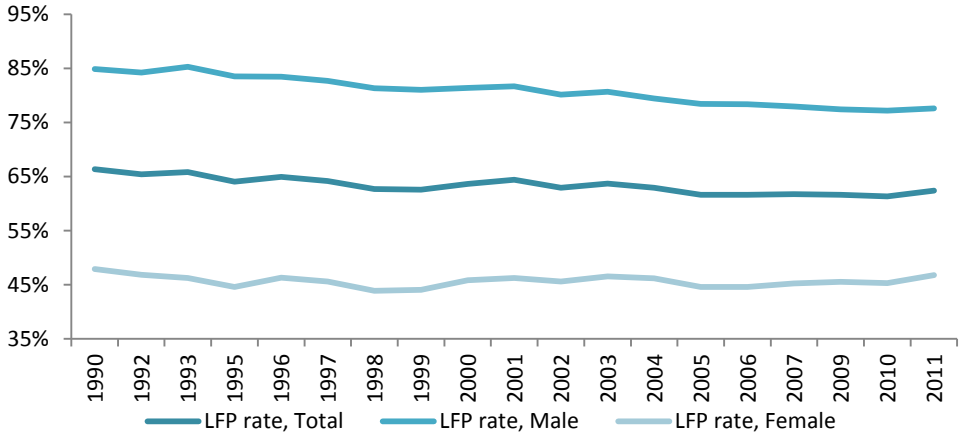
60. People out of the labor force - not working nor actively looking for a job - represent a potential source of available labor. Although not all individuals out of the labor force have the same degree of interest in taking a job, a better understanding of this group could help uncover their true potential as a source of labor.

61. A large number of people are out of the labor force, especially women. Despite the fact that most of those out of the labor force have lower levels of education, almost 500,000 Malaysians between the ages of 25 and 35 with at least SPM/SPMV education are potentially employable in low- or mid-skilled professions. Interestingly, the majority of tertiary educated economically inactive individuals are women with a certificate/diploma or a degree in Services. Given that the Wholesale and Retail, as well as the Tourism sub-sector, have been identified as two of the twelve NKEAs in the ETP, the labor supply could benefit greatly from inclusion of this group.

62. A natural indicator to capture the size of the population out of the labor force is the labor force participation (LFP) rate. The LFP is defined as the ratio of the labor force (people employed and unemployed between the ages 15 through 64) to the total population (also between the ages 15 through 64). The LFP rate conveys information about labor market dynamics. For instance, declining labor force participation rates could be interpreted in various ways; for instance, workers may be discouraged by poor labor market prospects, or workers may be able (or have) to retire earlier, or young people may choose to remain in the education system to further their studies.

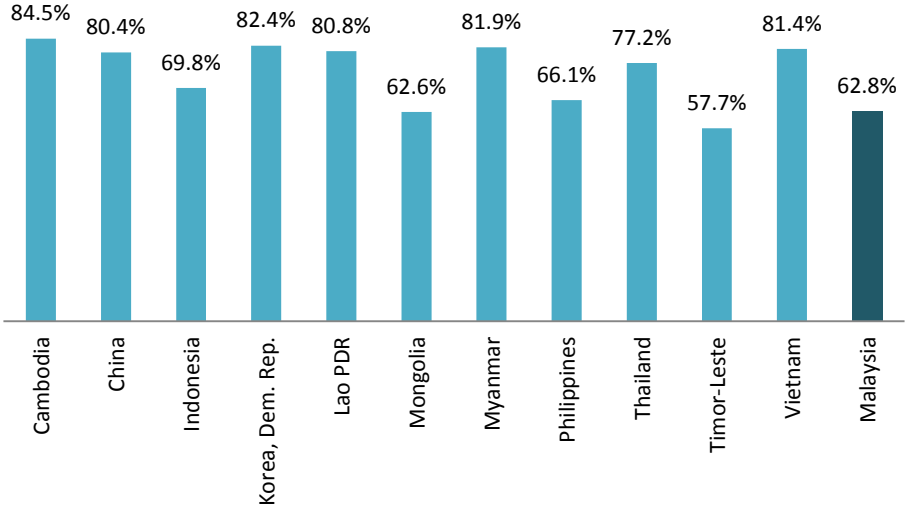
63. Over the last twenty years, the LFP declined from slightly above 65 percent in 1990 to 62.4 percent in 2011. Such low levels are mainly driven by the low (less than 50 percent) participation of women in the labor force (Figure 44). International comparisons suggest that Malaysia's labor force participation is lower than other upper-middle income economies and other countries in East Asia (Figure 45), and significantly lower than that of the high-income countries (Figure 46).

Figure 44: Malaysians aged 15-64



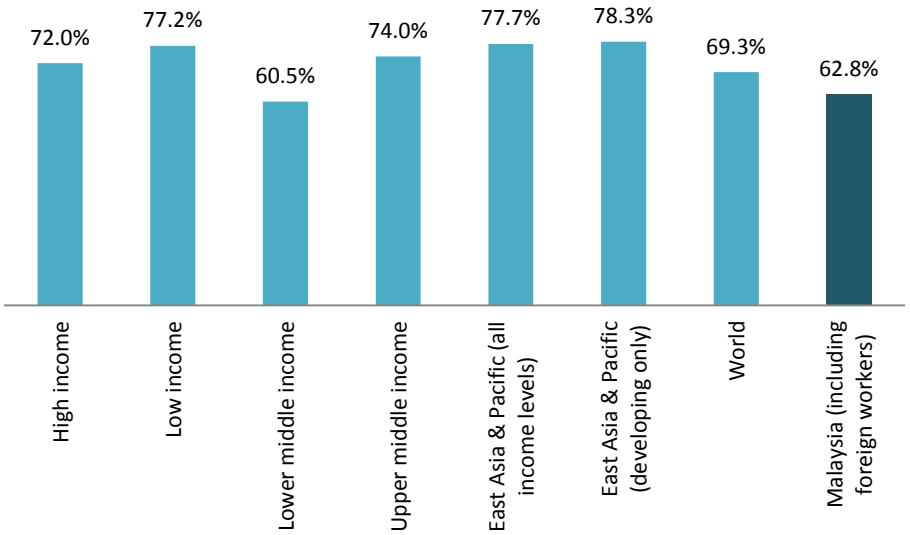
Source: Malaysian LFS 1990-2011

Figure 45: LFP rates in the East Asia Region, 2011



Source: World Development Indicators 2011

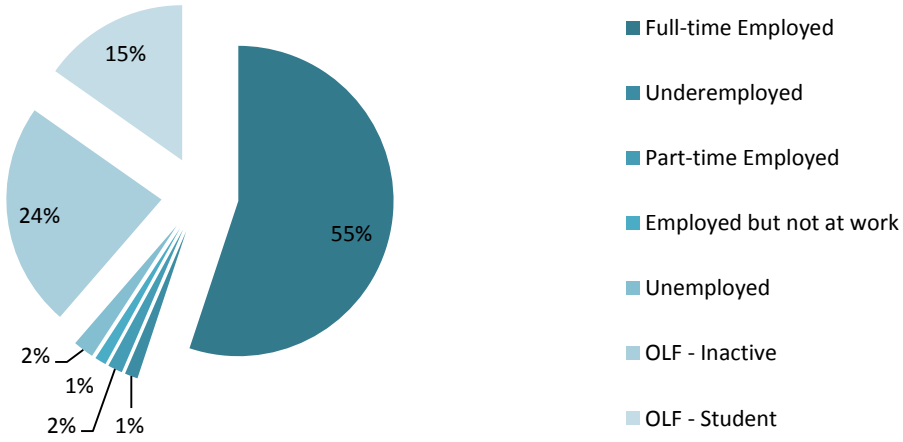
Figure 46: LFP rates across the World, 2010



Source: World Development Indicators 2011

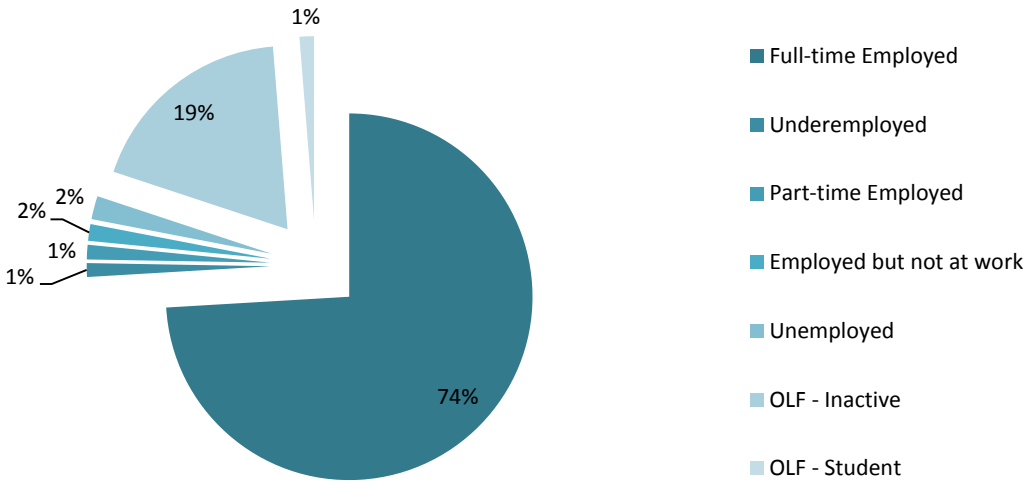
64. In 2010, a total of 6,562,389 Malaysians were out of the labor force, accounting for 39 percent of the total working age population. A large share of them – 24 percent – was economically inactive, while another 15 percent was not working or looking for a job because they were students (Figure 47). The picture is somewhat different for Malaysians in prime working years (ages 25 to 35); this group has a smaller share of inactive people (19 percent compared to the 24 percent for the entire Malaysian population) (Figure 48).

Figure 47: Malaysians aged 15-64, 2010



Source: Malaysian LFS 2010

Figure 48: Malaysians aged 25-35, 2010

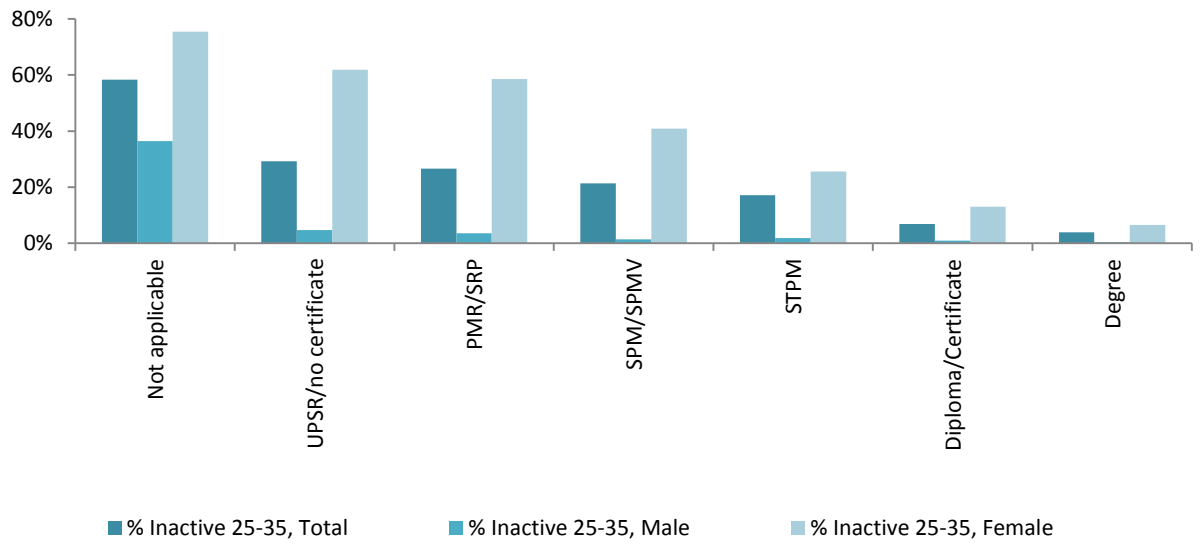


Source: Malaysian LFS 2010

65. The fact that nearly one million people (829,453 in 2010) are economically inactive (neither working nor looking for a job) has several negative implications. This group is neither producing additional resources for the economy, nor is it utilizing its skills to generate individual gains, which translates into limited or no savings for old age. It is important to note, however, that many of these people, especially women, may not be fully inactive; some may perform household/family duties while others may be engaged in house-based economic (informal) work (World Bank, 2012). Understanding the characteristics of these individuals is therefore crucial to identifying the skills that they could bring to the formal labor market and also in designing employment targeting efforts.

66. As previously noted, inactivity rates among Malaysians aged 25 to 35 are higher for women than men; fortunately, the gap narrows as education levels increase and inactivity rates decrease at higher education levels. However, while men in each education category (except for the not applicable group) experience very low (below 5 percent) inactivity rates, the same is true only for women with a certificate/diploma or a degree (Figure 49).

Figure 49: Inactive Malaysians Aged 25-35 By Education And Gender

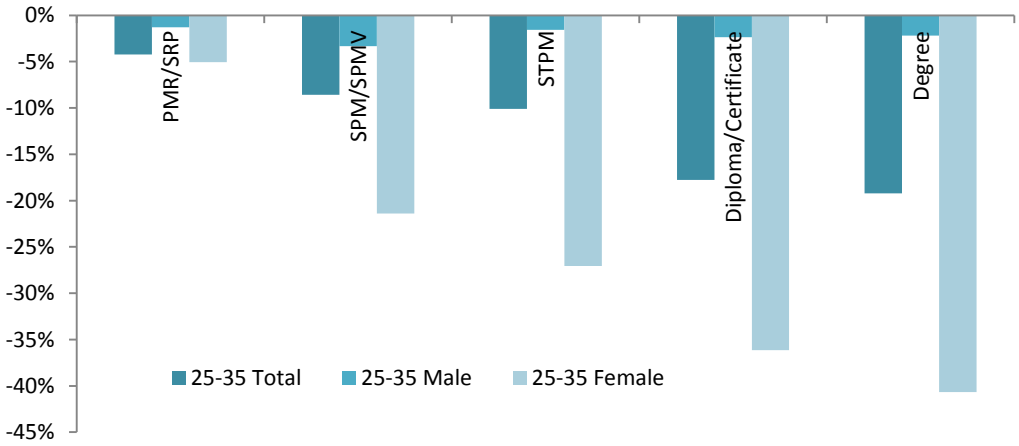


Source: Malaysian LFS 2010

67. Indeed, higher levels of education reduce the probability of inactivity for women. Econometric results confirm that educational attainment is a crucial predictor of economic activity for all, but especially for women (Figure 50). Women between the ages of 25 and 35 who have completed university education are 40 percent less likely to be inactive than the same age cohort of women with at most primary education. For men, among whom inactivity is low at all levels of education (except for those with "not applicable" education levels), the probability of inactivity is minimized with an upper secondary education (SPM/SPMV). However, the small difference in the results for the various education levels shows that they are not important determinants of labor market participation among men.

Figure 50: Changes In Probability To Be Inactive By Education Level And Gender

(no formal / primary education = reference group)

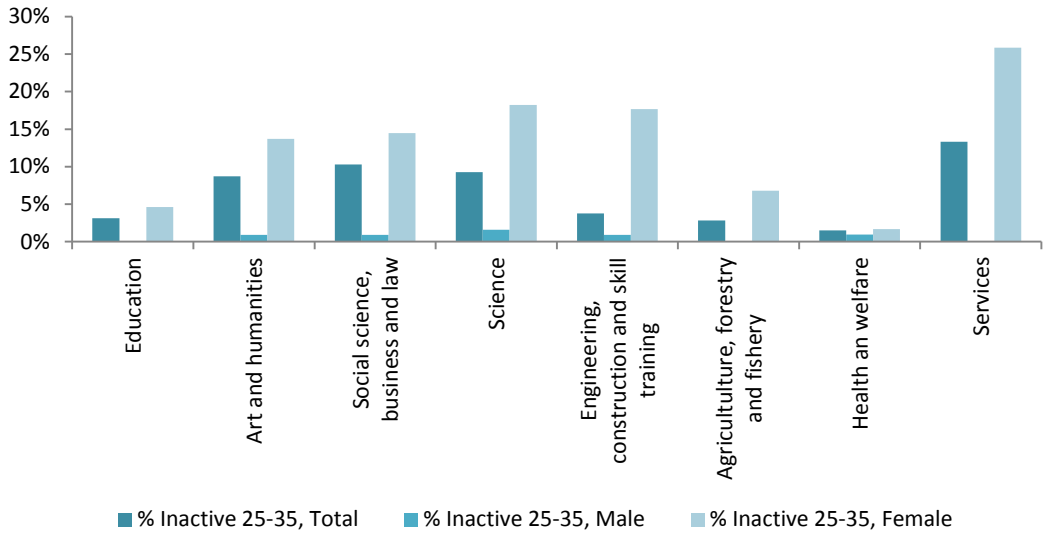


Source: Authors' analysis based on Malaysian LFS 2010

Note: Bars with shaded areas indicate not statistically significant results.

68. A breakdown by field of study shows that a large share of women (over 2,000) in their prime working years with vocational degrees in Services was not working or looking for a job in 2010. Similarly, a large pool (almost 14,000) of young women with vocational education in technical subjects such as Engineering, Construction and Skill Training, and Science were also inactive. That same year, few men with the same level of education were economically inactive (Figure 51).

Figure 51: Inactive Malaysians with a Certificate/Diploma

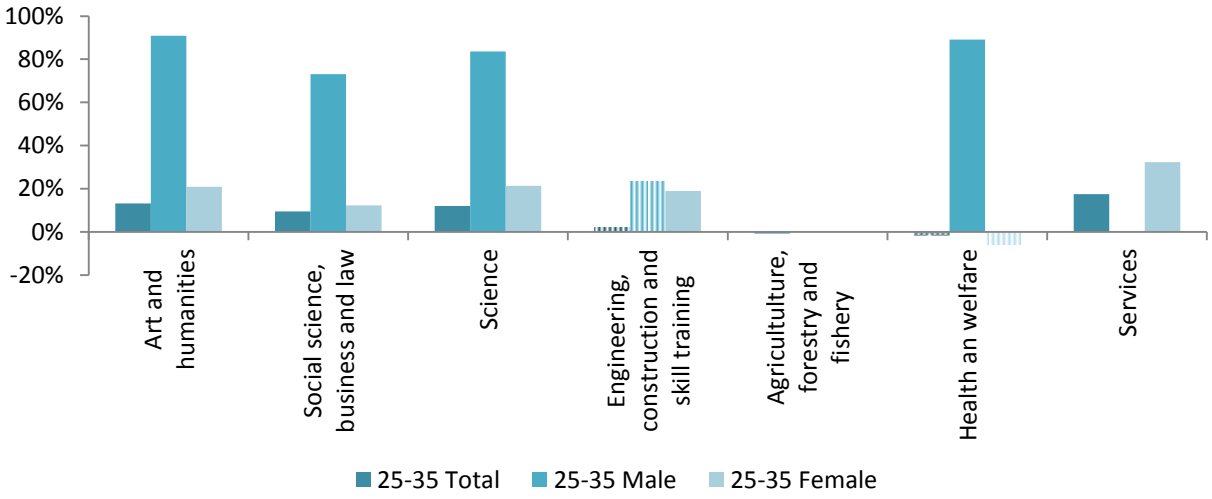


*Services includes: Tourism, Hotel management, Restaurant management
Source: Malaysian LFS 2010

69. A vocational diploma in the field of Education reduces everyone's probability of inactivity compared to studies in other fields, particularly for men. On the other hand, a vocational diploma in a Service related field increases the probability of a woman being economically inactive. Given that inactivity rates are low for both men and women between the ages of 25 to 35 with vocational studies in Education, this field of study was chosen as a reference group in the econometric analysis used to measure the probability of being inactive, and how it changes when other fields of study are chosen. For men, Engineering, Contruction and Skill Training is the only field that does not significantly increase the probability of being inactive (except Agriculture, Forestry and Fishing and Services, however the inactivity rate is equal to zero). For women, differences are less pronounced, but Services emerges once again as the field of study that, compared to Education, lends the highest chances of economic inactivity (slightly above 30 percent). Health and Welfare studies, on the other hand, reduce the probability of inactivity among women, even if not significantly so compared to Education (Figure 52).

Figure 52: Changes In Probability To Be Inactive By Field Of Vocational Study And Gender

(education= reference group)

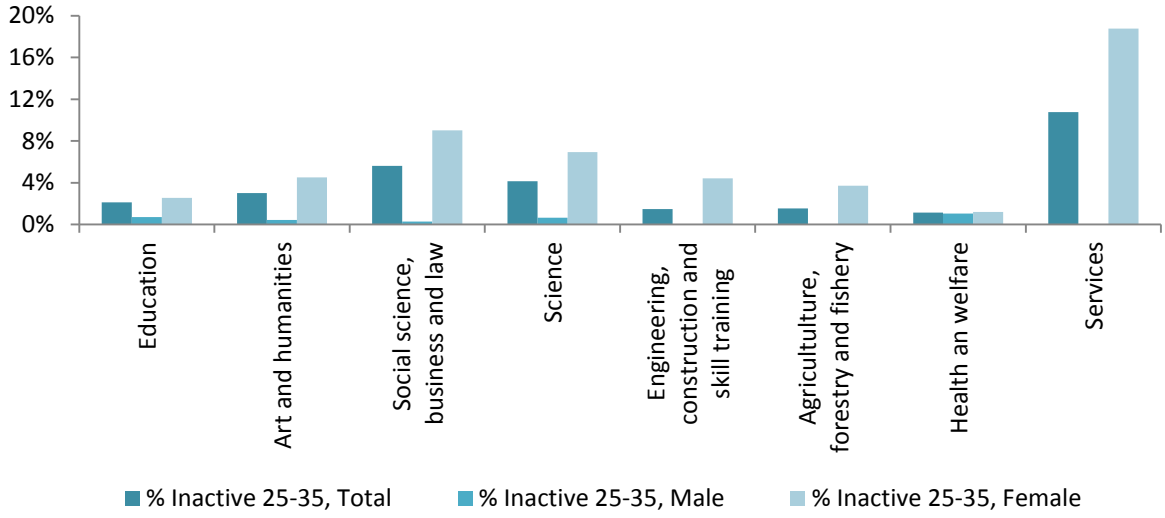


Source: Authors' analysis based on Malaysian LFS 2010

Note: Bars with shaded areas indicate not statistically significant results.

70. Similar trends are observed among degree holders. Inactivity rates are quite pronounced for female graduates in their prime working years with a degree in a Services related area, Social Science, Business, and Law. Male degree holders, in contrast, experience very low of inactivity rates, irrespective of the field of studies chosen. The rate of economic inactivity among Malaysian men in prime working years with a degree is never higher than one percent, suggesting that nearly all men aged 25 to 35 are economically active if they hold an academic degree (Figure 53). The same is not true for women, though, as over 12,000 women with degrees in disciplines related to Social Science, Business and Law, were neither working nor looking for jobs.

Figure 53: Inactive Malaysians with a University Degree

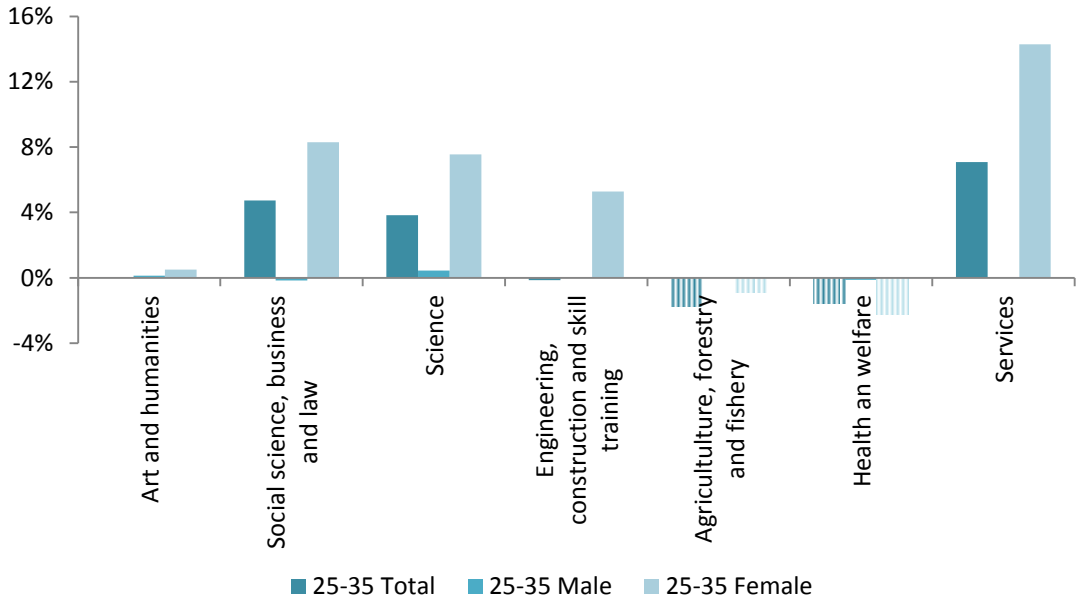


Source: Malaysian LFS 2010

71. Econometric analysis confirms these trends: the field of academic studies for men aged 25 to 35 does not affect their probability of being economically inactive. For women, almost all fields are associated with a higher probability of inactivity compared to Education. Results show that once awarded a degree, a woman aged 25 to 35 who studied disciplines related to Services is almost 15 percent more likely to be inactive than a woman with a degree in Education. However, degrees in Agriculture, Forestry and Fisheries or in Health and Welfare are not associated with a higher probability of inactivity compared to Education (Figure 54).

Figure 54: Changes In Probability To Be Inactive By Field Of Academic Study And Gender

(education= reference group)



Source: Authors' analysis based on Malaysian LFS 2010
Note: Bars with shaded areas indicate not statistically significant results.

Unemployment

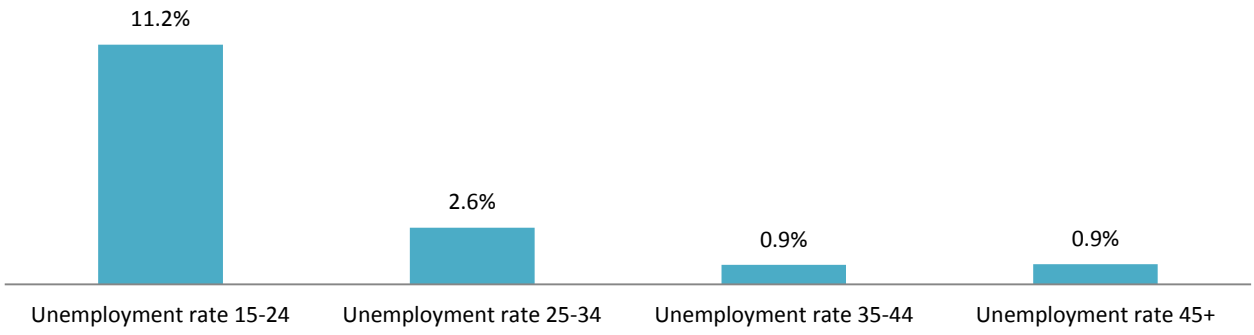
72. Unemployed Malaysians represent a source of readily available labor, as they are both available for work and actively looking for jobs. The unemployment rate in Malaysia, however, is low (at around 3-4 percent, and stable over decades; see Figure 55) relative to OECD countries, signaling high labor absorption capacity by local labor markets. Malaysia's dynamic economic growth has enabled the unemployment rate to stay below 5 percent and in 2011, only about 350,000 Malaysians were unemployed.

Figure 55: Unemployment among Malaysians aged 15-64

Source: Malaysian LFS 1990-2011

73. Most unemployment has been concentrated among young job seekers with tertiary education (Figure 56). In 2011, unemployment rates for Malaysians aged 25 and above were remarkably low and never higher than 2.6 percent (for the group ages 25 to 34). The same was not true for younger Malaysians. In 2011, among the total labor force ages 15 to 24, 11.2 percent were willing to work but did not have a job. The reason for this phenomenon is unclear, though some employers posit that unemployed new graduates do not have the set of skills (often interpersonal rather than technical) demanded by the jobs they are seeking. Thus, knowing what skills these young workers are lacking could help to direct specific initiatives to strengthen them.

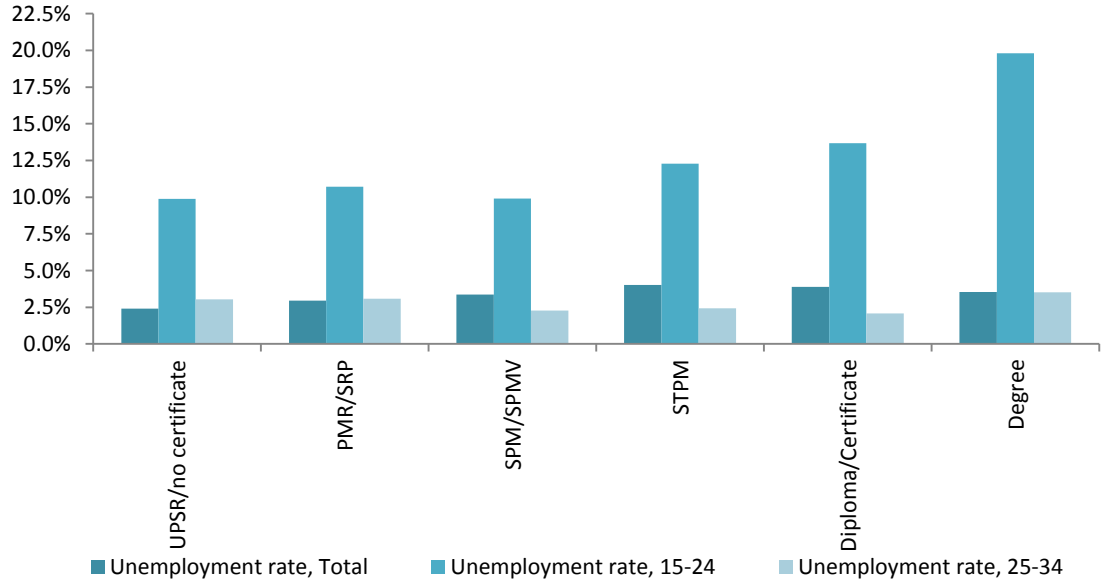
Figure 56: Unemployment rates by age group, 2011



Source: Malaysian LFS 2011

74. The peak unemployment rate for young Malaysians is among university degree holders at 19.8 percent. The unemployment rate for young Malaysians across all education levels is similarly high, albeit less pronounced, but never dropping below 10 percent (for SMP/SPMV and UPSR or no certificate holders) (Figure 57). This pattern differs significantly from unemployment among the slightly older population ages 25 to 34 or for the working age population as a whole.

Figure 57: Unemployment Rates by Educational Attainment, 2011



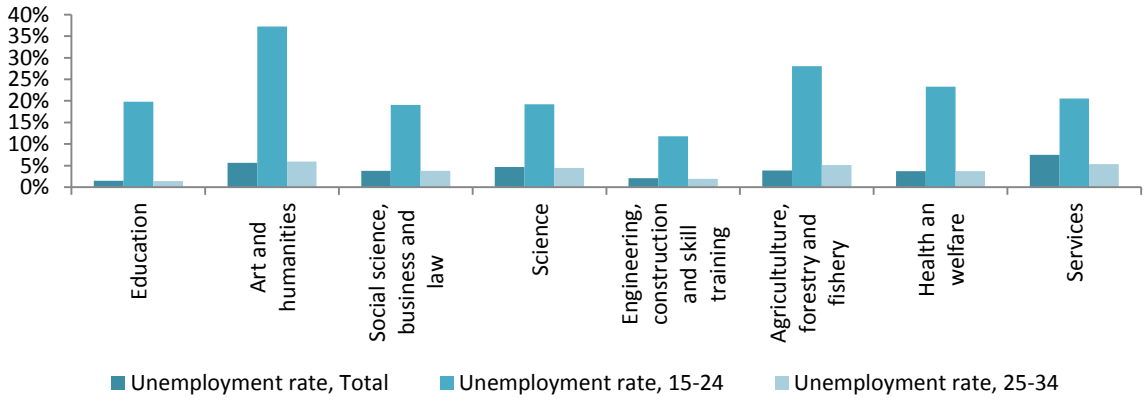
Source: Malaysian LFS 2011

Note: Figure shows the unemployed population aged 15 to 24 for all educational levels. However, there are no unemployed SPM / SPMV holders under age 17, no unemployed STPM holders under age 19, no unemployed certificate / diploma holders under age 17 and no unemployed degree holders unemployed under age 20.

75. A Malaysian between the ages of 15 and 24 with an academic degree is almost 16 percent more likely to be unemployed than another one in the same age group with primary or no formal education. On the other hand, PMR/SRP holders of the same age are nearly two percent less likely to be unemployed compared to the lowest educated group. This provides further evidence that for individuals ages 15 to 24, skill mismatches become more pronounced as education levels – and the complexity of tasks required – increases.

76. As such, low graduate employability for youth aged 15 to 24 is a cause for concern across all fields of university study, especially Arts and Humanities. For the youngest age cohorts – 15 to 24 and 25 to 35 – unemployment rates are highest in that field. Over a third of recent graduates – again, those ages 15 to 24 – in this field are unable to find a job, suggesting that some intervention is needed to improve the employability of this category of potential workers (Figure 58). On the other hand, the highest unemployment rate for the entire working age population (i.e. 15-64) corresponds to the Services field.

Figure 58: Unemployment Rates for University Degree holders



Source: Malaysian LFS 2011

Note: Figure shows the unemployed population aged 15 to 24 for all educational levels. However, there are no unemployed SPM / SPMV holders under age 17, no unemployed STPM holders under age 19, no unemployed certificate / diploma holders under age 17 and no unemployed degree holders unemployed under age 20.

77. University graduates in Services have the highest probability of unemployment in all age groups excluding those aged 15 to 24, for whom Science, and Arts and Humanities, are associated with the lowest employability. But again, the youngest cohort experiences increases in the probability of unemployment across several fields of study. For the youngest cohort, Education, Agriculture, Forestry and Fishing, Health and Welfare and Services are the fields of study in which graduates face lower probabilities of unemployment. For people aged 25 to 34 with a university degree in the field of Services, the probability of unemployment is almost 25 percent higher than for a degree holder in the field of Education (Figure 59). The estimate is almost 11 percent if the focus shifts to the entire working age population.

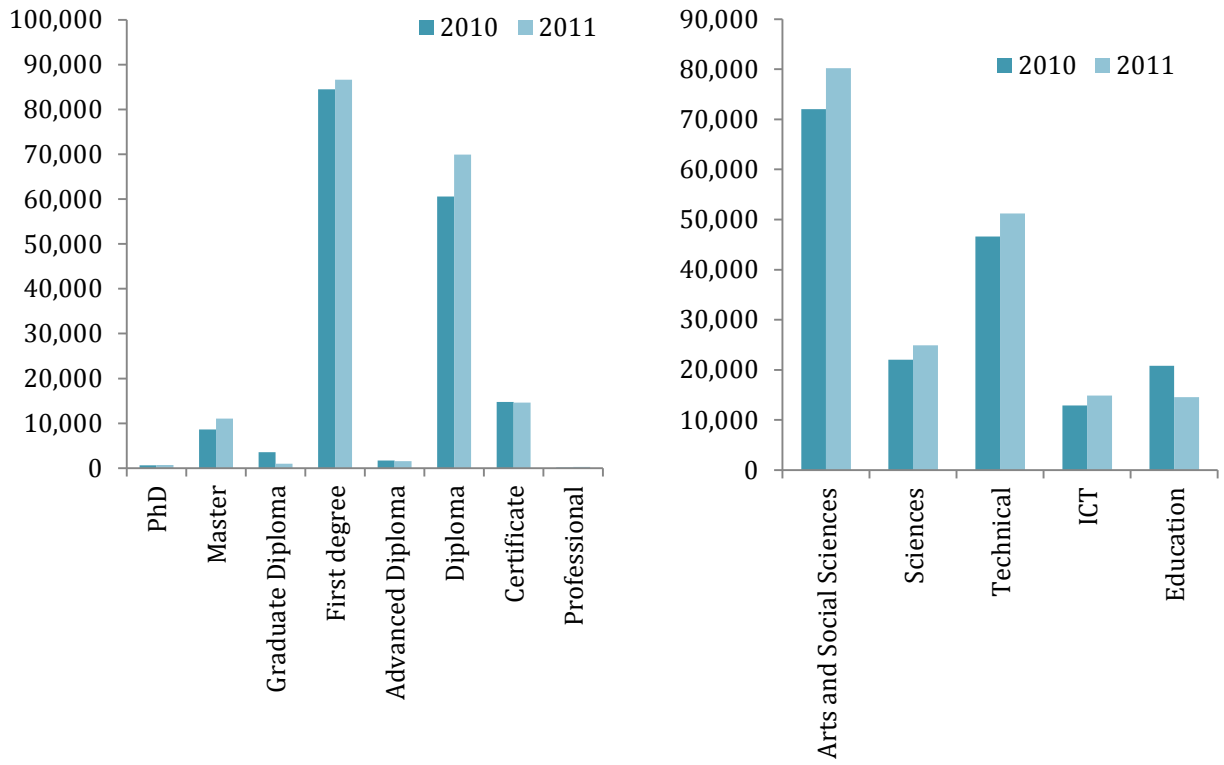
78. At a time when employers report difficulties finding high-skilled workers to fill vacancies, the unemployment rate for recent university graduates points to potential mismatches in the type of skills produced by the education system, as well as inefficiencies in the delivery system. Indeed, taking it back to the analytical framework, this reflects inefficiencies in the interaction between employers and the institutions of learning (the "feedback" dotted blue arrow that goes from right to left), as well as weaknesses in at least one of the institutional (the third) pillars, which focuses on having a modern and accurate information infrastructure to monitor progress.

Box 1: Labor Market Outcomes of Tertiary Level Malaysian Graduates

Quality higher education systems should be able to produce employable graduates; however, around the world, TVET, college and university graduates are finding it increasingly more difficult in recent years to find permanent employment. In Malaysia this issue is also at the forefront of policymaker's issues of interest. The general view is that university degrees and tertiary certificates/diplomas do not guarantee immediate access to a job, let alone a good job. Analysis using the National Tracer data of Malaysian graduates in 2010 and 2011 (in national High Learning Institutions upon graduation) provides a snapshot of various labor market outcomes of recent graduates.

In 2010 and 2011, about 174,000 and 185,000 graduates, respectively, provided information on their labor market prospects upon graduation. Most of them had completed a University Degree or Diploma, but some had completed graduate studies and vocational certificates (Figure 1). In both years, the fields of study most commonly chosen were arts and social sciences (slightly above 40 percent), and these were followed by various technical fields (27 percent) (Figure 1, right panel).

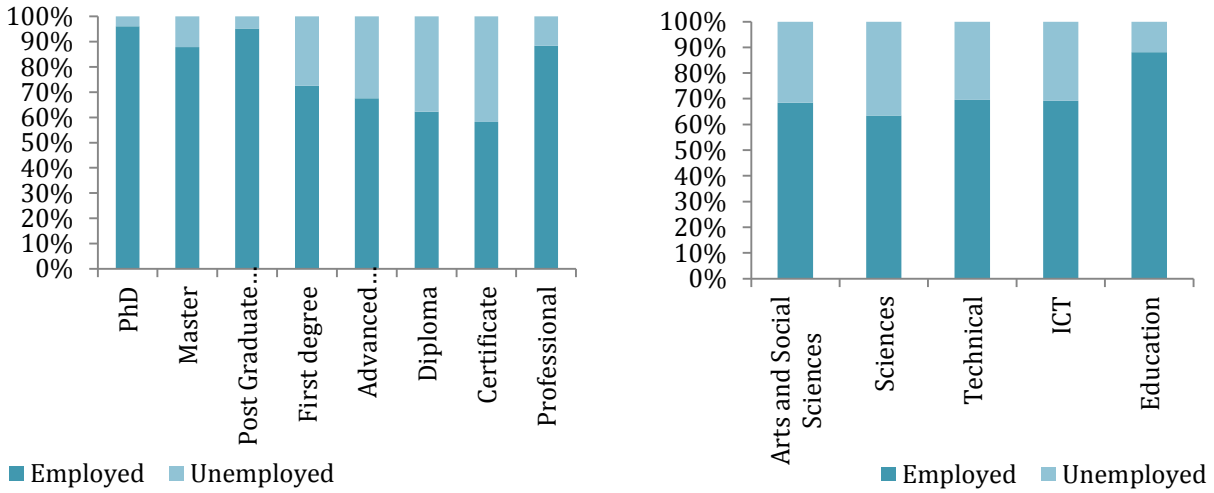
Figure 1: Number of Graduates by Type of Higher Education (left) and 1-digit Field of Study (right)



Source: Tracer Study 2010 and 2011

The purpose of the National Tracer Study Survey was to get information on the employment status of these graduates upon (or shortly after) graduation. Descriptively, it is clear that students in some fields of study have easier access to the labor market than others. For instance, almost one-third (30 percent) of Certificate holders were unemployed when they responded to the survey. On the other side of the spectrum, graduates with Education as their field of study had the largest share of employment rates among all respondents. Interestingly, and slightly worrisome, well over 20 percent of graduates in the Science and ICT fields had not secured employment when they responded to the survey (Figure 2).

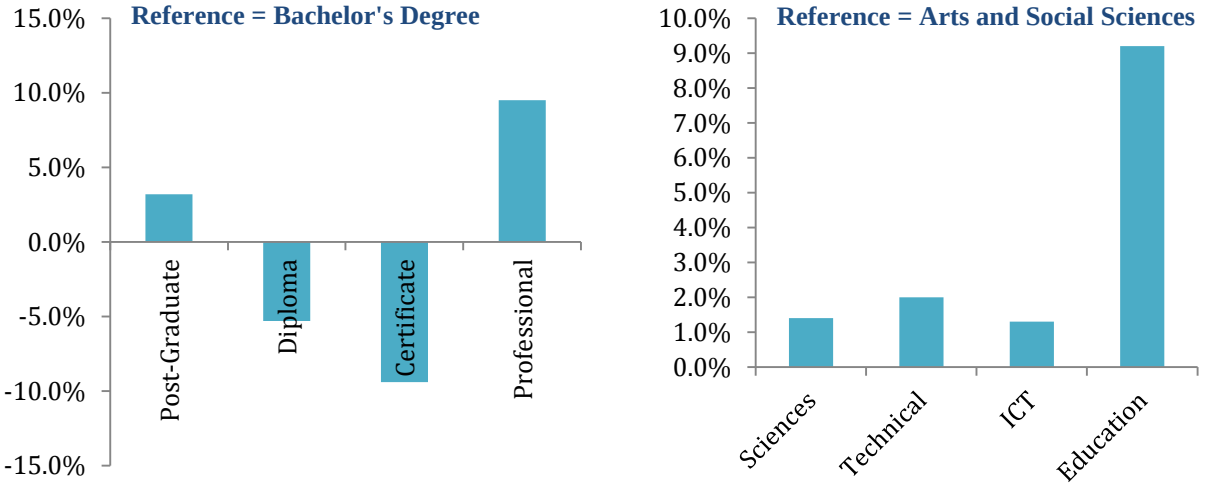
Figure 2: Number of Graduates by Work Status and Type of Higher Education (left) and 1-digit Field of Study (right), 2011



Source: Tracer Study 2011

The information collected allows for a simple analysis of the key determinants of what contributes to graduate employment in the labor market. Results shows that a graduate in a Sciences field is 1.4 percent more likely to be employed than a graduate in Arts and Social Sciences with comparable characteristics, i.e. age, gender, education level, state of residence, type of education institution. On the other hand, graduates in the fields of Education are the most likely to be employed (9.2 percent more than Arts and Social Science graduates). The level of education of the graduate plays an important role in determining the work status of the person. With the exception of graduates awarded a certificate or a diploma, all other educational levels (namely, Master, PhD, Professional) have a higher probability of having secured a job upon graduation or soon after than graduates with a Bachelor level (Figure 3). Lastly, results show that there is no difference in the probability of having obtained a job between graduates from public and private institutions, while students who graduated from a polytechnic or community college are 3.1 and 3.9 percent, respectively, more likely to be employed.

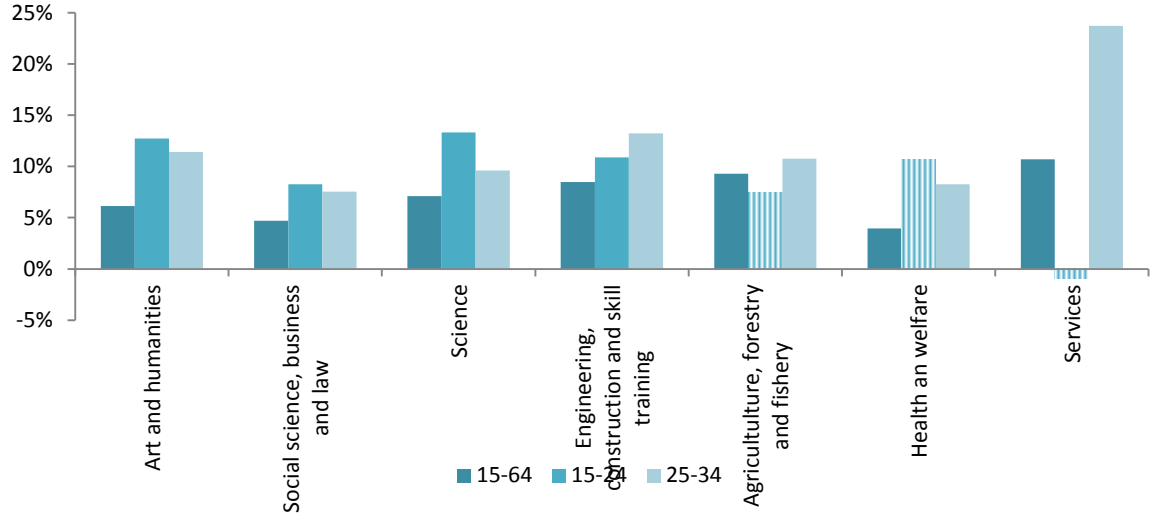
Figure 3: Change in the Probability to be Employed by Type of Higher Education (left) and 1-digit Field of Study (right), 2010-2011



Source: Authors' estimation based on Tracer Study 2010 and 2011

Figure 59: Changes in Probability of Unemployment by Field of Academic Study and Age

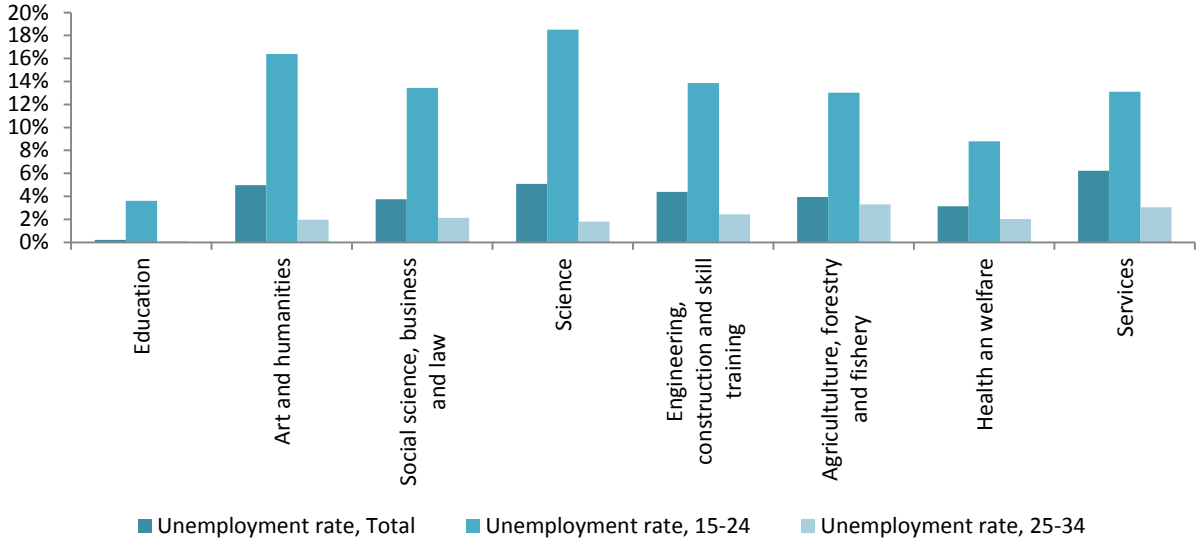
(education= reference group)



Source: Authors' analysis based on Malaysian LFS 2011

Note: Bars with shaded areas indicate not statistically significant results. Figure shows the unemployed population aged 15 to 24 for all educational levels. However, there are no unemployed SPM / SPMV holders under age 17, no unemployed STPM holders under age 19, no unemployed certificate / diploma holders under age 17 and no unemployed degree holders unemployed under age 20.

79. As it relates to vocational education, graduates aged 15 to 64 have slightly higher chances of being unemployed compared to other groups (see Figure 60). The result is not surprising, considering that vocational education in Malaysia, as well as in most countries around the world, is considered a secondary choice. For the youngest cohort, Science and Arts and Humanities are the fields most affected by unemployment whereas for all age groups, Education attracts the fewest students but yields the lowest unemployment rates (Figure 60). Vocational education in the fields of Services and Science yields the highest unemployment rates among the entire working age population. Although most unemployed people with vocational education have a certificate/diploma in Engineering, Construction and Skill Training (nearly 18,900), or in Social Sciences, Business & Law (above 14,300), unemployment rates are highest in the fields of Services (6.2 percent) and Science (5.1 percent).

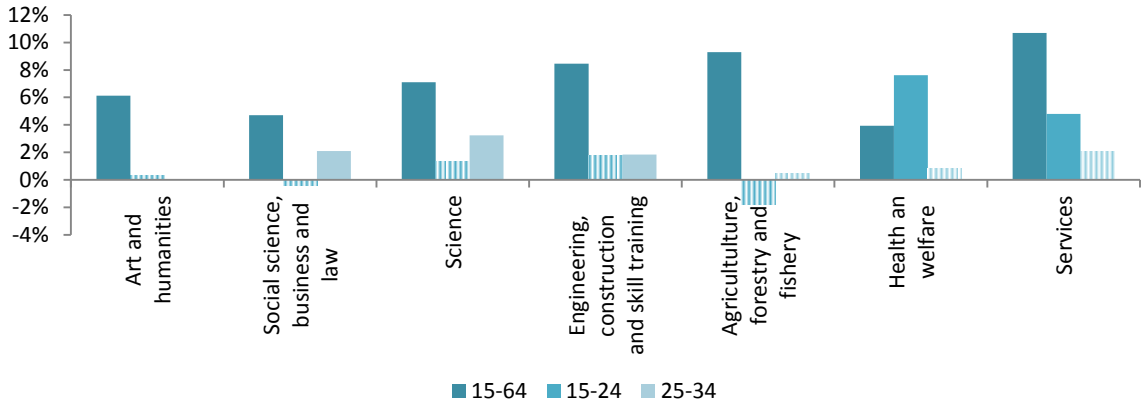


Source: Malaysian LFS 2011

Note: Figure shows the unemployed population aged 15 to 24 for all educational levels. However, there are no unemployed SPM / SPMV holders under age 17, no unemployed STPM holders under age 19, no unemployed certificate / diploma holders under age 17 and no unemployed degree holders unemployed under age 20.

80. Fields of vocational study also impact different age cohorts differently. Health and Welfare yields the highest probability of unemployment for 15 to 24 years olds (almost 8 percent more than Education). This result confirms anecdotal evidence that nurses cannot find work. For people ages 25 to 34, a vocational education in Science leads to the largest increase in the probability of unemployment (3.2 percent more than Education). Based on previous results that show high demand for university degree holders, this finding is likely due to the fact that employers seek university graduates for careers in sciences, rather than vocational graduates. When the focus is on the entire working age population, Services is the area of study with the highest increase in the probability of unemployment, around 10 percent more than the Education field. (Figure 61)

Figure 61: Changes In Probability Of Unemployment By Field Of Vocational Study And Age
(Education= Reference Group)



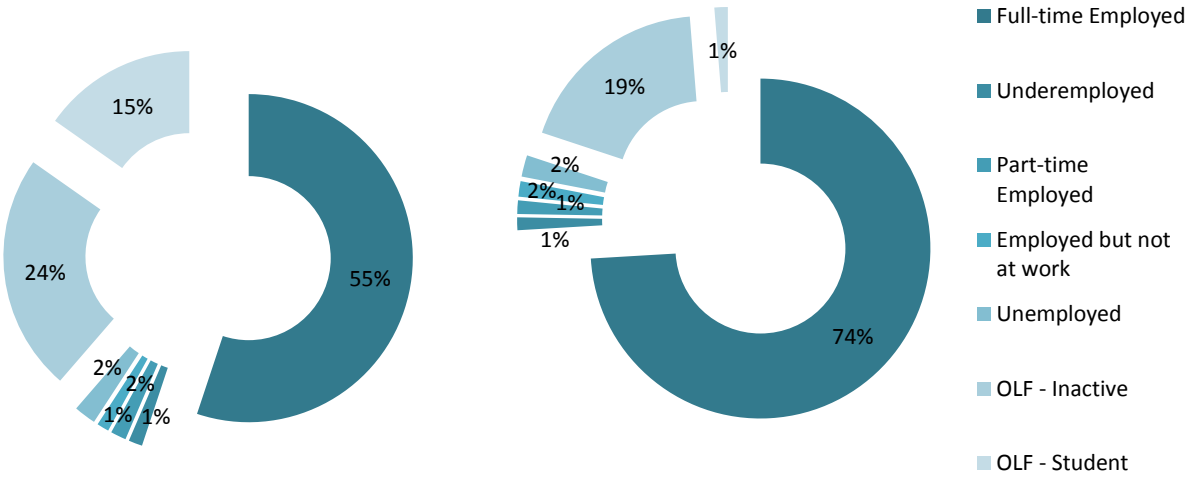
Source: Authors' analysis based on Malaysian LFS 2011

Note: Bars with shaded areas indicate not statistically significant results. Figure shows the unemployed population aged 15 to 24 for all educational levels. However, there are no unemployed SPM / SPMV holders under age 17, no unemployed STPM holders under age 19, no unemployed certificate / diploma holders under age 17 and no unemployed degree holders unemployed under age 20.

Underemployment (part-time work)

81. Underemployment is defined as people working less than 30 hours per week but willing to work more; these are people that are involuntarily working part-time but could potentially be employed full-time. Involuntary part-time work is common in many countries around the world, but the number of underemployed Malaysians is low and limited to 240,000 people (in 2010), or one percent of the total working age population (Figure 62).

Figure 62: Underemployed Malaysians aged 15-64 (left) and 25-35 (right), 2010



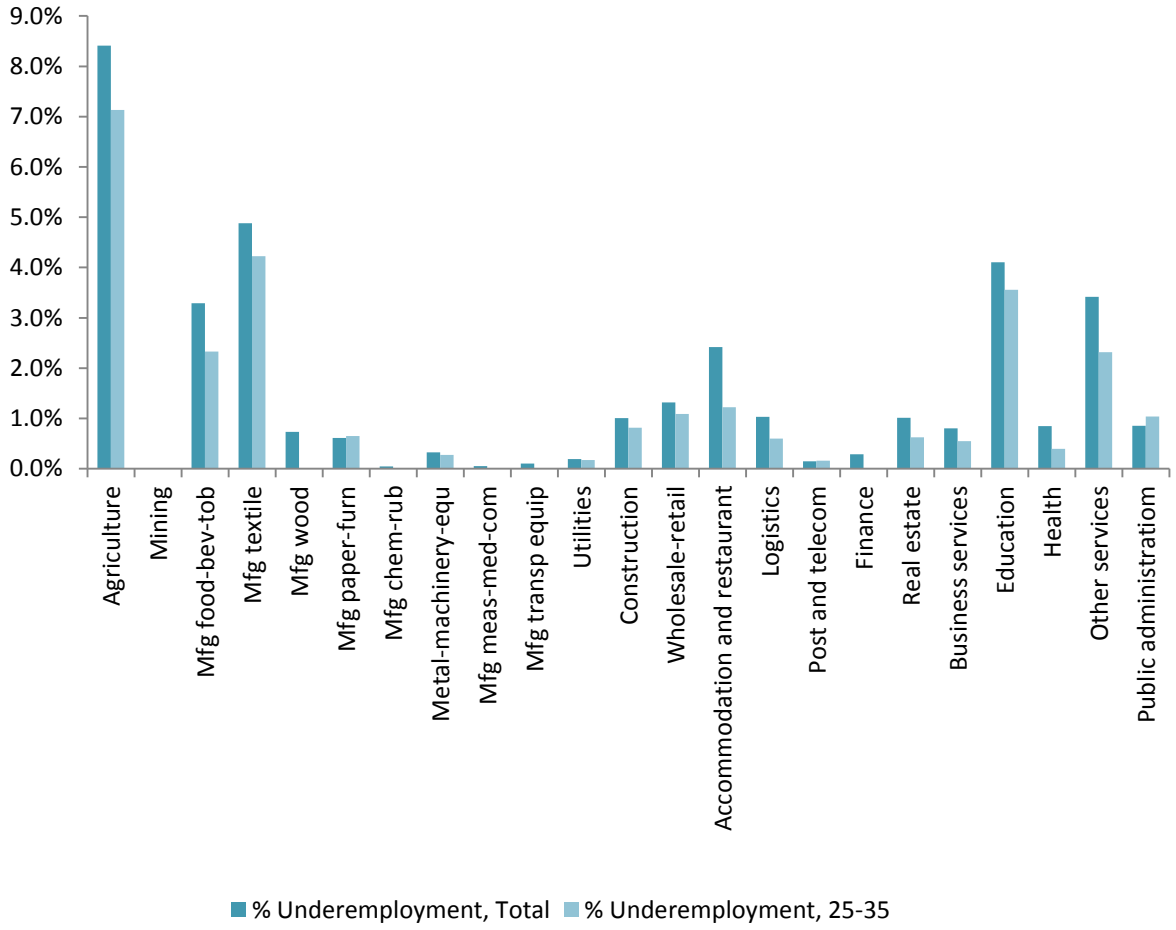
Source: Malaysian LFS 2010

82. Most underemployed workers have low levels of education and/or are employed in occupations that by definition are based on short-term, "on demand" contracts. Therefore, the analysis of this group suggests that the pool of underemployed workers has a negligible pool of candidates to provide the numbers and types of workers needed to achieve the country's economic objectives.

83. Given the limited size of the underemployed pool of workers, most of the results are contained in Annex 2; this section only highlights the economic subsectors and occupations where under-employment is most prevalent. For instance, Figure 63 shows that underemployment is more common in Agriculture, Manufacturing-Textile, and Education, than in the rest of the economy. In Agriculture, for example, seasonality plays an important role as firms typically need more labor at planting or harvesting time. As such, farm laborers may work less than they desire during other periods of the year. Higher underemployment (8.4 percent for the group ages 15 to 64 years old and 7.1 percent for the group ages 25 to 35 years old) in Agriculture may thus be a direct consequence of the

unique and intrinsic characteristics of the sector. The same type of reasoning can be applied to the Education and Textile sectors, in which labor demand varies with the academic year and with the production cycle, respectively.

Figure 63: Underemployment by Economic Sector



Source: Malaysian LFS 2010

Note: The sector "Other services" includes domestic services, sports and recreation, culture.

84. Most occupations with a higher incidence of underemployment are low-skilled. However, there are also some medium- and high-skilled occupations in which a non-trivial share of workers are under-employed. As is the case for some economic sectors, some occupations require a very specific type of labor, which is not necessarily needed over a continuous period of time. For example, in clerical (medium-skilled) professions which have temporary/short-term demand profiles, such as for petition writers and proofreaders, the incidence of underemployment is high. Low- and medium-skilled occupations in the Agriculture and Education sub-sectors have similarly specific needs and similarly elevated levels of underemployment. Among the high-skilled occupations, workers in jobs related to religion, recreation, and culture experience higher levels of underemployment (Table 3).

Table 3: Underemployment by occupation (top 10): (2-digit MASCO)

OCCUPATIONS MOST AFFECTED BY UNDEREMPLOYMENT (Malaysians aged 15-64)	
Occupation	**% of Underemployed over Total Employed**
CLERICAL WORKERS (PETITION WRITERS, PROOFREADERS)	18.87%
AGRICULTURAL AND RELATED WORKERS	9.52%
TEACHING ASSOCIATE PROFESSIONALS	8.09%
FOOD PROCESSING, WOODWORKING, TEXTILE, LEATHER AND RELATED TRADES WORKERS	7.59%
FISHERY WORKERS, HUNTERS AND TRAPPERS AND GATHERERS	7.20%
SALES AND SERVICES ELEMENTARY OCCUPATIONS	4.21%
LEGISLATORS AND SENIOR OFFICIALS	4.01%
CREATIVE OR PERFORMIN ARTISTS, RELIGIOUS PROFESSIONALS	3.73%
AGRICULTURAL AND FISHERY LABOURERS AND RELATED WORKERS	2.86%
FINANCE, SALES AND RELATED BUSINESS ASSOCIATE	2.42%

Source: Malaysian LFS 2010
Note: Darker rows denote higher skill requirement occupations

Chapter 3: Returns to Education

3.1 Introduction

85. As Malaysia's workforce becomes more educated and the strategic direction of the country aims toward becoming a knowledge economy, the labor market continues to shift its demand of workers, away from labor intensive sectors such as low-value-added-manufacturing and agriculture to high-value-added natural resource, manufacturing and services. This shift relies heavily on improvements in the quality of education and alternatives to up-skill, and it relates directly to the fourth Pillar of a knowledge economy. But in order people to want to further their educational investments they need to experience a positive return to their investment, namely in the form of increased earnings.

86. The importance of economic incentives for furthering one's education was discussed in Chapter 1, as a core focus on the first Pillar of the Knowledge Economy. It also relates to the fourth Pillar, educated, skilled and adaptable workers; having a large proportion of workers in the economy with higher levels of education is at the core of a Knowledge Economy. Thus, a key issue concerning policy makers is the extent to which earnings respond to increased levels of schooling, which is pivotal for individual decision-making on education investments.

3.2 Data and Sample Descriptive analysis

87. The analysis presented in this chapter uses LFS data for the period 2007-2010, especially the salaries and wages component of the survey, which focuses on public and private employees aged 15 and over whose status is either as government employees or private employees.[13] The authors note that basic descriptive statistics make a case for undertaking analysis at a disaggregated level, especially along key demographic dimensions such as gender, age cohorts and ethnic group. The main reason is that there are clear differences across these dimensions that could easily be missed if all groups are lumped together. Thus, for policy purposes it is best to know how education returns differ based on important characteristics so that incentives to obtain more education can be better targeted.

88. Among wage earners, Malaysian women tend to have completed higher levels of education than men. Table 4 shows the mean value for each variable by gender and ethnic group for wage earners[14]. Men in the sample are slightly older than women on average, but women are more likely to have received higher levels of education. The proportion of females with certificates/diplomas and university degrees is higher than males', but the proportion of females with either primary and below or lower secondary level schooling is lower. These patterns are especially acute for workers in the *Bumiputera* (including Malays and native Malaysians) group for whom the proportion of women with tertiary education is about twice as high as for men.

[13] Income information is not collected from certain respondents including the self-employed, unpaid house workers, and persons not in the labor force at the time of the survey. The analysis in this chapter covers Malaysian citizen aged 18 to 64More details on the data can be found in the Annex..

[14] For ease of analysis and comparison Malaysia's ethnic structure was simplified by aggregating numerous smaller ethnic groups into one single group, referred to as natives hereafter in the chapter. As a result, there are four ethnic groups represented: Malay, Chinese, Indians and native Malaysians.

Table 4: Averages of Selected Variables by Ethnicity and Gender

	Malay		Chinese		Indian		Natives	
SAMPLE SIZE &VARIABLES	Male	Female	Male	Female	Male	Female	Male	Female
Wage earner sample age 18-64	42,283	26,593	12,603	8,412	5,028	3,073	6,999	3,464
Monthly wage in 2007 Ringgit	1,683	1,562	1,953	1,681	1,580	1,185	1,424	1,292
Age	35.9	33.7	38.1	35.4	36.8	35.4	34.9	32.8
Proportion in birth cohort:								
- 1964	.341	.313	.442	.398	.351	.352	.292	.267
1965 - 1983	.465	.476	.432	.462	.474	.462	.492	.498
1984 -	.194	.211	.126	.141	.175	.186	.216	.235
Education attainment dummies:								
Primary and below	.135	.084	.281	.124	.306	.283	.283	.181
Low secondary	.151	.073	.178	.105	.203	.136	.182	.111
Upper secondary	.461	.427	.333	.437	.314	.334	.370	.410
Pre-university	.083	.102	.035	.066	.036	.048	.063	.091
Certificate/Diploma	.085	.156	.073	.133	.068	.098	.055	.120
University & above	.085	.158	.100	.135	.074	.101	.046	.086
Proportion of urban residents	.563	.599	.829	.857	.698	.696	.594	.635
Location dummy:								
Peninsular Malaysia	.940	.948	.835	.824	.987	.994	.099	.071
Number of household members	1.94	2.52	2.13	2.77	2.03	2.73	2.23	2.76
Proportion in public sector	.289	.402	.031	.105	.085	.125	.253	.339
Proportion of being married	.693	.608	.571	.535	.656	.547	.705	.554
Working hours per week	47.2	43.7	48.9	45.7	50.8	46.3	48.9	45.1

Source: Author's Calculations using Labor Force Survey, 2010

89. As a middle income country, Malaysia is currently at a higher stage of urbanization than most other Southeast Asian countries, standing in contrast to the urban-rural distribution of survey respondents which differs significantly across the four major races[15]. Malaysians of Chinese ethnicity have the highest percentage – around 80 percent – of urban residents, followed by ethnic Indians at around 70 percent. On the other end, around 40 percent of Malay and native wage earners are still living in rural areas.[16] There are significant differences in the geographic distribution of wage earners across the four ethnic groups. Table 2 shows that the vast majority of the ethnic Malay, Chinese and Indian populations reside in Peninsular Malaysia. By contrast, less than ten percent of non-Malay *Bumiputeras*, who traditionally constitute a significant share of the population in Sabah and Sarawak, live in Peninsula Malaysia.

90. Table 5 compares the basic characteristics of wage earners (public and private employees) and non-wage earners (self-employed, own account workers and people out of the labor force)[17]. It shows that wage earners are noticeably younger than non-wage earners, and the female to male ratio is highest for individuals not in the labor force and lowest among self-employed individuals. Malays are much more likely to be employed in the public sector,

[15] As of 2011, only two countries in Southeast Asia has higher percentages of urban population than Malaysia: Singapore and Brunei Darussalam (United Nations, 2011)

[16] The degree of urbanization is lowest for the Malays among all races if restricted to the wage earners sample. Switching to the full sample including non-wage earners, the urbanization ratio is lowest for indigenous people.

[17] The wage earners sample accounts for around 60% of the original full sample as it automatically excludes individuals outside the public and private sector from whom earnings information is not collected.

while ethnic Chinese are most likely to be self-employed entrepreneurs. In the sampled studies for this Chapter, workers in the public sector have higher levels of education than workers in the private sector and among the self-employed. The self-employed tend to be much more urbanized, followed by public and private sector employees, and lastly by own account and family workers. The average wage earnings in the public sector are almost twice as much as in the private sector as a whole; however, the variability of wages in the private sector, across economic sectors, is very wide.

Table 5: Comparison of Averages by Sector of Employment

	Wage earners			Non-wage earners	
SAMPLE SIZE &VARIABLES	Public sector	Private sector	Self-employed	Own account & home	Not in labor force
All persons age 18-64	28,729	84,752	6,859	41,134	37,151
Age	37.9	34.5	43.6	42.7	39.5
Proportion of female	.47	.36	.16	.34	.74
Ethnic group dummies:					
Malay	.82	.57	.43	.60	.58
Chinese	.05	.25	.47	.23	.21
Indians	.03	.09	.06	.04	.08
Natives	.11	.09	.03	.14	.13
Education attainment dummies:					
Primary and below	.04	.21	.20	.45	.38
Low secondary	.07	.16	.16	.18	.16
Upper secondary	.36	.44	.38	.30	.30
Pre-university	.11	.06	.07	.03	.08
Certificate/Diploma	.19	.07	.08	.02	.05
University & above	.23	.06	.11	.02	.03
Proportion of urban residents	.65	.63	.73	.42	.56
Location dummy:					
Peninsular Malaysia	.83	.85	.84	.82	.81
Number of household members	1.84	2.41	1.49	1.98	2.64
Proportion of being married	.80	.57	.87	.74	.61
Monthly wage in 2007 Ringgit	2,400	1,372	-	-	-
Working hours per week	40.4	48.7	51.0	41.9	-

Source: Author's Calculations using Labor Force Survey, 2010

3.3 Summary of the Analytical Approach – Technical

91. A few caveats worth stating up-front are that the results are only representative of wage earners in Malaysia and not the entire working population (excluding self-employed and family workers). Also, results are only applicable to wage workers in the public and private sectors, who represent only 60 percent of the total working population. Thus, the findings in this section are about the earning-education relationship drawn on the basis of this sample only and for this reason, the analysis in this section adopts an appropriate econometric approach (a Heckman sample selection model) designed to address sample selection issues. The approach is discussed in more detail in Del Carpio and Li, 2013.

92. Apart from breaking down the analysis by gender and ethnic group, the sample is also analyzed separately for individuals born before and after 1965, given that people from each

of these two cohorts had different levels of exposure to education related policies (mainly the New Economic Policy or NEP). For instance, the NEP, which was formally launched in 1971, introduced a new ethnicity related quota system at various education levels ranging from lower secondary to tertiary levels. The post-1965 cohorts were therefore affected by the NEP to a larger extent than older generations[18].

93. The impact of completing a certain education level on wages is first measured as the percentage increase in wage earnings due to completion of that level of schooling relative to the adjacent lower level[19]. Due to the variations in the number of years required to complete different levels of schooling, annualized rates of returns computed are also reported as the returns between two adjacent levels of degrees divided by the number of incremental years of schooling separating those two levels[20]. In the empirical approach,[21] the results of all groups should be compared to the group of individuals with at most primary education completed. Also, factors such as work experience, marital status, ethnic group, provinces of residence and urban/rural status, as well as the survey year and month are all taken into consideration (controlled for) so as to not bias the results due to one of these important factors.

3.4 Results

Average Returns to Schooling

94. Results show that the Malaysian market rewards upper secondary level studies and above. Completion of lower secondary school results in a small increase in wages for both men and women born before and after 1965. Results show that an additional year of schooling up to Form 3 of lower secondary school could yield an increase in wage income as low as 0.5 percent for the post-1965 cohort of males and 1.8 percent for the post-1965 cohort of females. The returns to lower secondary schooling for pre-1965 cohort men and women are higher (4.9 percent and 6.1 percent respectively), but still much lower than returns to other schooling levels. The estimated results of the rates of returns to different levels of schooling are displayed in Annex 3[22].

[18] The NEP was already underway by the time they reached the age of 7, the point of entry into elementary school.

[19] As the only exception, rates of return to university and above level are calculated as the percentage increase of income from pre-university level, which is two levels below, rather than the certificate/diploma level which is just one level below. This is to capture the returns to the two distinct paths of tertiary education, vocational and academic. Vocational education in nature, certificate/diploma schooling is not a required step towards university education.

[20] To do this the following year gaps are assumed to separate any two levels of completed schooling given the prevalent education system in Malaysia (1) LOWSEC – NOCERT = 4.5 (2) UPPSEC – LOWSEC = 2 (3) PREUNI – UPPSEC = 2 (4) DIPLOM – PREUNI = 2 (5) UNIVER – PREUNI = 4.

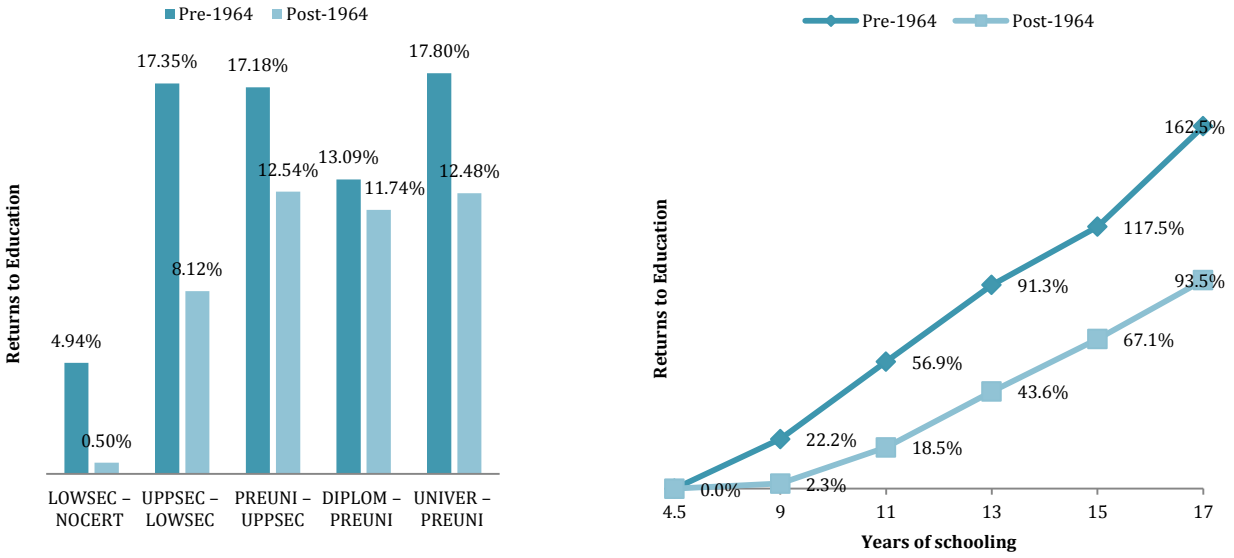
[21] The simplest regression equation presented is written as follows: $\ln(W_i) = \beta_0 + \beta_1 * \text{LOWSEC}_i + \beta_2 * \text{UPPSEC}_i + \beta_3 * \text{PREUNI}_i + \beta_4 * \text{DIPLOM}_i + \beta_5 * \text{UNIVER}_i + \boldsymbol{Z_i'\gamma} + \varepsilon_i$. Where $\ln(W_i)$ refers to the natural logarithm of individuals' gross monthly wage earnings. LOWSEC, UPPSEC, PREUNI, DIPLOM and UNIVER are the set of dummies for the highest levels of degree completed, the reference category being individuals with at most primary education. $\boldsymbol{Z_i}$ is a comprehensive set of explanatory (dummy) variables including work experience, marital status, ethnic groups, provinces of residence and urban/rural status, as well as year and month the survey was conducted (which helps account for the time trend and potential seasonal effects on individual monthly earnings). β's and $\boldsymbol{\gamma}$ are the parameters of interest (those estimated), and ε_i is the random error term.

[22] Results are in Annex in Table 5 for male employees and in Table 6 for female employees. Each table consists of two panels for the two birth cohorts before and after 1965 (inclusive). For ease of comparison across different education levels, Table 7 calculates the annualized returns among two birth cohorts.

95. There is a clear jump in the rates of return to education when moving from lower secondary to upper secondary level. Depending on the age cohort analyzed, the increase in wages for men resulting from an additional year of upper secondary education is three to 16 times higher than the increase deriving from completing lower secondary education, while it is four to six times higher for women. The sharp contrasts between returns to higher and lower levels of secondary education likely reflect the diminishing market demand for local low-skilled workers. Also there may be a relation between the shift away from low-value added manufacturing to higher-value added industries, and the overall knowledge economy focus and the decrease in wage premiums offered for lower education levels[23].

96. The wage increase associated with completing an additional year of vocational education is the lowest for all post-secondary education options. Figure 64 and Figure 65 show that for men and women alike, investment in vocational education provides a lower return than university studies, and even pre-university studies, especially for the older cohort. The Government's awareness of this problem led them to introduce a number of reforms to the TVET system in the ETP, aimed at training high quality technical workers. As the latter chapters (mainly Chapter 7, focused on TVET institutions) will emphasize, boosting the quality of middle and vocational education seems crucial for secondary and vocational educated workers to get appropriate returns to their educational investment.

Figure 64: Annualized Returns to Education 2007-2010, Men



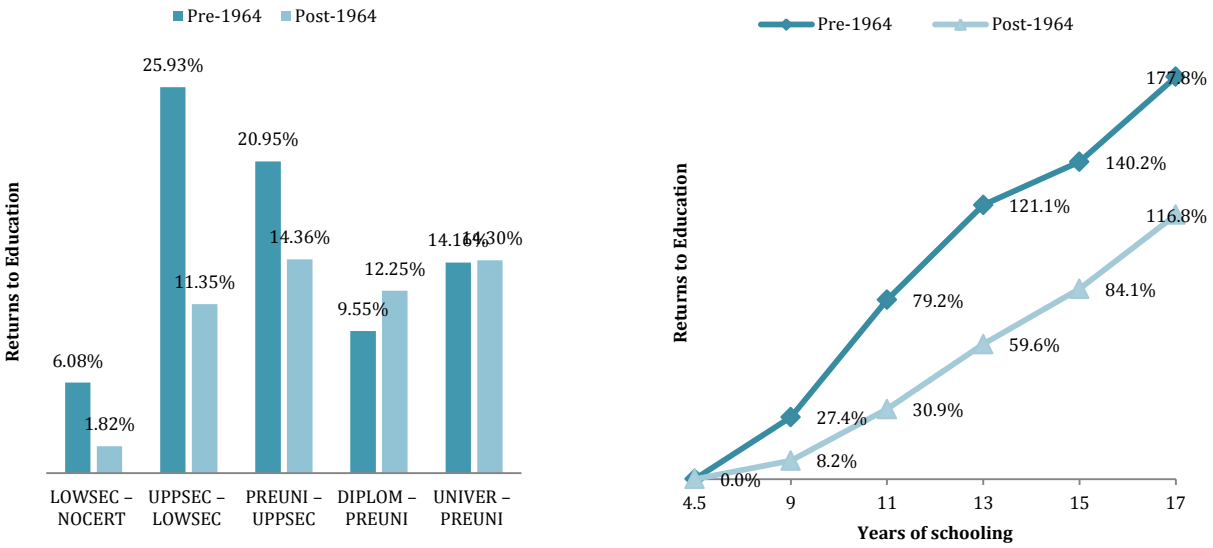
Source: Authors' analysis based on Malaysian LFS 2007-2010

97. Female workers obtain higher rates of returns to upper secondary education in both age cohorts. Figure 93 shows that for women, especially women in the earlier cohort, the increase in wages associated with an upper secondary education is substantial. On the contrary, male employees get higher returns at relatively advanced levels of education,

[23] A recent World Bank report titled "Immigration in Malaysia: Assessment of its Economic Effects, and a Review of the Policy and System" published in 2013 finds that even though the demand for low skilled workers in Malaysia is lower than in previous decades, it is not completely eroded. Many employers opt to employ foreign low-skilled workers who come to Malaysia willing to do such work and can earn below the minimum wage level implemented in 2012.

including pre-university, certificate/diploma and university. This could be a potential disincentive for women to pursue further studies after upper secondary; however the findings from Chapter 2, which show that the share of women completing higher education is higher than men's, dissipates this concern.

Figure 65: Annualized Returns to Education 2007-2010, Women



Source: Authors' analysis based on Malaysian LFS 2007-2010

98. In general, Malaysians born before 1965 receive higher returns for their investments in education, especially at lower levels, than those born after 1965. For men, the rates of returns to schooling are consistently lower for the post-1965 cohort at all levels of education except for certificate/diploma holders. The pattern of female returns to education is analogous. However, returns to certificate/diploma and university schooling increase slightly, from 9.55 percent to 12.25 percent and from 14.16 percent to 14.30 percent, respectively, for the younger cohort. The reason behind this pattern is likely to be related to the different profile of workers in the two age cohorts. But it is also important to note that the measurement approach takes into account work experience within cohort groups rather than across groups; thus, part of the explanation for why the older cohort of workers may have higher returns to lower levels of education than the younger cohort can be partly attributed to the methodological approach.

99. Table 6 shows that Malaysians who are more exposed to the NEP (post-1965 cohort) tend to pursue higher levels of education and, as expected, also tend to be employed in higher-valued added industries. Given the increasing need for high-skilled workers to fill vacancies in the booming high-value added industries, it is not surprising to see that the decreases in returns to education mostly affect the group of workers (low educated) whose skills are decreasingly in demand.

Table 6: Averages of Education and Sector of Employment by Birth Cohort

	Male		Female	
SAMPLE SIZE & VARIABLES	Pre-1964	Post-1965	Pre-1964	Post-1965
Education attainment dummies:				
Primary and below	.328	.136	.291	.068
Low secondary	.182	.156	.121	.079
Upper secondary	.311	.459	.325	.446
Pre-university	.048	.076	.066	.096
Certificate/Diploma	.053	.088	.108	.154
University & above	.078	.085	.089	.157
Detailed industry sector dummies:				
Agriculture/Forestry/Fishing/Mining	.224	.121	.174	.048
Manufacturing - Basic	.026	.029	.083	.054
Manufacturing - Middle	.059	.080	.043	.054
Manufacturing - Advanced	.026	.082	.028	.094
Construction/Electricity/Gas/Water	.127	.138	.012	.024
Wholesale/Retail	.143	.173	.131	.170
Hotel/Restarrant	.053	.064	.139	.100
Transportation/Storage	.073	.065	.010	.020
Information/Communication	.008	.015	.004	.012
Finance/Real Estate	.019	.022	.018	.041
Administration/Business Activities	.044	.042	.045	.044
Public administration/Social security	.116	.094	.077	.084
Education/R&D	.050	.042	.124	.150
Health/Social work	.014	.014	.044	.056
Other Activities	.018	.020	.067	.049

Source: Authors' analysis based on Malaysian LFS 2007-2010

Returns to Schooling across the Wage Distribution

100. Average returns to schooling convey information about the impact of additional education on wages, but not on how that impact varies across the wage distribution. Isolating the impacts of the same level of education on workers with different wages is fundamental to better understand the dynamics of wage inequality. For instance, at any particular level of schooling, higher rates of return for workers earning high wages could result in increasing wage inequality. In order to address this issue the analysis conducted here relies on a methodology that allows for more detailed understanding of the results (quintile regression model, technical details are discussed in Annex 3)[24]. Hence, while the importance of estimating the marginal returns of schooling on an average individual should not be discounted, the assumption that everyone with the same characteristics will get the same returns is far from the complete picture. For policymakers, it is important to know whether education returns, within the same level of schooling, differ at different points of

[24] The main advantage of quantile regression is that it allows the parameters to vary across the distribution of the dependent variable conditional on all explanatory variables (Buchinsky, 1998) while OLS approach only evaluates at the conditional mean of the distribution.

the wage distribution in order to detect inefficacies in the existing education system (Del Carpio and Li, 2013).

101. Results from using this methodology confirm that there are differences in the returns observed by groups in the older cohort (compared to younger cohort), and in the public sector (compared to the private sector), across the entire wage distribution. Interestingly, the returns to education in general vary across wage quantiles (Tables 7 and 8), indicating that perhaps "other" unobservable factors (e.g. more ability, quality of the institution of learning, personal connections, among others) also play a role in determining the person's earnings at higher levels, even within the same level of education. For instance, the *average* return to having a diploma/certificate for a man in the post-1965 cohort (over a man with pre-university coursework but no diploma or certificate) is 15.7 percent and 17.8 percent for a woman. However, when broken down by percentiles of the wage distribution it is clear that the effects are much larger for people in the lower wage quantiles; as high as 17.9 for men and 20 percent for women.

Table 7: Annualized Rates of Returns to Schooling by Quantile: Men 18-64

		OLS/Quantiles								
EDU. LEVELS	OLS-Mean	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Pre-1964 cohort										
LOWSEC - NOCERT	5.82%	3.83%	4.54%	5.27%	5.71%	6.25%	6.47%	6.49%	6.14%	6.40%
UPPSEC - LOWSEC	18.74%	12.41%	15.37%	18.77%	20.38%	21.05%	21.71%	21.41%	21.96%	20.44%
PREUNI - UPPSEC	17.95%	23.43%	25.55%	22.75%	19.90%	17.23%	15.60%	15.43%	12.69%	13.60%
DIPLOM - PREUNI	15.73%	25.11%	20.86%	17.59%	15.95%	13.60%	11.68%	9.09%	10.57%	11.52%
UNIVER - PREUNI	18.89%	21.47%	18.15%	16.59%	16.07%	16.18%	16.15%	16.53%	19.21%	21.59%
	OLS-Mean	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Post-1965 cohort										
LOWSEC - NOCERT	2.83%	2.63%	2.77%	2.34%	2.66%	2.77%	2.57%	2.50%	2.32%	2.84%
UPPSEC - LOWSEC	11.29%	8.49%	8.93%	9.86%	10.57%	11.29%	11.63%	11.91%	12.86%	12.36%
PREUNI - UPPSEC	12.01%	9.09%	11.02%	11.91%	12.64%	12.86%	13.03%	12.75%	12.13%	10.96%
DIPLOM - PREUNI	15.73%	17.94%	17.82%	17.53%	16.77%	16.18%	14.45%	13.09%	11.91%	11.91%
UNIVER - PREUNI	17.26%	19.12%	18.59%	18.12%	17.62%	17.06%	16.30%	15.49%	15.03%	16.36%

Table 8: Annualized Rates of Returns to Schooling by Quantile: Women 18-64

		OLS/Quantiles								
EDU. LEVELS	OLS-Mean	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Pre-1964 cohort										
LOWSEC - NOCERT	7.59%	4.43%	4.31%	4.87%	5.95%	7.35%	8.21%	10.35%	12.10%	11.11%
UPPSEC - LOWSEC	33.15%	18.59%	27.95%	38.89%	45.86%	46.59%	45.86%	37.71%	31.19%	27.00%
PREUNI - UPPSEC	24.74%	41.84%	36.34%	32.78%	27.83%	23.00%	19.24%	17.53%	17.12%	13.94%
DIPLOM - PREUNI	15.08%	32.64%	25.11%	17.82%	12.64%	10.96%	10.13%	8.17%	5.13%	4.92%
UNIVER - PREUNI	16.52%	20.50%	18.53%	15.89%	14.00%	14.28%	14.77%	15.20%	14.85%	16.21%
	OLS-Mean	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Post-1965 cohort										
LOWSEC - NOCERT	3.96%	3.09%	3.60%	3.94%	4.27%	4.20%	4.27%	4.57%	4.13%	3.50%
UPPSEC - LOWSEC	20.02%	14.97%	16.82%	18.06%	19.72%	21.11%	22.02%	21.35%	20.38%	19.01%
PREUNI - UPPSEC	14.67%	9.69%	11.80%	13.54%	15.84%	16.42%	16.07%	15.37%	13.88%	12.52%

DIPLOM - PREUNI	17.87%	18.18%	19.84%	20.56%	19.12%	18.06%	17.06%	15.49%	13.54%	11.96%
UNIVER - PREUNI	18.18%	18.89%	21.05%	20.92%	19.57%	18.38%	17.03%	15.75%	14.91%	14.60%

Source: Del Carpio and Li, 2013.

102. Other factors contributing to the large variability observed in the quantile results may be related to higher ability or better social connections, which allow the person to land a better rewarded job. It is also possible that the difference is related to the quality (and recognition) of the institution of learning. In other words, two people of similar age and gender with the same education level in the same field, but graduating from distinct institutions, may be remunerated differently depending on how the labor market recognizes their certificate or degree. Knowing that there is (sometimes large) variability in the returns to education among individuals within the same education level (and with similar observable characteristics such as age and gender among others) matters for policy making. As the government continues to invest in education, it should also address factors related to aligning the quality of standards across institutions so as to not exacerbate wage inequality.

Chapter 4: Labor Imbalances

4.1 Introduction

103. The interactions between the *Education/Skill system* and the *Labor Market* are complex and involve a multiplicity of stakeholders. Labor imbalances reveal coordination failures between stakeholders involved in the education and skills production system and the skills utilization processes (or labor markets). In the framework presented in Chapter 1, this breakdown occurs at two junctures, one in the "blue" circle (where graduates join the labor force), and the other at the blue (right-to-left) dotted arrow, which is the avenue for providing feedback from the labor market back into the institutions of learning.

104. Even if labor imbalances manifest themselves in the Labor Market (when the quality and quantity of skills supplied does not correspond to the employers' requirements), the origin of the problem lies largely in the education/skill system. For instance, the lack of up-to-date information on the changing needs in the labor market and limited feedback between employers and education institutions widens skills mismatches. The third Pillar of a knowledge economy, which is a modern and adequate information infrastructure that facilitates effective communication, dissemination and processing of information, and knowledge, is therefore essential to sustain a functional knowledge economy framework.

105. This chapter explores in greater detail the labor imbalances caused by failed interactions between the Education/Skills system and the Labor Market. The analysis and results presented in this chapter are based on the Labor Force Survey: Wages and Salaries Module[25] for the years 2007 and 2010. These years were chosen in order to isolate longer-term trends in the Malaysian labor market. The sample analyzed includes Malaysian workers who reported working between *30 and 84 hours* in the week before the survey. Workers whose basic monthly wages are *below half the minimum wage, i.e. 400MYR, despite working full-time,* are excluded from the analysis to avoid atypical observations from affecting the estimation.

4.2 Labor Imbalances by Education Level

106. The evolution of returns to education and employment by educational attainment is informative of the extent of labor imbalances in the Malaysian economy. Chapter 4 shows that the returns to education in Malaysia are high and convex, i.e. the labor market rewards those who invest in education. This pattern has contributed to the remarkable increase in educational attainment of the population in the last 20 years. However, if this increased supply of skilled labor outweighs the absorption capacity of the labor market (among other imperfections), wage growth for educated workers may slow down. By looking at the evolution of supply and wage premiums of workers with different education levels, it is then possible to infer the extent to which the market is affected by skill mismatches.

[25] The analysis presented in this chapter is based on the Salaries and Wages Survey for 2007 and 2010. Since 2007, the Department of Statistics has conducted the Salaries and Wages Survey that collects information on workers' monthly earnings (including basic wages, job-related bonuses, allowances and payments in-kind) as well as on their occupation and sector of employment. This survey is conducted on a yearly basis (between January and June) and represents an additional module included in the standard LFS. The Salaries and Wages survey focuses on public and private employees aged 15 and over, whose employment status is either *government employee* or *private employee.*

Methodology

107. The econometric approach adopted allows for the identification of the dynamics of returns to education between 2007 and 2010. The resulting estimates are informative of the dynamics over time of labor prices. The regression equation estimated includes a variable for year 2010 ($Y2010_i$), a dummy variable equal to 1 if individual i reports his/her wage in 2010 and 0 if in 2007:

$$\ln(W_i) = \beta_0 + \beta_1 * \text{LOWSEC}_i * Y2010_i + \beta_2 * \text{UPPSEC}_i * Y2010_i + \beta_3 * \text{PREUNI}_i * Y2010_i + \beta_4 * \text{DIPLOM}_i * Y2010_i + \beta_5 * \text{UNIVER}_i * Y2010_i + \delta_1 * \text{LOWSEC}_i + \delta_2 * \text{UPPSEC}_i + \delta_3 * \text{PREUNI}_i + \delta_4 * \text{DIPLOM}_i + \delta_5 * \text{UNIVER}_i + Y2010_i + \boldsymbol{Z_i'} + \varepsilon_i.$$

108. The variable 2010_i enters the regression as an interaction with all the variables measuring completion of different levels of education; by doing so the coefficients β_j (j=1, …,5) can be interpreted as the increase in wages derived from an additional year of education at level *j* in 2010 *relative* to the correspondent increase experienced in 2007. The equation above is estimated using OLS regressions for the whole economy as well as by gender and sector of employment.

109. Employment growth by education level is used to measure the evolution of labor quantities. Job creation at different levels of education is used to understand the evolution of the economy in terms of labor force needs. Using LFS data for 2007 and 2010 we calculate workers' growth rate (relative to the growth rate of workers with at most primary education) as:

$$\frac{\ln(\#\, Workers_e^{2010}) - \ln(\#\, Workers_e^{2007})}{\ln(\#\, Workers_{primary}^{2010}) - \ln(\#\, Workers_{primary}^{2007})}$$

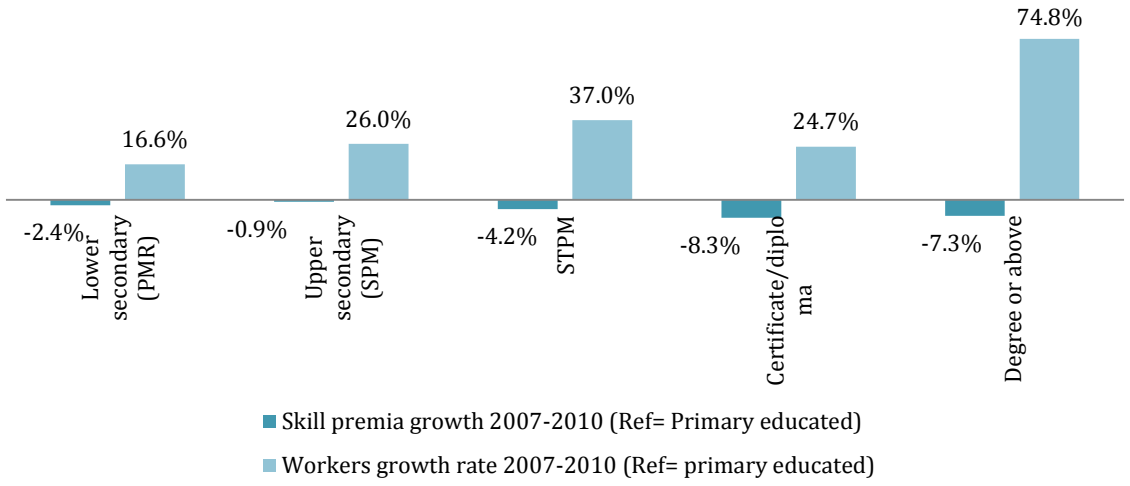
where *e* denotes levels of education above primary.

Results

110. Labor imbalances are evident, especially at higher levels of education. Between 2007 and 2010 the employment of full-time degree holders increased by 74.8 percent relative to workers with at most primary education; however wage growth for the former was 7.3 percent lower than for the least educated workers (Figure 66). Similarly, relative employment growth of full-time workers with vocational education was as high as 24.7 percent, but the corresponding wage growth was negative (-8.3 percent). This pattern seems to be less common at lower levels of education, as relative wage decreases are never higher than 5 percent.

111. Mismatches between the skills provided by the most educated workers and employers' requirements are likely to be at the basis of the slow wage growth of degree holders. Given that the economy has started to transition toward a new economic model in which the highly educated are crucial players, it is likely that the downward trend in the relative wage growth of degree and certificate/diploma holders is due to the quality of their skills rather than a quantity issue. High unemployment rates of young graduates (Chapter 2), together with the skill deficiencies reported by employers (Chapter 5) present further evidence in support of this hypothesis.

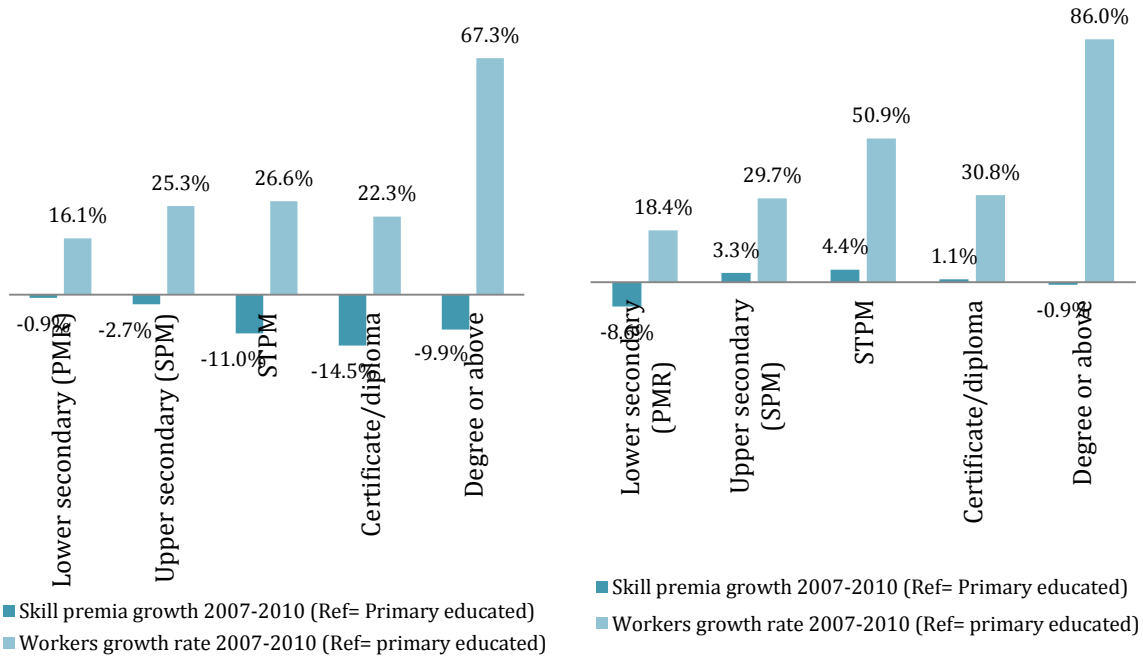
Figure 66: Skill Premiums and Worker Growth



Source: Authors' analysis based on Malaysian LFS 2007-2010

112. Labor imbalances are more pronounced for men than women, and occur at different educational levels for each gender. The trend experienced by full-time male workers is very similar to the trend that is prevalent throughout the economy. For women, instead, labor imbalances are far less accentuated. Figure 67 (right-panel) shows that the market is almost perfectly able to absorb the large increase in tertiary educated female workers (relative wage decrease is equal to -0.9 percent); on the other hand, the negative relative wage growth experienced by women with at most upper secondary education is in line with the country's knowledge based economic model. These results suggest that differences between the soft skills that men and women bring to their jobs play a crucial role in wage dynamics.

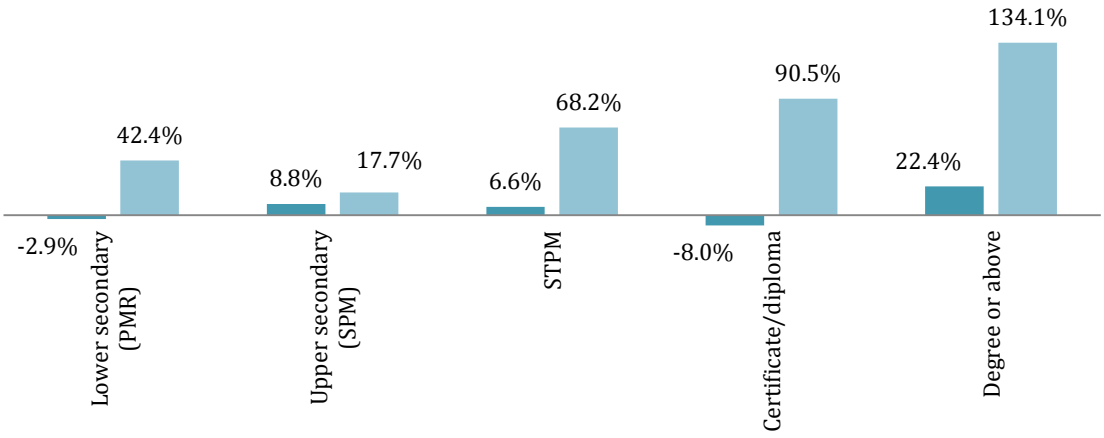
Figure 67: Skill Premiums and Worker Growth for Male (left) and Female (right) Malaysians



Source: Authors' analysis based on Malaysian LFS 2007-2010

113. Agriculture, for instance, is undergoing a transformation as envisaged in the ETP: between 2007 and 2010 the growth in the number of tertiary educated compared to primary educated workers was remarkable. Despite the large relative growth of tertiary educated workers in agriculture and plantations between 2007 and 2010, degree holders remained in high demand as evidenced by the fact that the returns to tertiary education kept increasing over the same period. A similar but less accentuated pattern is visible for all levels of education, except for PMR and certificate/diploma holders, whose wage growth has been slower than for the least educated group of Malaysian workers (Figure 68).

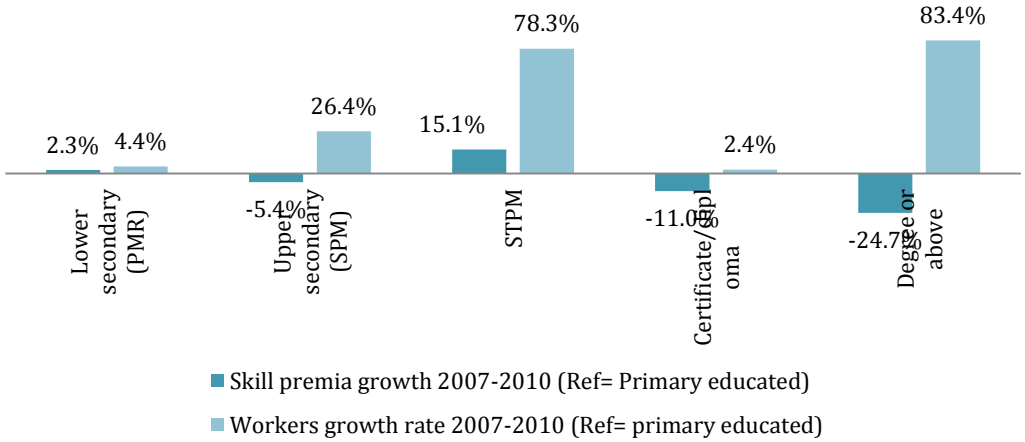
Figure 68: Labor Imbalances in Agriculture and Plantations



Source: Authors' analysis based on Malaysian LFS 2007-2010

114. The evolution of skills required in the Construction sector between 2007 and 2010 depicts the opposite pattern of the Agriculture sector (Figure 69). A clear pattern emerges in Construction: despite the large increase in employment of tertiary educated workers compared to the reference group, relative wage growth between 2007 and 2010 was negative. This can be interpreted as a signal of the misalignment between the quality and/or the quantity of skills sought by employers in this sector and the set of competencies and knowledge of tertiary educated workers.

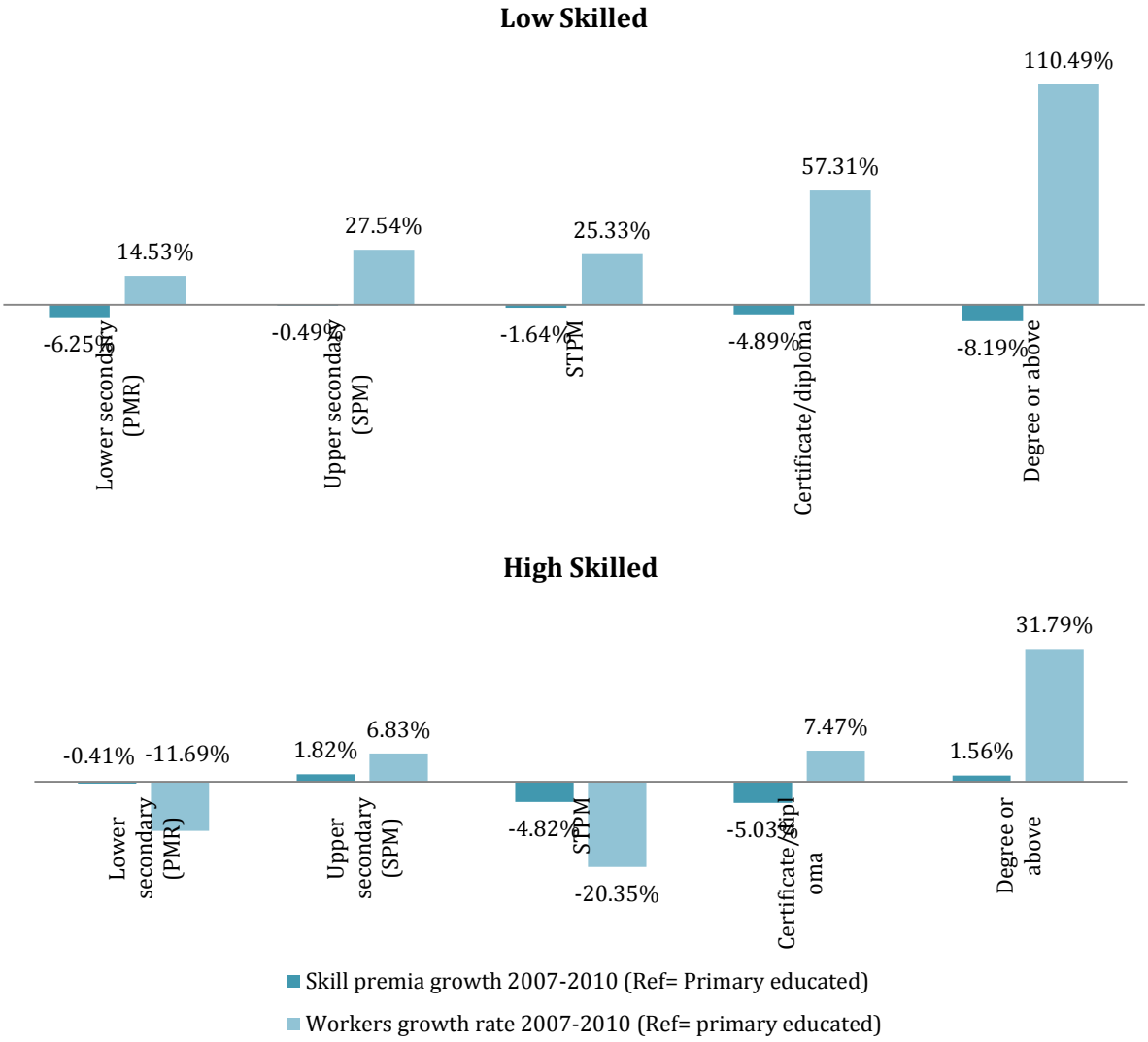
Figure 69: Labor Imbalances in Construction



Source: Authors' analysis based on Malaysian LFS 2007-2010

115. In the low- and high-value added Manufacturing sectors the dynamics of demand and supply of tertiary educated workers are notably different. Between 2007 and 2010, full-time employment of degree holders increased considerably (110.5 percent) relative to the corresponding employment of workers with at most primary education (Figure 70 – top panel). However, relative wage growth was negative (-8.2 percent), suggesting that either the supply of degree holders increased relatively too fast compared to the demand, or that high-skilled workers did not possess the skills required by employers in this sector. On the other hand, in high-value added manufacturing, where the composition of the workforce is traditionally more high-skilled, the employment growth of high-skilled workers was more limited (31.8 percent), but was coupled with positive relative wage growth (1.6 percent).

Figure 70: Labor Imbalances in Manufacturing

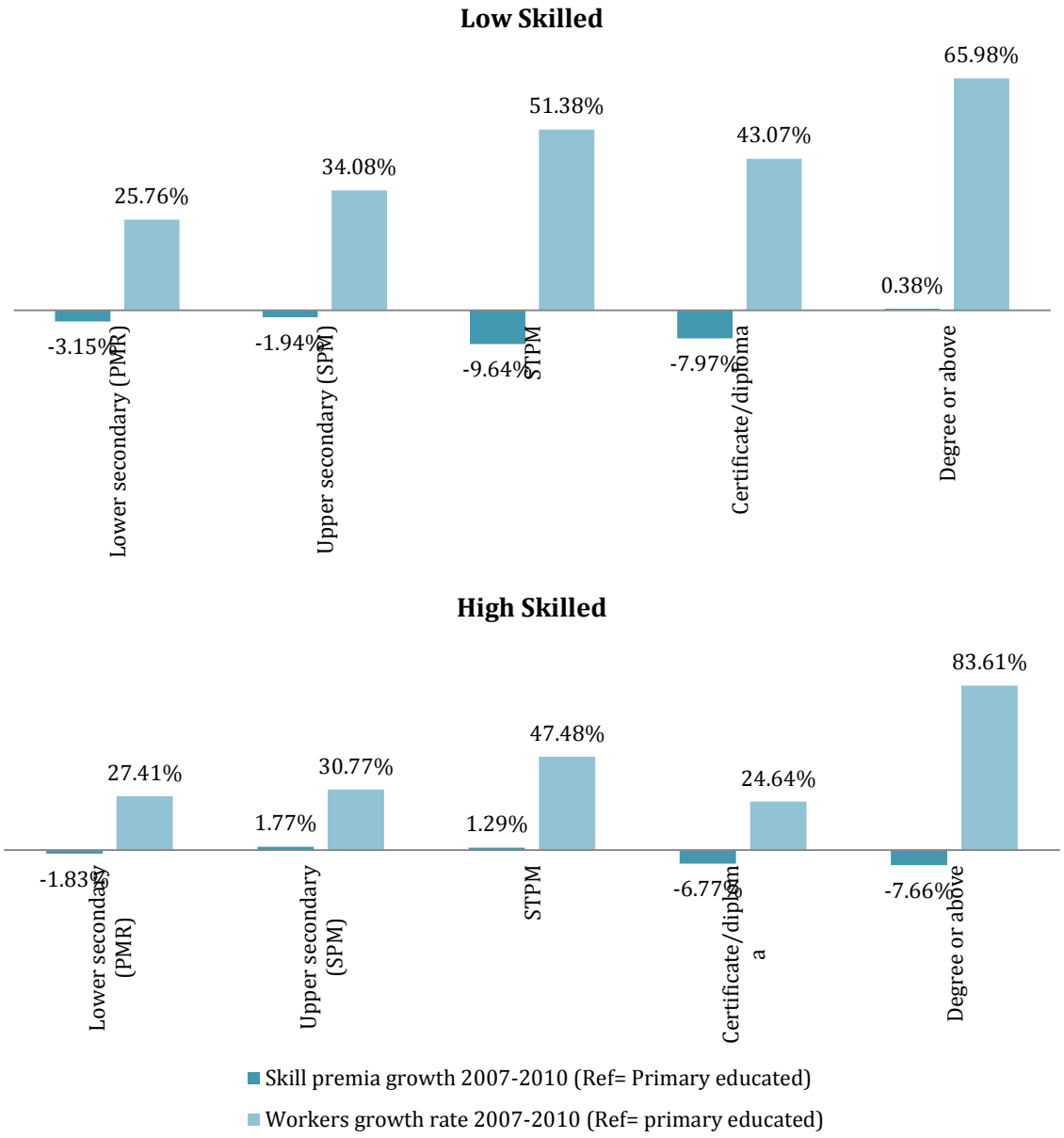


Source: Authors' analysis based on Malaysian LFS 2007-2010

116. Labor imbalances are more pronounced at medium levels of education for low-value added Services and at high levels of education for high-value added Services. The degree of absorption of workers holding a degree in low-skilled Services is nearly perfect; however,

results point to a problem with the quantity and/or quality of certificate/diploma holders in this sector (Figure 99--Top). In high-skilled Services, the negative relative wage growth experienced by degree holders represents a warning sign for the economy. Since this sector is mainly composed by NKEAs such as Education, Health, Business and Financial Services and ICT, which are key for the transition to the Knowledge Economy, problems related to the quality of the skills provided by the most educated workers must be carefully addressed (Figure 71--Bottom).

Figure 71: Labor Imbalances in Services



Source: Authors' analysis based on Malaysian LFS 2007-2010

4.3 Labor Imbalances by Occupation

117. Labor markets in a dynamic economy continuously evolve, implying that new occupations are created while others become obsolete. The analysis in this subsection shows the occupations that experienced high wage increases and decreases between 2007 and 2010. While positive wage growth can signal that an occupation is in high demand, wage decreases reveal *either* a lack of demand in that the occupation or a lack of quality (as valued by the labor market) of the skills that workers in that occupation have to offer.

Methodology and Results

118. Through regression analysis it is possible to isolate the occupation-specific component of wage growth. The approach adopted in this section allows for the comparison of the wage growth of individuals with very similar profiles (age, education, work experience, gender, state in which they work, marital status, economic sector) but employed in different occupations[26]; thus, resulting wage changes are attributable to the occupation in which workers are employed.

119. The interpretation is as follows: from 2007 to 2010, occupations that experienced a positive occupation-specific wage growth are considered to be in *high* demand in Malaysia. On the other hand, negative occupation-specific wage growths are interpreted as either signals of *over-supply* of workers in the correspondent occupations or as *deficiencies in the quality* of worker skills in these occupations.

120. Between 2007 and 2010 workers in a large number of occupations were in high demand in Malaysia. The analysis focuses on the 116 3-digit occupations classified following the MASCO-1998 classification adopted in the LFS. Because of the high level of disaggregation in the occupation classification and the resulting sampling issues, it was not possible to conduct the analysis for 41 (out of the 116) occupations[27].

121. Among the remaining 75 occupations, Table 9 shows that most occupations (52) experienced positive occupation-specific wage growth, compared to only 23 for which growth was negative (Table 10). Annex 5 shows occupations for which change could not be estimated. In addition, the magnitude of the change is larger in the case of positive wage growth. These results show that a large number of occupations are in high demand, in line with the targets set in the ETP, according to which 3.3 million new jobs will be created by 2020. However, given the focus on innovation and knowledge as engines of future economic growth, in the remainder of the section the focus is on the skills content of different occupations.

[26] The regression equation can be written as: $\ln(W_i) = \beta_0\ \mathrm{Y2010}_i + \boldsymbol{Z_i'\gamma} + \varepsilon_i$,
where $\ln(W_i)$ is the natural logarithm of individuals' gross monthly wage earnings, $\mathrm{Y2010}_i$ is a dummy variable equal to 1 if individual i reports his/her wage in 2010 and 0 if in 2007, and $\boldsymbol{Z_i}$ is a vector of explanatory dummy variables[26]. The coefficient β_0 represents wage changes only attributable to the occupation in which workers are employed. For this reason, such wage changes are referred to as *occupation-specific wage growths*.

[27] For 41 out of the 116 3-digit MASCO-1998 occupations the number of observations in the data was not sufficient to conduct a reliable statistical analysis. A priori it is not possible to say whether these occupations would experience a positive or negative occupation-specific wage growth. Some occupations could employ few workers because they are obsolete and then experience a negative occupation-specific wage growth. In other occupations, occupation-specific wage growth could be positive because there are only few workers and more are needed.

Table 9: Jobs with Positive Occupation-Specific Growth 2007-2010

3-digit MASCO Occupation	Wage Growth 2007-2010
METAL PROCESSING PLANT OPERATORS	36.9%
HEALTH PROFESSIONALS (EXCEPT NURSING)	31.5%
PRIMARY EDUCATION TEACHERS	21.3%
BLACKSMITHS, TOOLMAKERS AND RELATED	19.9%
MODERN HEALTH ASSOCIATE PROFESSIONALS (EXCEPT NURSING)	17.9%
GARBAGE COLLECTORS AND RELATED	16.3%
PROTECTIVE SERVICE AND RELATED	15.8%
GOVERNMENT ASSOCIATE PROFESSIONALS	15.1%
LIFE SCIENCE TECHNICIANS AND RELATED	15.1%
AGRICULTURAL AND OTHER MOBILE PLANT OPERATORS	14.7%
NURSING AND MIDWIFERY ASSOCIATE PROFESSIONALS	14.4%
DOMESTIC AND RELATED, CLEANERS AND LAUNDERERS	13.2%
ARTISTIC, ENTERTAINMENT AND SPORTS ASSOCIATE PROFESSIONALS	12.7%
MESSENGERS, PORTERS, ATTENDANTS AND RELATED	12.7%
STATISTICAL, ADMINISTRATIVE AND RELATED ASSOCIATE PROFESSIONALS	11.8%
GENERAL MANAGERS	11.6%
TEACHING ASSOCIATE PROFESSIONALS NEC	11.3%
PRE-UNIVERSITY AND SECONDARY EDUCATION TEACHING PROFESSIONALS	10.5%
FISHERY WORKERS	9.6%
MINING AND CONSTRUCTION LABOURERS AND RELATED	9.3%
PERSONAL CARE AND RELATED	8.8%
ADMINISTRATIVE CLERKS	7.6%
ACCOUNTANTS AND AUDITORS	7.5%
UNIVERSITY, POLYTECHNIC AND HIGHER EDUCATION TEACHING PROFESSIONALS	7.4%
FINANCE AND SALES ASSOCIATE PROFESSIONALS	6.9%
AGRICULTURAL AND FISHERY LABOURERS AND RELATED WORKERS	6.5%
MOTOR VEHICLE DRIVERS	6.5%
ACCOUNTING AND FINANCE CLERKS	6.5%
METAL AND MINERAL PRODUCTS MACHINE-OPERATORS	6.3%
SENIOR GOVERNMENT AND STATUTORY BOARD OFFICIALS	6.2%
BUSINESS PROFESSIONALS NEC	6.2%
MATERIAL-RECORDING CLERKS	5.4%
SECRETARIES AND KEYBOARD-OPERATING CLERKS	5.2%
ARCHITECTS, ENGINEERS AND RELATED	4.7%
FOOD AND RELATED PRODUCTS MACHINE-OPERATORS	4.7%
WOOD PRODUCTS MACHINE-OPERATORS	4.7%
CHEMICAL PRODUCTS MACHINE-OPERATORS	4.5%
HOUSEKEEPING AND CATERING SERVICES WORKERS	4.5%
PHYSICAL SCIENCE AND ENGINEERING TECHNICIANS	4.4%
FOOD PROCESSING AND RELATED	4.3%
CLIENT INFORMATION CLERKS	4.3%
CASHIERS, TELLERS AND RELATED	4.2%
MAIL DISTRIBUTION CLERKS	4.1%
WOOD PROCESSING AND PAPERMAKING PLANT OPERATORS	3.9%
SUPERVISORS	3.7%
ASSEMBLERS	3.6%
ELECTRICAL AND ELECTRONIC EQUIPMENT MECHANICS AND	3.2%

FITTERS	
PRE-PRIMARY EDUCATION TEACHERS	2.8%
TRANSPORT LABOURERS AND RELATED	1.3%
TRANSPORT CONTROLLERS AND TECHNICIANS	1.3%
BUILDING FRAME AND RELATED	0.6%
MANUFACTURING LABOURERS AND RELATED	0.2%

Source: Authors' analysis based on Malaysian LFS 2007-2010

Table 10: Jobs with Negative Occupation-Specific Growth 2007-2010

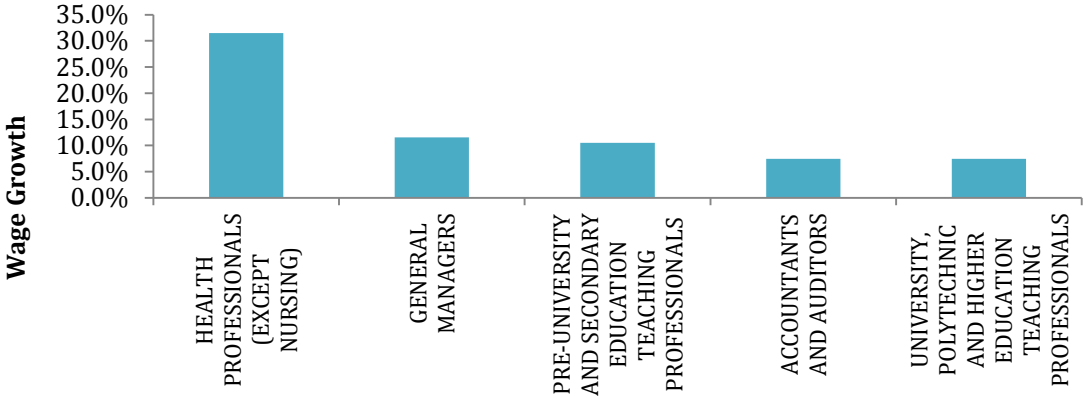
3-digit MASCO Occupation	Wage Growth 2007-2010
RUBBER AND PLASTIC PRODUCTS MACHINE-OPERATORS	-0.3%
PRODUCTION AND OPERATION DEPARTMENT MANAGERS	-0.3%
SHOP SALES WORKERS AND DEMONSTRATORS	-0.5%
PRINTING, BINDING AND PAPER PRODUCTS MACHINE-OPERATORS	-0.5%
TEXTILE, GARMENT AND RELATED TRADES WORKERS	-0.6%
MACHINE-OPERATORS NEC	-1.3%
MACHINERY MECHANICS AND FITTERS	-1.5%
METAL MOULDERS, WELDERS, SHEET METAL WORKERS, STRUCTURAL METAL PREPARERS AND RELATED TRADES WORKERS	-1.8%
PERSONNEL AND CAREERS PROFESSIONALS	-2.8%
SPECIALISED FARMING WORKERS	-2.8%
SPECIALISED DEPARTMENT MANAGERS	-2.8%
PAINTERS, BUILDING STRUCTURE CLEANERS AND RELATED TRADES WORKERS	-2.9%
FORESTRY WORKERS AND LOGGERS	-3.0%
POWER GENERATING AND RELATED PLANT OPERATORS	-3.8%
TEXTILE PRODUCTS MACHINE-OPERATORS	-4.1%
BUILDING, PUBLIC HEALTH AND SAFETY AND QUALITY INSPECTORS	-4.3%
COMPUTING PROFESSIONALS	-6.1%
BUILDING FINISHERS AND RELATED TRADES WORKERS	-7.7%
PLANTATION WORKERS	-8.1%
STALL AND MARKET SALES WORKERS	-8.4%
COMPANY DIRECTORS	-12.1%
CHEMICAL PROCESSING PLANT OPERATORS	-13.2%
WOOD TREATERS, CABINET MAKERS AND RELATED	-17.0%

Source: Authors' analysis based on Malaysian LFS 2007-2010

122. The high-skill occupations with the largest occupation-specific growths are mainly in NKEA sectors. Between 2007 and 2010 Malaysians working as health professionals (except nurses) experienced wage increases of nearly 37 percent. Teachers at the pre-university/secondary and higher education levels experienced occupation-specific wage increases in the order of 10.5 percent and 7.4 percent, respectively, confirming the country's investment in the Education sector. Despite the fact that they are in high demand,

though, not all pre-university and secondary education teachers command high wages, nor do they hold a post-secondary degree. The same is true for general managers, even if the wage range is wider. Accountants and auditors, whose average age is incidentally well below the corresponding average for the rest of the high-skill occupations in high demand, also exhibit significant positive occupation-specific wage growth (Figure 72 and Table 11).

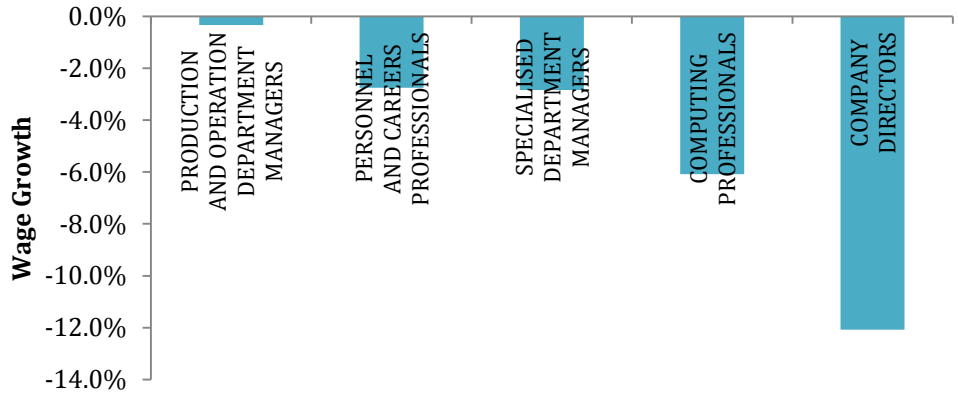
Figure 72: Top 5 High-skill Jobs by Occupation-Specific Growth 2007-2010



Source: Authors' analysis based on Malaysian LFS 2007-2010

123. Computing professionals are not equipped with the skills required by employers (Figure 73) according to the analysis. Communication Contents and Infrastructure (CC&I) is one of the NKEAs, as well as one of the pillars of the Knowledge Economy. Given increased demand for ICT specialists, the 6.1 percent decrease in their occupation-specific wages is more likely due to a quality, rather than a quantity deficiency. The other type of high-skill workers that experienced a significant occupation-specific wage decrease are company directors. This could be the result of the slowdown of the Malaysian economy in 2009. On the other hand, more specialized management, i.e. production and operation department managers, experienced virtually no labor imbalances, as shown by an almost null occupation-specific wage growth between 2007 and 2010. For all the occupations that experienced a negative occupation-specific wage growth in 2010, the largest share of their workforce held a degree.

Figure 73: Bottom 5 High-skill Jobs by Occupation-Specific Growth 2007-2010



Source: Authors' analysis based on Malaysian LFS 2007-2010

Table 11: Profiles of Selected High-skill Jobs with Labor Imbalances

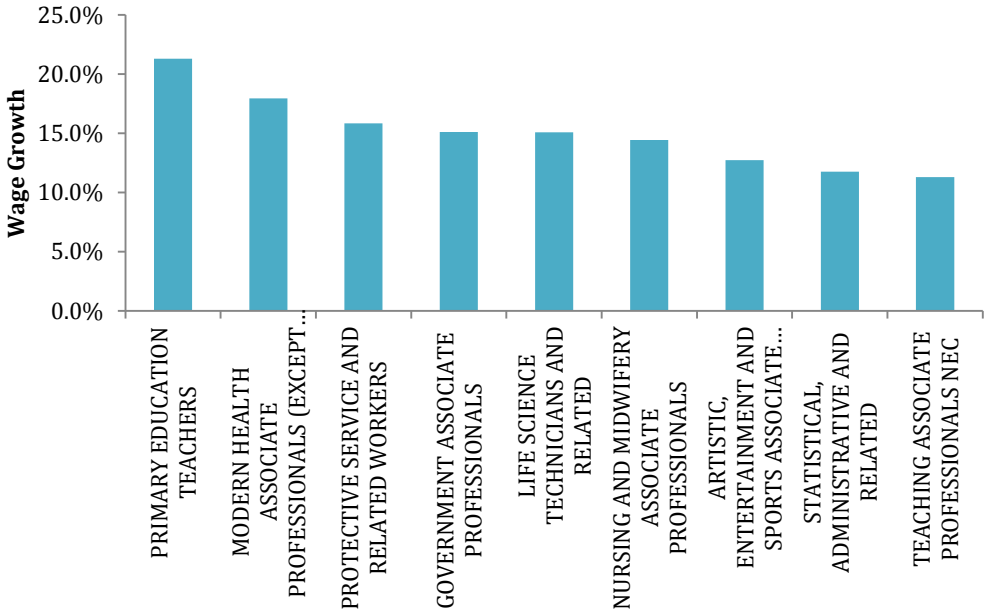
Occupation	Change in wage premium 2007-2010	Profile (2010)		
		Average age	Wage Range in MYR (25 to 75 percentiles)	Typical education
HEALTH PROFESSIONALS (EXCEPT NURSING)	31.5%	37	3,125 - 5,789	Degree in in Health and welfare
GENERAL MANAGERS	11.6%	41	1,754 - 4,385	SPMV/SPM
PRE-UNIVERSITY AND SECONDARY EDUCATION TEACHING PROFESSIONALS	10.5%	35	877 – 2,421	SPMV/SPM – Degree in Education
ACCOUNTANTS AND AUDITORS	7.5%	32	1,754 – 3,508	Degree in Social science, business and law
UNIVERSITY, POLYTECHNIC AND HIGHER EDUCATION TEACHING PROFESSIONALS	7.4%	38	2,807 – 4,824	Degree in Education
PRODUCTION AND OPERATION DEPARTMENT MANAGERS	-0.3%	39	2,631 – 5,877	Degree in Social science, business and law
PERSONNEL AND CAREERS PROFESSIONALS	-2.8%	35	1,754 - 3,377	Degree in Social science, business and law
SPECIALISED DEPARTMENT MANAGERS	-2.8%	37	2,192 - 4,385	Degree in Social science, business and law
COMPUTING PROFESSIONALS	-6.1%	33	2,192 - 3,859	Degree in Science
COMPANY DIRECTORS	-12.1%	42	2,807 - 6,140	Degree in Social science, business and law

Source: Authors' analysis based on Malaysian LFS 2007-2010

124. Between 2007 and 2010, a large number of mid-skill level occupations were in high demand. The ETP recognizes the importance of workers with the right vocational and technical training, and expects that 46 percent of new jobs created by 2020 will be allocated to workers with vocational education. Mid-skill occupations - technicians and associate

professionals, service workers and clerical workers – intensively use vocationally trained labor, hence, it is not surprising to see that a large number of these occupations are in high demand (Figure 74). The Education and Health NKEAs feature largely among the fields of occupations in high demand between 2007 and 2010. However, results also show increasing demand for workers in the public sector (protective service workers and government associate professionals), as well as workers with specialized skills and training (life science technicians, artistic, entertainment and sport associate professionals, and statistical, administrative and related workers) (Table 11).

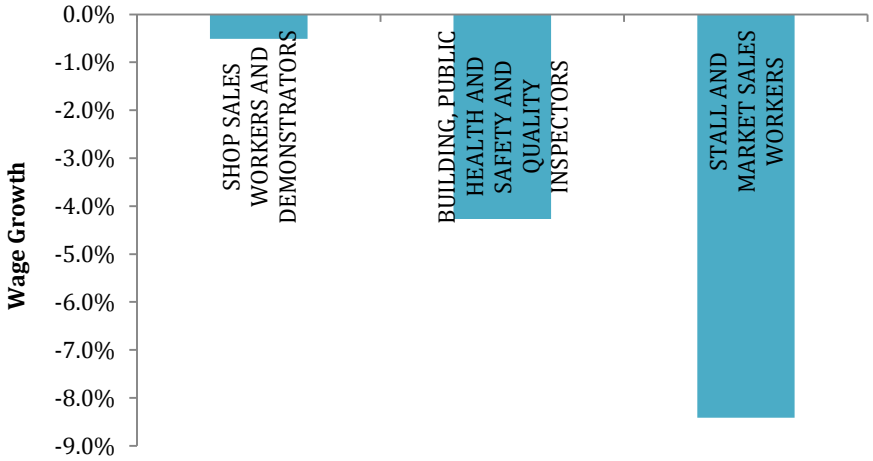
Figure 74: Mid-skill Jobs with Occupation-specific Growth 2007-2010 Larger Than 10%



Source: Authors' analysis based on Malaysian LFS 2007-2010

Note: Modern Health Associate Professionals include among others assistants, nutritionists, opticians, optometrists, etc.; protective service workers include police officers, fire-fighters, guards, armed forces, etc.; government associate professionals include inspectors, executive officers, etc.; teaching associates nec (not elsewhere classified) include adult education, fine arts, home economics, modeling, private tutors, etc.

Figure 75: Mid-skill Jobs with Negative Occupation-specific Growth 2007-2010



Source: Authors' analysis based on Malaysian LFS 2007-2010

125. Only a small number of mid-skill occupations saw signs of skill mismatches between 2007 and 2010. Three mid-skill occupations experienced a negative occupation-specific wage growth, and for one of them the size of the wage decrease was negligible. The largest decrease occurred for stall and market sale workers, an occupation that is not highly sought after in a Knowledge Economy. On the other hand, for building and public health and safety quality inspectors, skill mismatches are again more likely the results of a quality, rather than a quantity issue; in 2010 the majority of them did not pursue specialized training beyond SPM / SPMV (Table 12).

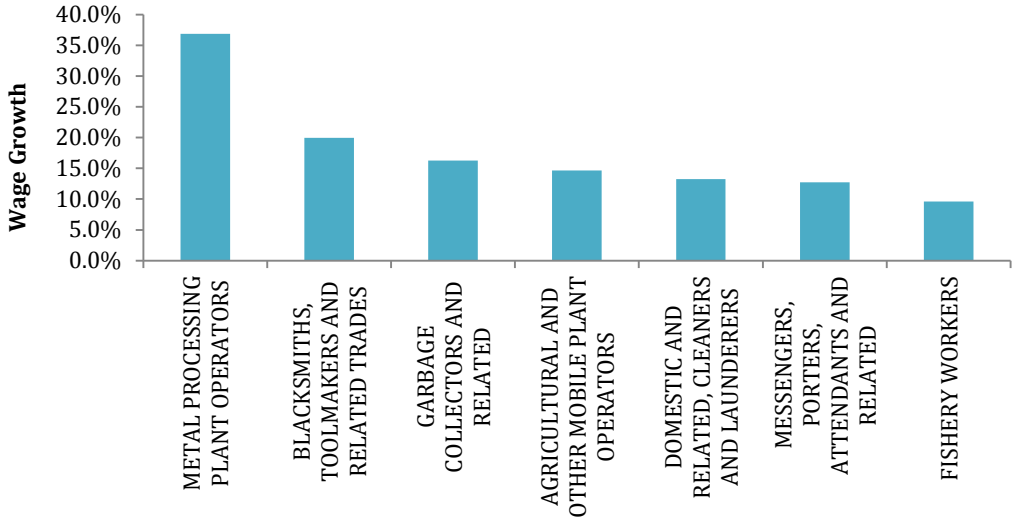
Table 12: Profiles of Selected Mid-skill Jobs With Labor Imbalances

Occupation	Change in wage premium 2007-2010	Profile (2010)		
		Average age	Wage Range in MYR (25 to 75 percentiles)	Typical education
PRIMARY EDUCATION TEACHERS	21.3%	37	2,192 - 3,192	Diploma / Certificate in Education
MODERN HEALTH ASSOCIATE PROFESSIONALS (EXCEPT NURSING)	17.9%	32	1,250 - 2,368	SPMV/SPM - Diploma / Certificate in Health & Welfare
PROTECTIVE SERVICE AND RELATED WORKERS	15.8%	38	964 - 2,407	SPMV/SPM
GOVERNMENT ASSOCIATE PROFESSIONALS	15.1%	37	1,662 – 3,012	SPMV/SPM
LIFE SCIENCE TECHNICIANS AND RELATED	15.1%	38	1,241 – 2,304	Diploma / Certificate in Agriculture, Forestry & Fishing
NURSING AND MIDWIFERY ASSOCIATE PROFESSIONALS	14.4%	35	1,649 – 2,631	Diploma / Certificate in Health & Welfare
ARTISTIC, ENTERTAINMENT AND SPORTS ASSOCIATE PROFESSIONALS	12.7%	31	1,140 – 2,456	Diploma / Certificate in Art & Humanities
STATISTICAL, ADMINISTRATIVE AND RELATED	11.8%	35	1,754 – 3,070	Diploma / Certificate in Social science, business and law – Degree in Social science, business and law
TEACHING ASSOCIATE PROFESSIONALS NEC	11.3%	35	877 - 2,421	SPMV/SPM - Diploma / Degree in Education
SHOP SALES WORKERS AND DEMONSTRATORS	-0.5%	30	570 – 1,228	SPMV/SPM
BUILDING, PUBLIC HEALTH AND SAFETY AND QUALITY INSPECTORS	-4.3%	32	1,000 – 2,188	SPMV/SPM
STALL AND MARKET SALES WORKERS	-8.4%	32	482 - 877	SPMV/SPM

Source: Authors' analysis based on Malaysian LFS 2007-2010

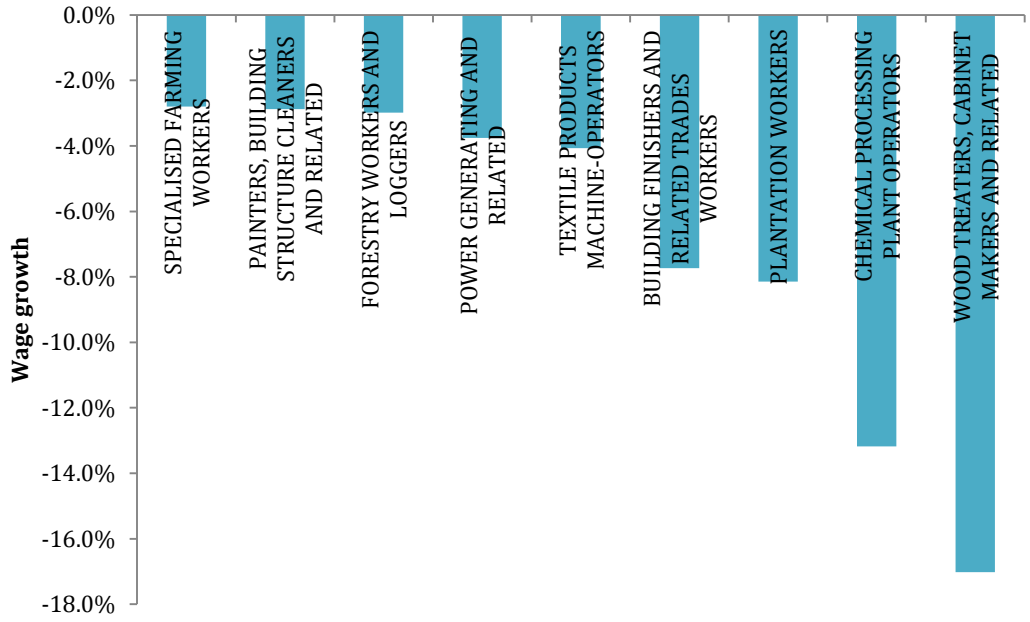
126. Despite the strong focus on knowledge and innovation as new engines of economic growth, some low skilled occupations are still needed in a Knowledge Economy. While it is possible to easily substitute workers with machines to perform some tasks, it is more difficult to automatize the production process in jobs in which workers are complementary to machines. Results show that seven low-skill occupations experienced an occupation-specific wage growth above 10 percent between 2007 and 2010. Plant operators, trade workers, and a large number of elementary workers belong to this group (Figure 76).

Figure 76: Low-skill Jobs with Occupation-Specific Growth 2007-2010 Larger Than 10%



Source: Authors' analysis based on Malaysian LFS 2007-2010

Figure 77: Low-skill Jobs with Occupation-Specific Growth 2007-2010 Smaller Than -2%



Source: Authors' analysis based on Malaysian LFS 2007-2010

127. On the other hand, nine low-skill occupations experienced wage declines above two percent between 2007 and 2010 (Figure 77 and Table 13). This could be due to the fact that some jobs have become less relevant in light of the new economic model. In other occupations, even if they are still considered relevant, workers need to upgrade their skills in order to meet employers' requirements, and thus earn higher wages. Table 13 shows that in the vast majority of low-skill occupations the largest share of the workforce is at most primary educated.

Table 13: Profiles of Selected Low-skill Jobs with Labor Imbalances

Occupation	Change in wage premium 2007-2010	Profile (2010)		
		Average age	Wage Range (25 to 75 percentiles)	Typical education
METAL PROCESSING PLANT OPERATORS	36.9%	31	789 - 1,345	SPMV/SPM
BLACKSMITHS, TOOLMAKERS AND RELATED TRADES	19.9%	36	701 – 1,491	At most primary (UPSR)
GARBAGE COLLECTORS AND RELATED	16.3%	40	438 – 842	At most primary (UPSR)
AGRICULTURAL AND OTHER MOBILE PLANT OPERATORS	14.7%	36	877- 1,666	At most primary (UPSR) - SPMV/SPM
DOMESTIC AND RELATED, CLEANERS AND LAUNDERERS	13.2%	39	438 – 807	At most primary (UPSR)
MESSENGERS, PORTERS, ATTENDANTS AND RELATED	12.7%	36	833 – 1,492	SPMV/SPM
FISHERY WORKERS	9.6%	36	526 – 982	At most primary (UPSR)
SPECIALISED FARMING WORKERS	-2.8%	38	438 – 684	At most primary (UPSR)
PAINTERS, BUILDING STRUCTURE CLEANERS AND RELATED	-2.9%	35	614 – 1228	At most primary (UPSR)
FORESTRY WORKERS AND LOGGERS	-3.0%	43	964 – 2114	SPMV/SPM
POWER GENERATING AND RELATED	-3.8%	37	877 – 1,754	SPMV/SPM
TEXTILE PRODUCTS MACHINE-OPERATORS	-4.1%	35	614 – 1,052	SPMV/SPM - PMR
BUILDING FINISHERS AND RELATED TRADES WORKERS	-7.7%	34	701 – 1,368	At most primary (UPSR)
PLANTATION WORKERS	-8.1%	39	438 – 701	At most primary (UPSR)
CHEMICAL PROCESSING PLANT OPERATORS	-13.2%	31	666 – 1,587	SPMV/SPM
WOOD TREATERS, CABINET MAKERS AND RELATED	-17.0%	40	614 – 1,491	At most primary (UPSR)

Source: Authors' analysis based on Malaysian LFS 2007-2010

Chapter 5: Demand for Skills in the Key Economic Sectors

5.1 Introduction

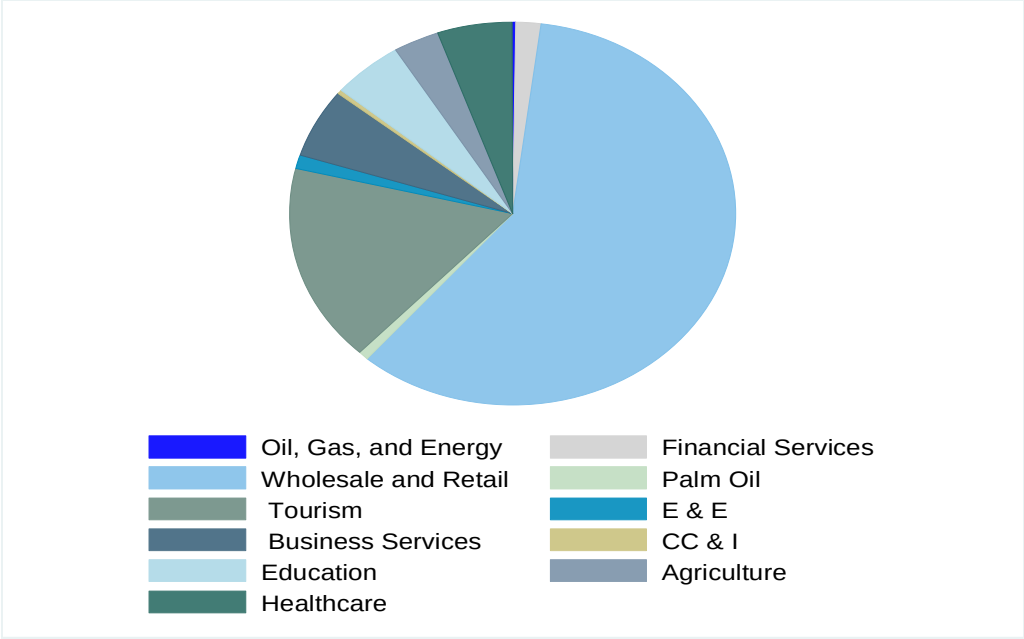
128. This chapter focuses less on education credentials and turns the spotlight onto worker skills, recognizing, first and foremost, their multidimensionality. There is no hierarchy of skills that maps neatly onto corresponding levels of education. As will be shown in this chapter, the most productive Malaysian employers pay their workers higher wages, but this is only partly explained by the fact that they are employing better educated workers. Formal education credentials do not fully capture the skills valued by employers. It follows, then, that the rapid educational transformation of Malaysia's workforce, documented in previous chapters, has not necessarily led to firms hiring the 'right' skills. This potential disconnect is a particular concern for those firms at or near the high-tech frontier who, as will become apparent, are the most skill-demanding. Moreover, the disconnect between skills produced by the education system and labor market demands limits Malaysia's ability to become a knowledge-based economy and is at the center of the analytical framework presented in chapter 1.

129. The core of this chapter is to investigate the *skills gap*, and how firms respond to it. The analysis draws mainly on two firm-level data sets: the Economic Census of 2010 and the NER of 2011. The Census provides a measure of labor productivity, value-added per worker, but has only limited information on worker skills and training, among other relevant dimensions. The NER, by contrast, has much detail on skills, but does not collect information on firm income and input expenditures. While it is possible to match firms from the Economic Census to the NER sample, at present the mapping is limited, hence the matched data is used sparingly in the chapter (and the rest of the report).

Data, Sample and Definitions

130. The NER sampled more than 24,000 firms in 2011, but only around half of the firms are in the priority NKEA sectors, which is the focus of this chapter. Eleven NKEA industries are represented in the data set: agriculture; business services; communication, content and infrastructure (CC&I); education; electronic and electrical (E&E); financial services; healthcare; oil, gas, and energy (OG&E); palm oil; tourism; and wholesale and retail. Figure 78 shows that wholesale/retail constitutes almost 60 percent of the NKEA firms covered by the NER; the next largest sector is tourism with only about 17 percent.

Figure 78: Sample of NKEA Firms in the NER



Source: NER, 2011

131. To guide the empirical analysis, the next section establishes a dichotomy of firms based on their contribution to innovation and international connectedness; this is contained in Pillar 2 of a knowledge-based economy. One set of firms, which constitute a distinct minority within their respective sectors, are designated as 'high-flyers'. Within a given sector, firms that are doing more R&D and those that are exporting are typically the more productive ones. Much economic literature links firm-level productivity to innovation and international orientation (e.g., Bernard et al, 2003). Thus, this suggests a way to distinguish high from low productivity firms or 'high-flyers' from non-high-flyers[28]. A key finding of this chapter is that high-flying firms have very distinct skill demands and face unique skill deficits compared to their non-high-flying counterparts.

132. It is important to note that given the fact that two data sources are used for this analysis, the definition of a high-flying firm differs slightly based on the data source. In the Economic Census, a high-flyer is a firm that exports (1.3 percent of all firms; 1.4 percent of NKEA firms excluding wholesale/retail) and/or does any R&D (2.3 percent of all firms; 4.2 percent of NKEA firms excluding wholesale/retail). Thus, this is equivalent 3.3 percent of all firms, and 5.2 percent of NKEA firms excluding wholesale/retail. By contrast, the NER 2011 provides an additional variable to expand the definition of high-flying firms, namely, innovation; specifically, whether the firm worked on new inventions, ideas, or processes in the last three years.

133. Focusing just on NKEA sectors, 1.8 percent of firms in the NER are exporters, 2.9 percent do R&D (inasmuch as they have established an R&D unit), and 9.1 percent are innovators based on the aforementioned variable. Combining all three variables results in 11.3 percent of NKEA firms classified as high-flyers (i.e., those which either export, do R&D, or innovate).

[28] Such a differentiation is important because, as mentioned above, for most firms, and, more specifically, for virtually all NKEA firms, data on skills collected at the firm-level in the NER of 2011 cannot be matched to firm productivity data from the Economic Census.

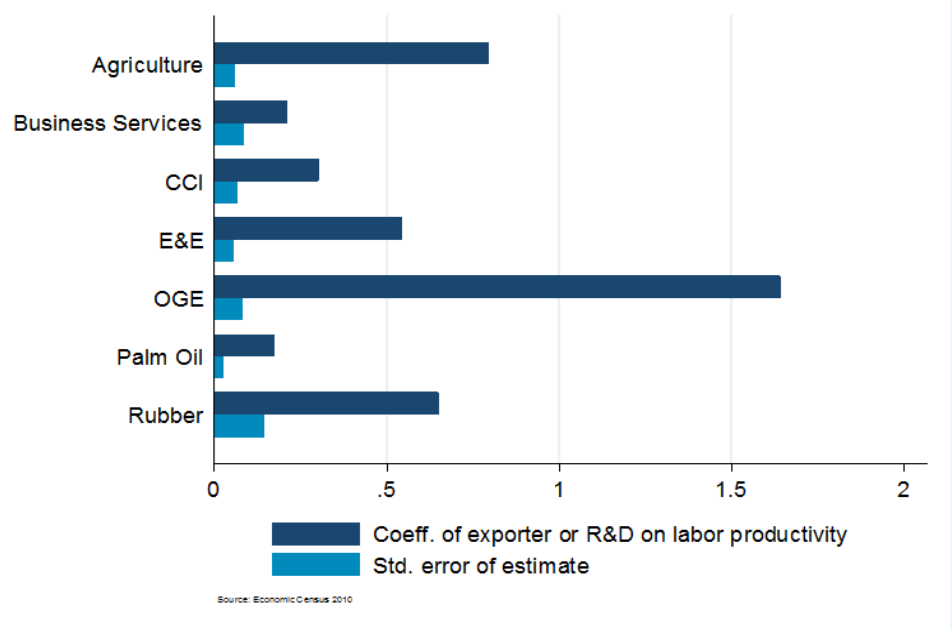
In other words, more than twice as many NKEA firms are classified as high-flyers in the NER as in the Economic Census.

Description of 'High-Flyers'

134. It is important to establish whether high-flyers are more productive than non-high flyers, especially given Malaysia's aspirations. Figure 65 shows the log value-added per worker *differentials* between high-flyers and non-high-flyers for selected NKEA industries, accounting for (or controlling for) the state in which the firms operate and the 5-digit industry classification. The best way to interpret the figure is as follows: the dark blue bar in Figure 79 represents the results (regression coefficients) on the high-flyer (0/1) compared to non-high flyers. The light blue bar is an indicator for the level of precision (standard errors) of the estimation.

135. Results show that a high-flying E&E firm, for example, is just over 50 percent more productive on average than a non-high-flying E&E firm operating in the same state and in the same economic sub-sector. Moreover, this difference is highly statistically significant (dark blue bar is well over twice as long as light blue). Similarly large labor productivity differentials are evident in such industries as agriculture, CC&I, OG&E, and rubber. In short, the evidence suggests that, indeed, the high-flyer dichotomy sharply delineates high and low productivity firms.

Figure 79: Are High-flyers More Productive?

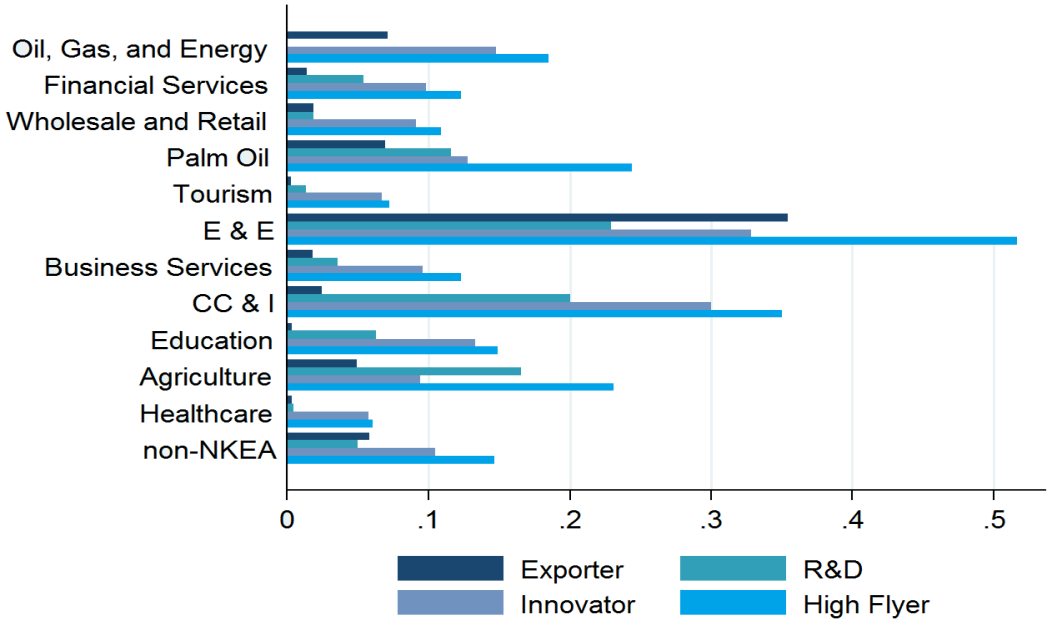


Source: Economic Census 2010

136. Figure 80, which uses NER data, breaks down the separate components of the high-flyer classification by NKEA industry. As might be expected, E&E is by far the most export-oriented sector, with OG&E and palm oil in a virtual tie for a distant second. E&E also happens to be the most innovative sector and the one with the highest proportion of firms doing R&D. Innovation and R&D are high in CC&I as well, and perhaps surprisingly so in agriculture. Taken together, the NKEA industry with the greatest proportion of high-flying

firms is thus E&E, followed well behind by CC&I, palm oil, and agriculture. Annex 3 shows further evidence that high-flyers are indeed more productive than non-high flyers.

Figure 80: High-flyers in the NER



Source: NER 2011

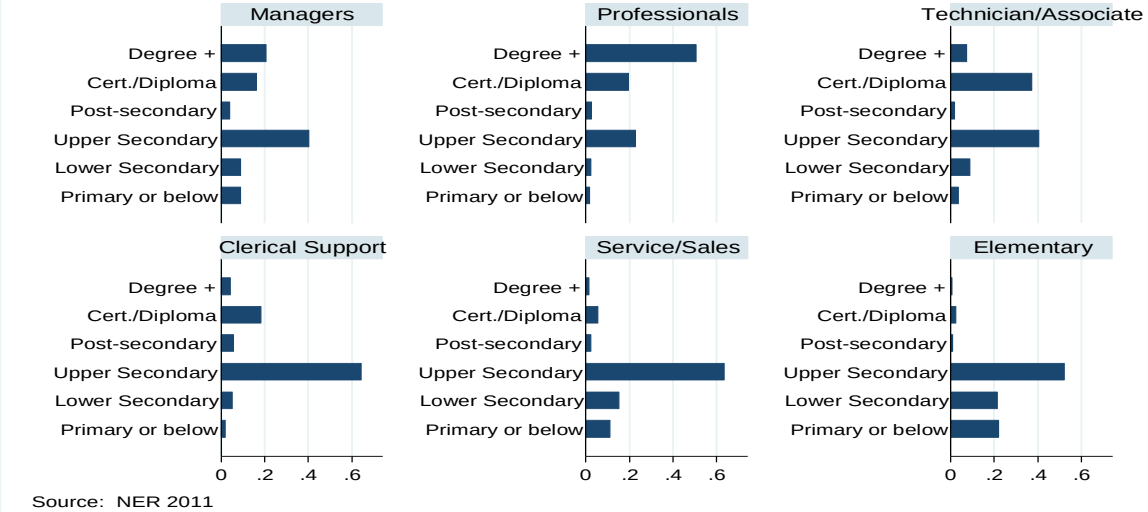
Source: NER 2011

5.2 Educational Credentials And Worker Compensation

137. To begin the exploration of skill differences between high-flying and non-high-flying firms, consider formal education[29]. At the firm level, there are stark educational differences across occupations (Figure 81). As shown in previous chapters and confirmed here, managers are likely to hold a bachelor's degree or above, but many have only completed upper secondary. By contrast, nearly half of professionals have a bachelor's or better, while vocational training (certificate or diploma) is most common among technicians/associates. In the middle and lower skilled occupations, upper secondary is the norm for NKEA sectors.

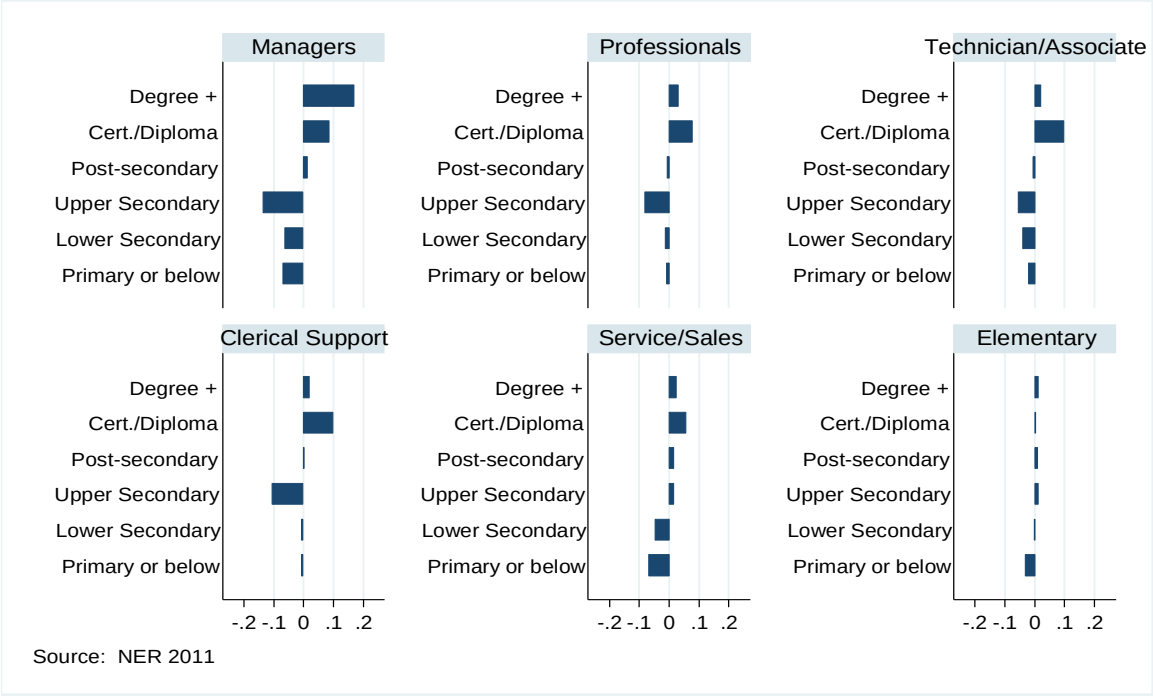
[29] The NER collects information on the proportion of workers in each occupation category with a given level of education. This represents a distinct improvement upon the Economic Census, which only provides the distribution of education for all workers taken together.

Figure 81: Distribution of Formal Education



138. Figure 82 indicates that workers in high-flying firms are more educated. Managers, for example, are much more likely to have a bachelor's degree (positive bar, right away from the zero line) and less likely to have only upper secondary (negative bar, left of the zero line). Similar patterns are evident for the other occupations, with the possible exception of elementary workers, where differences are minimal. Thus, a substantial divergence emerges in the demand for educational credentials across the high-flyer dichotomy. This raises the question of whether other types of skills, not necessarily those reflected in formal education levels, are also in greater demand by high-flying firms. This question can be addressed directly, by looking at various non-educational measures of worker skills as well as indirectly by looking at worker compensation *conditional* on formal education.

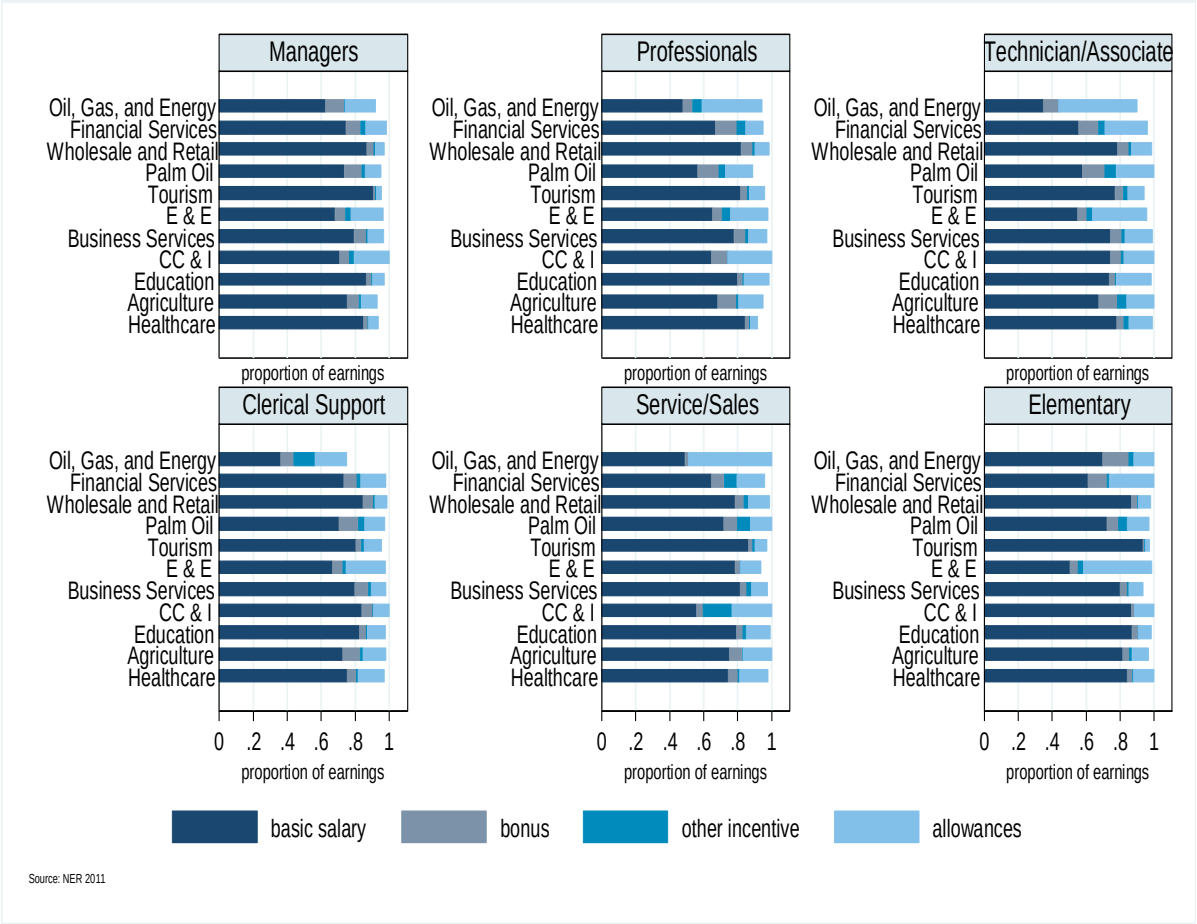
Figure 82: Workers in High-flyers Are Better Educated



Source: NER 2011

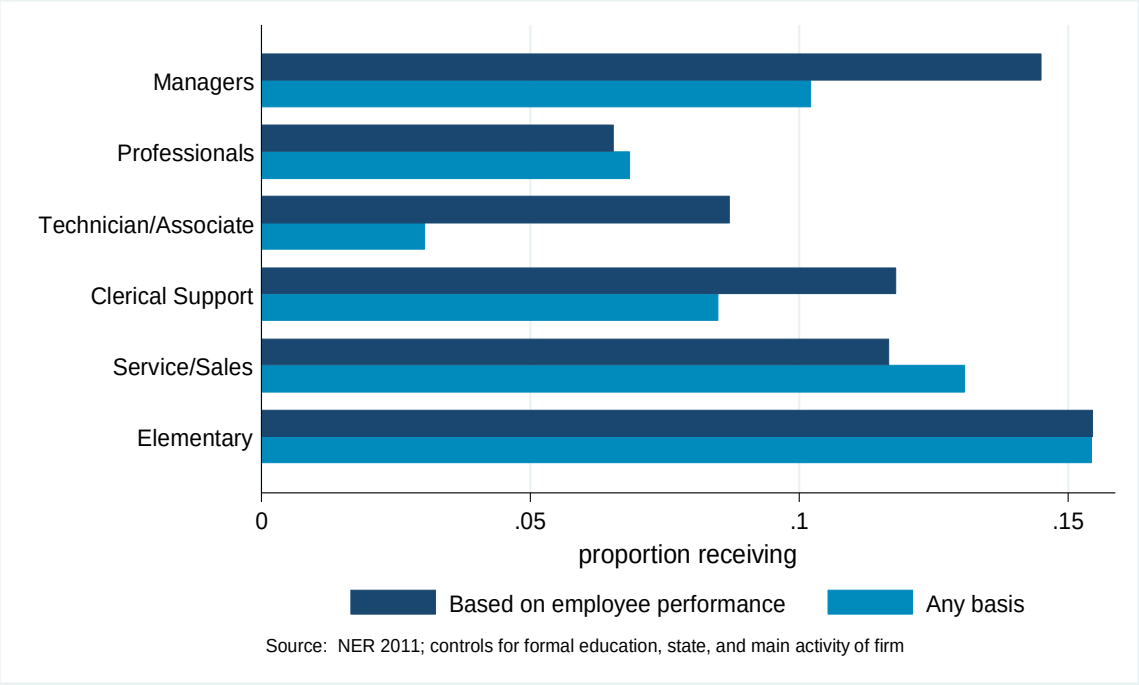
139. Malaysian firms pay a significant share of their compensation in terms of cash allowances, bonuses, and other incentives, although there is considerable variability across occupations and NKEA sectors (Figure 83). The predominant criterion for bonuses is the performance of the individual employee; team or company based performance incentives are used to a far lesser extent.

Figure 83: Compensation Practices in NKEA sectors



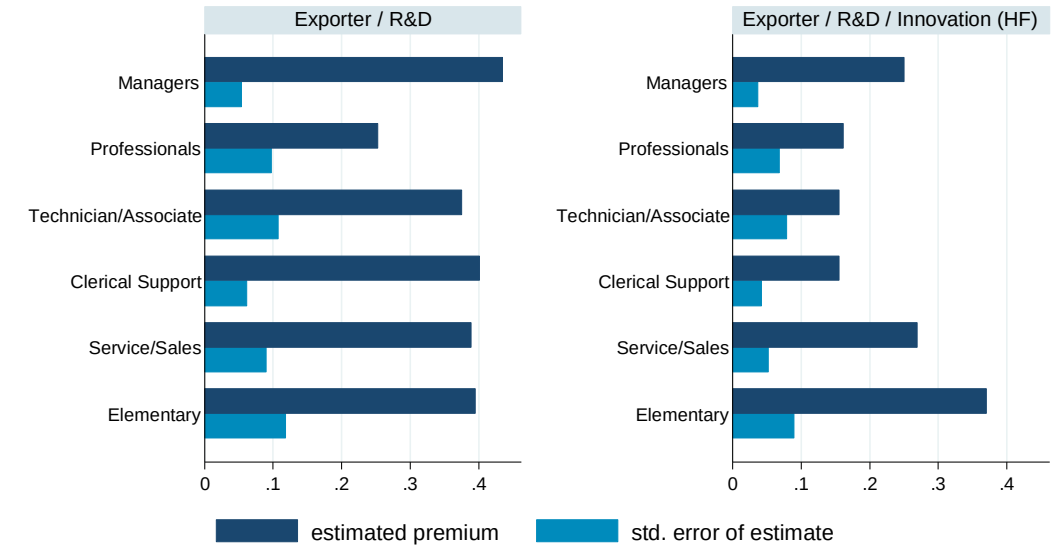
140. Regression analysis of incentive practices, taking into account (or controlling) for worker formal education, geographic state of the firm's operation and main activity of the firm, shows consistent differences in the use of incentive based pay between high-flying and non-high-flying firms across all occupational categories (Figure 84). High-flyers are incentivizing their workers using performance-based bonuses to a much greater extent, especially in the case of managers and elementary workers. An analysis of salary increments (not shown) yields much the same findings.

Figure 84: High-flyers Have Different Incentive Payment Practices



141. Figure 85 displays wage (total compensation) premia paid by high-flying NKEA firms for each occupational category. The left-hand panel shows consistently large and statistically significant wage differentials for high-flying firms. Remarkably, even elementary workers in high-flyers earn in excess of 40 percent more than their counterparts employed by non-high-flyers, and this is after taking into account worker education. Using the more restrictive definition of high-flyer based only on exporting and R&D gives uniformly larger wage premia (right-hand panel). Of course, high-flyers in this case are a far smaller and even more select subset of firms.

Figure 85: High-flyers Pay Higher Wages



Source: NER 2011; controls for formal education, state, and main activity of firm

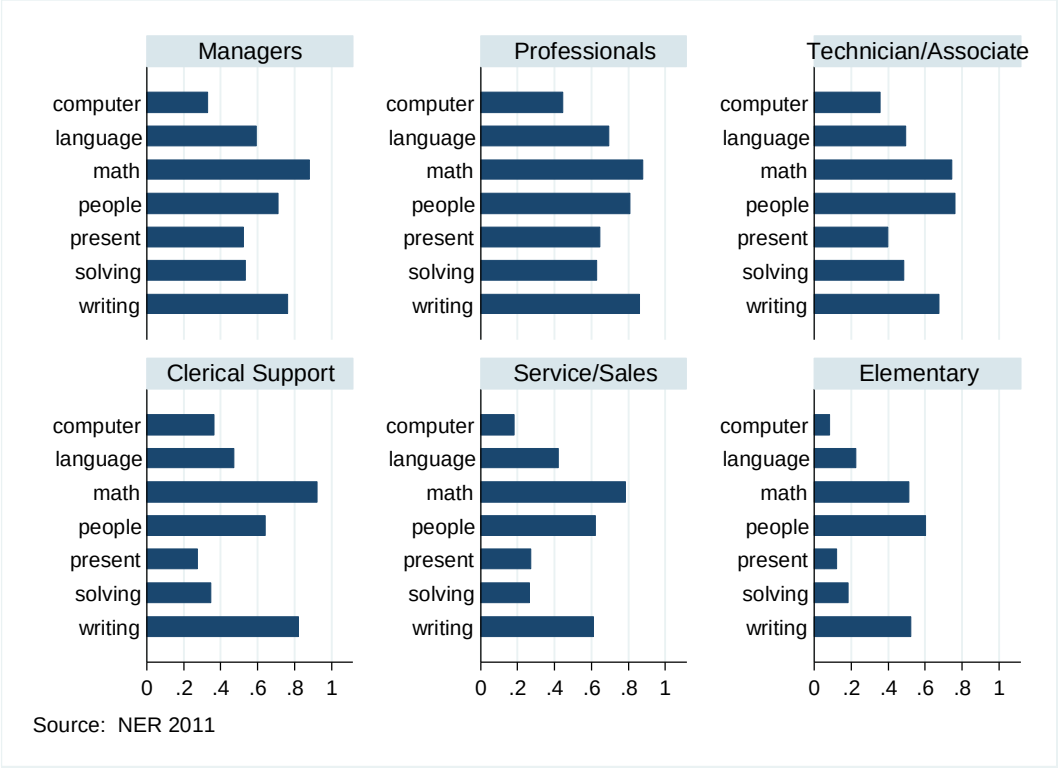
5.3 Skills Required by High-Flyer NKEA Firms

142. So far the evidence shows that high-flying firms—models of productivity within their respective sectors—require better educated workers across occupational categories and pay these workers more even after accounting for higher education levels. The next section of the chapter delves into what these high productivity firms pay for beyond formal education credentials, and what specific types of skills they demand.

Required Job skills

143. Most firms require basic cognitive skills, such as mathematics (using calculator/computer if necessary) and writing (using correct spelling and grammar), for their high to mid-skilled workers; far less so for their elementary workers. Specific skill requirements for different occupations based on the NER questionnaire, averaged across NKEA firms, are shown in Figure 86. English (language) is relatively important in management and professional jobs; IT proficiency (computer) in professional, technical, and clerical. Among elementary workers, by contrast, English and IT are of much less value. Interestingly, people skills – specifically, "interacting with [a] team of coworkers"—is an important job requirement across the board, more so even, for the higher skilled occupations, than the ability to make formal presentations to clients/colleagues (present).

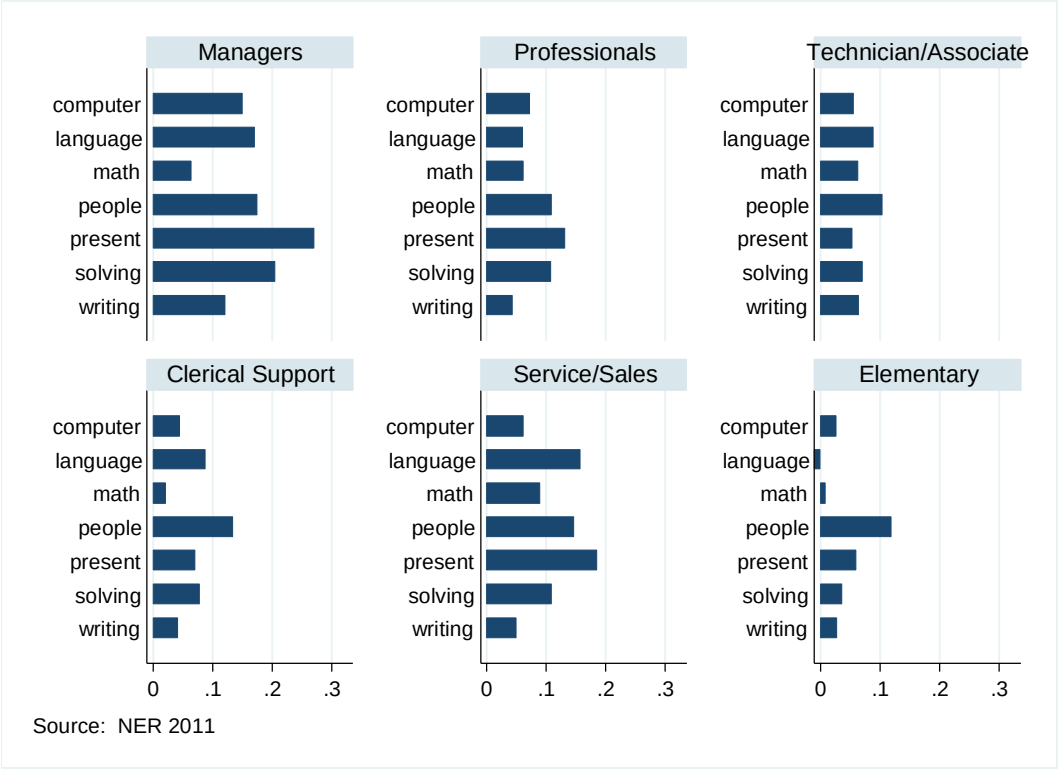
Figure 86: Required Skills in Each Occupation Based on NER



Source: NER 2011

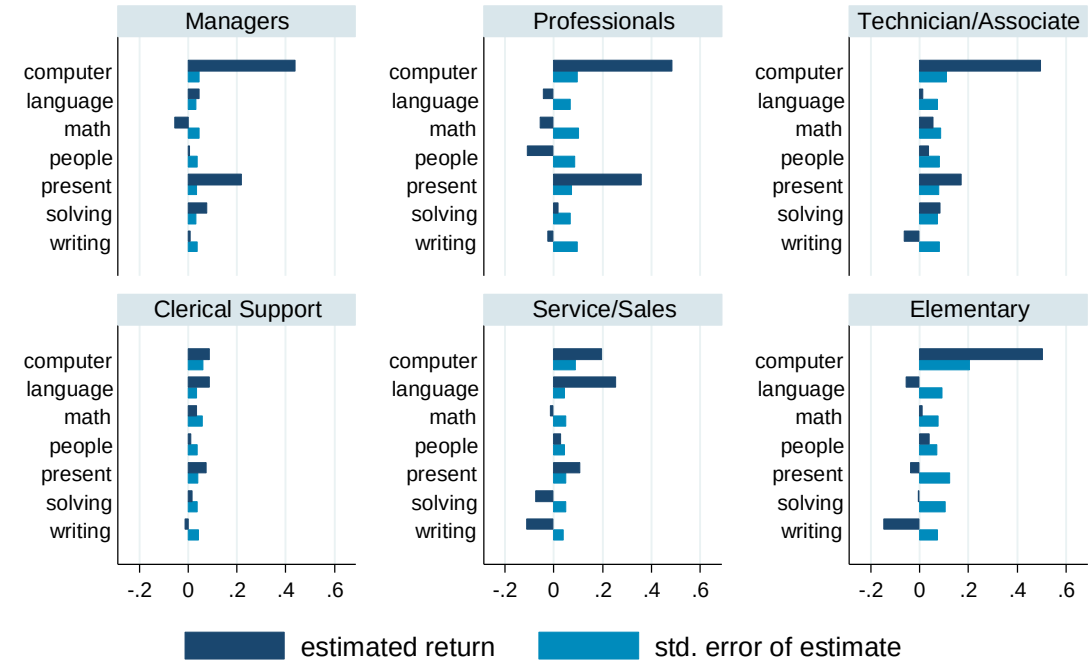
144. Figure 87 shows that high flyer firms have much greater skill requirements, and overall higher expectations of worker quality, than other firms. This is the case for every skill type and for each occupation. This pattern is most evident at the managerial level, where such skills as the ability to make presentations, interacting with coworkers, and problem solving ("more than 30 min. of thinking to find suitable solution"), not to mention English and IT, are needed to a much greater extent by high-flyers. Service and sales workers are also required to have substantially better English, people, and presentation skills in high-flying firms.

Figure 87: Do High-flyers have Greater Skill Requirements?



145. The evidence presented in the previous section shows that high-flyers are willing to pay their workers more than non-high-flyers at each level of formal education. The same is true for specific skills, evidenced by different wage premiums for specific skills as shown in Figure 88. IT skills, for instance, appears to be well compensated for in the labor market inasmuch as firms requiring computer literacy compensate their workers better. For those in service/sales, working in firms that require English also pays off. And, recall, that for this occupational category, English is particularly valued among the high-flyers. Lastly, where presentation skills are important, workers earn more, especially in management and professional jobs. The ability to make presentations, as seen above, is the skill that high-flyers need most relative to non-high-flyers.

Figure 88: Wage Premia for Required Skills



Source: NER 2011

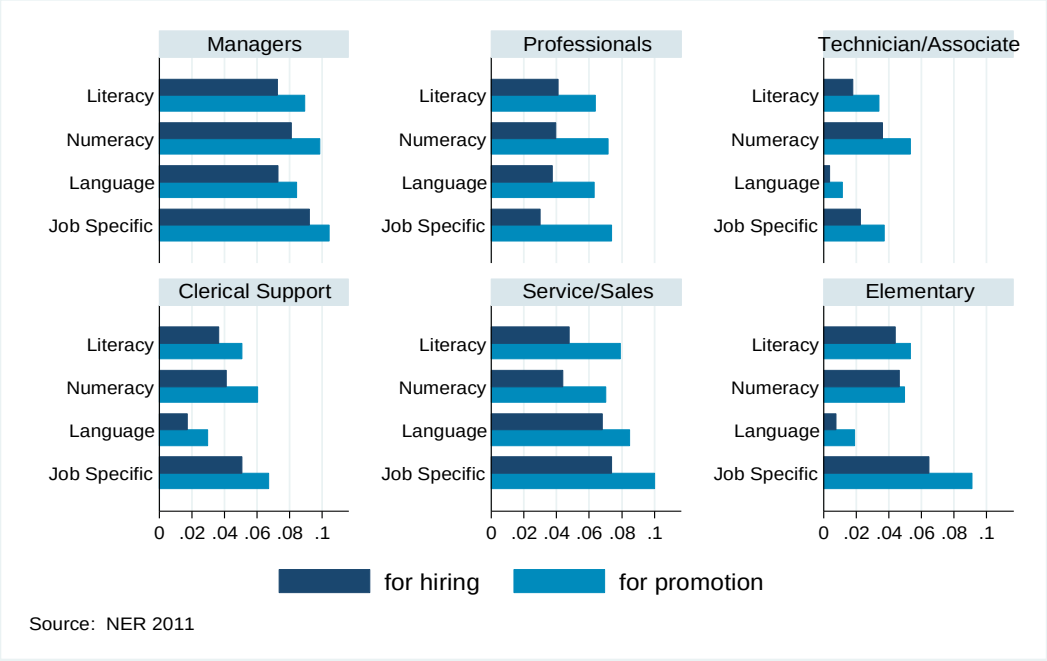
Desirable Skills: Hard and Soft

146. The NER collects information on the skills and attitudes viewed by firms as important for hiring (retention of new hires after initial probation) and for promotion. These include the 'hard' skills (literacy, numeracy, English, and job-specific skills) as well as the 'soft' skills (e.g., leadership, creativity, teamwork), among these the 'big-five' personality traits: openness, conscientiousness ('work ethic'), extraversion, agreeableness, and emotional stability. Recent research from high income countries has demonstrated the importance of these so-called OCEAN traits for labor market success (Heckman and Rubinstein, 2001).

147. Figure 89 and Figure 90 shows that while the data indicate that each of these skills is broadly valued across NKEA firms, of greater interest are the *differences* in skill valuation between high-flyers and non-high-flyers. The next three figures present these results for the three groups of skills: hard, soft, and big-five personality traits, respectively. There is a striking consistency in the findings. *Across virtually all occupations and all skill types, high-flyers place greater emphasis on skills.* While this is true for both hiring and for promotion, soft-skill and attitude differentials tend to be the more salient at the promotion stage. This could be because it takes more time to learn about a worker's personality traits than about his or her technical know-how.

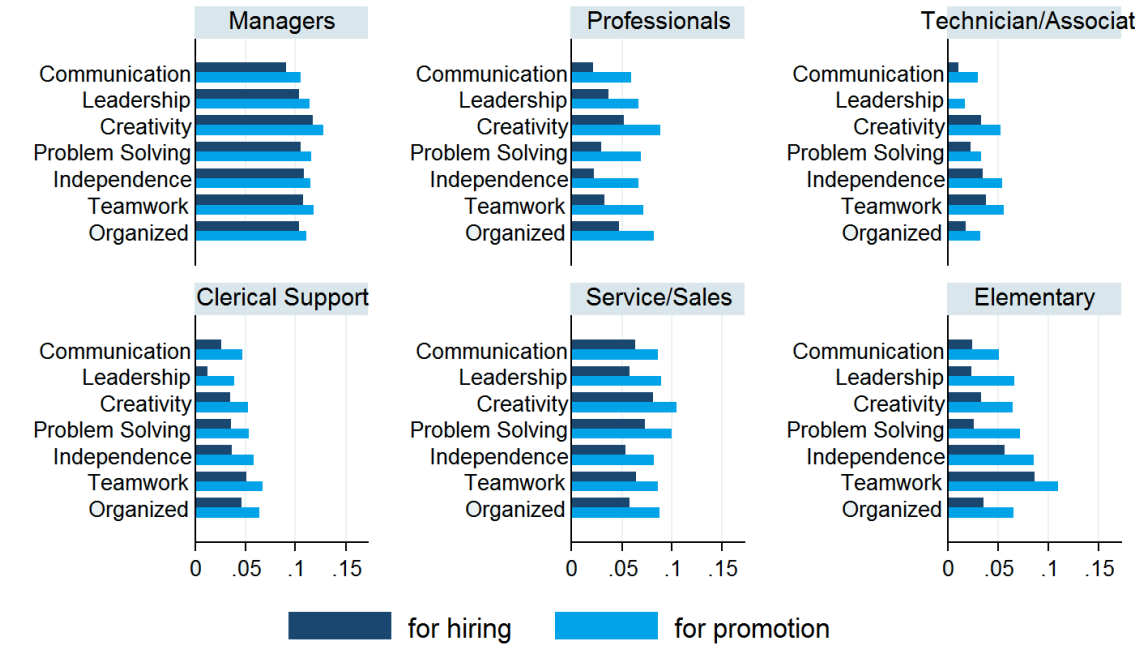
148. The largest hard-skill differentials are for managers and service/sales workers, a pattern mirrored in the soft-skills and big-five results as well. Remarkably, more so than non-high-flying firms, high-flyers are interested in the key personality traits—conscientiousness, emotional stability, teamwork, and independence—even for their elementary workers. At the other end of the skills spectrum, managers in high-flying firms must be more creative and better leaders, team-players, problem solvers, and communicators than their counterparts in non-high-flying firms.

Figure 89: High-Flyers Value Hard Skills More



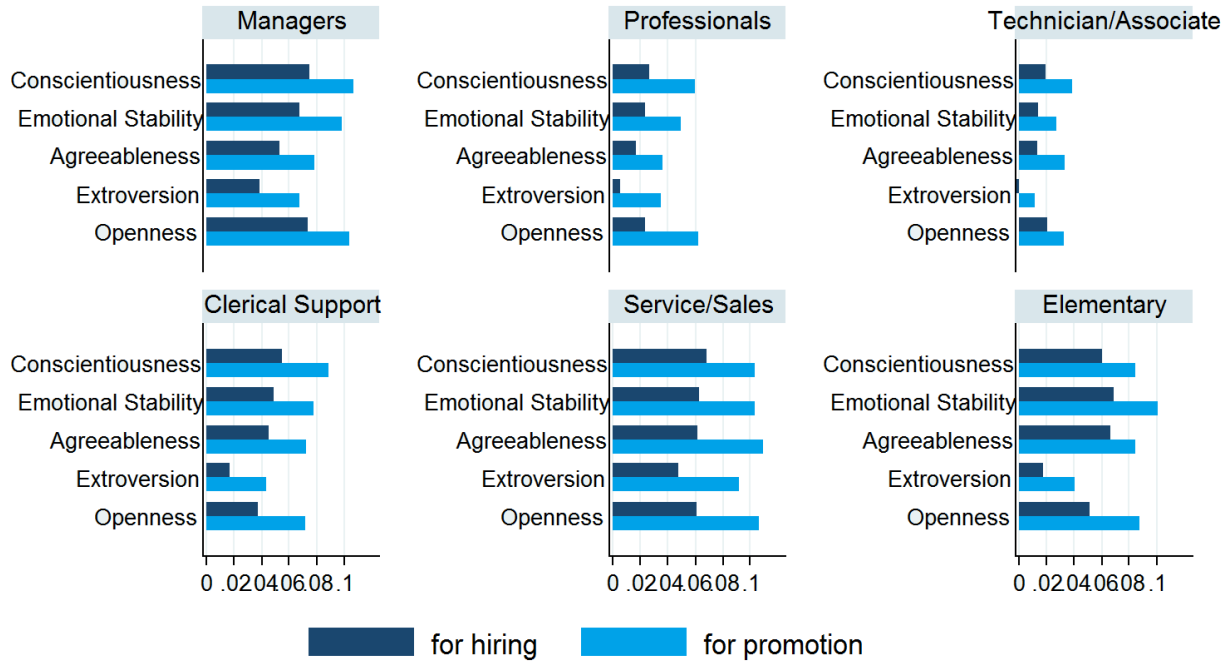
Source: NER 2011

Figure 90: High-flyers Value Soft Skills More



Source: NER 2011

Figure 91: High-Flyers Value The Big-Five More



Source: NER 2011

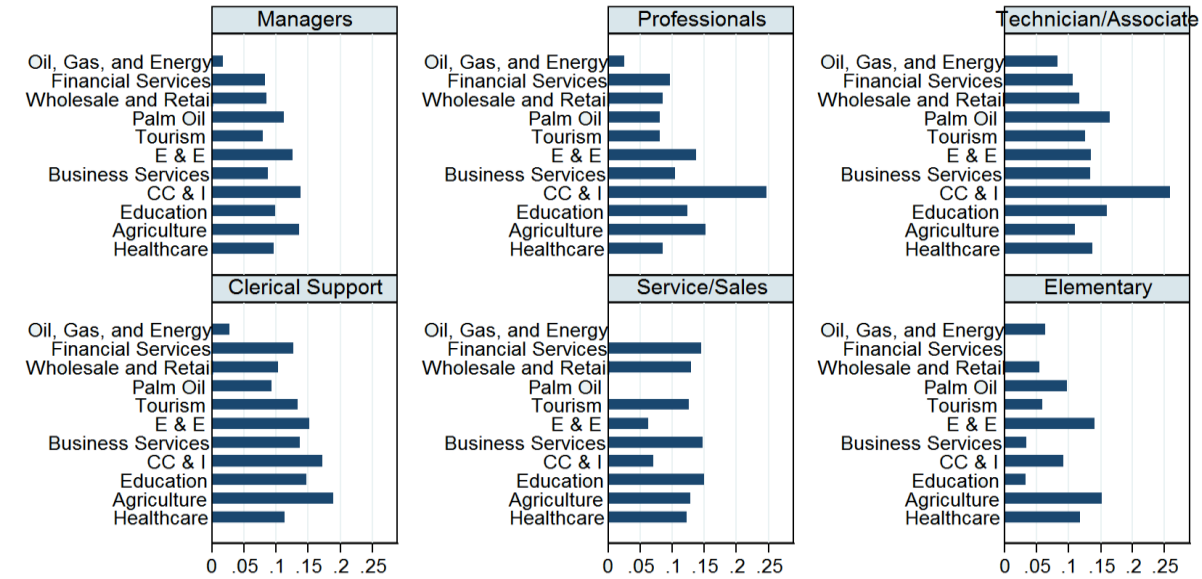
5.4 The Skills Gap and Responses to it

Specific skill deficits

149. Does the labor market adequately match the supply with the demand for skills? This is a key policy question. If there are information frictions that prevent efficient matching, then there may be a role for public provision of matching services and/or labor market information. The NER survey takes a direct approach to the issue of skills deficits by asking firms about them. Nine generic skills are investigated: IT, analytical, communications, language, problem solving, numeracy, literacy, teamwork, and technical.

150. An index of skill deficits allows a simple aggregation of the nine distinct skill deficit 0/1 indicators into a single number. Thus, the index takes a value of one if all skills are in deficit and a value of zero is none are in deficit, along with various intermediate values. Figure 92 shows how the index differs on average across occupations and NKEA industries. CC&I firms report the largest skill deficits for professional and technical staff, followed by E&E for elementary workers. The energy sector reports the smallest skill deficits overall.

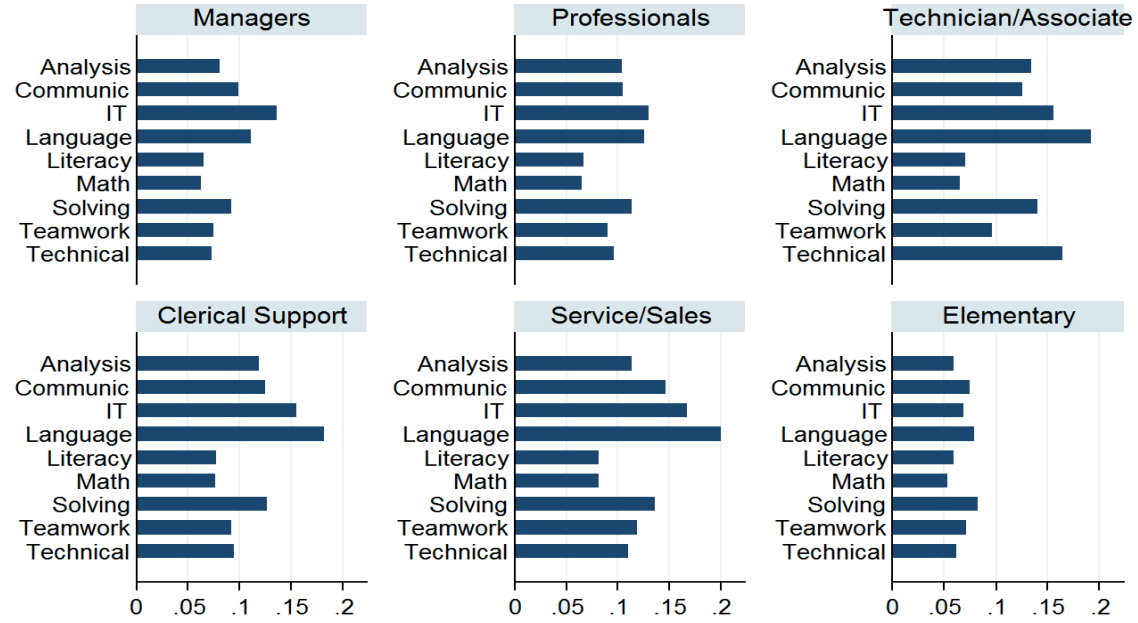
Figure 92: An Index of Deficits in Nine Distinct Skills



Source: NER 2011

151. Drilling down to specific skills in Figure 93, the largest deficits are in IT, particularly for mid-skill occupations. English language is also a major deficit area for these jobs. Deficits of technical skills reported for technician/associates raise concern about the adequacy of vocational training. Numeracy and literacy skills are broadly adequate. Comparing Figure 93 to previous findings, the skills most in deficit among NKEA firms, which are IT, language, and communication, also tend to be the ones with the largest wage premia (computer, language, presentations skills). This suggests that even though firms are willing to pay for these skills, they cannot always satisfy their demands.

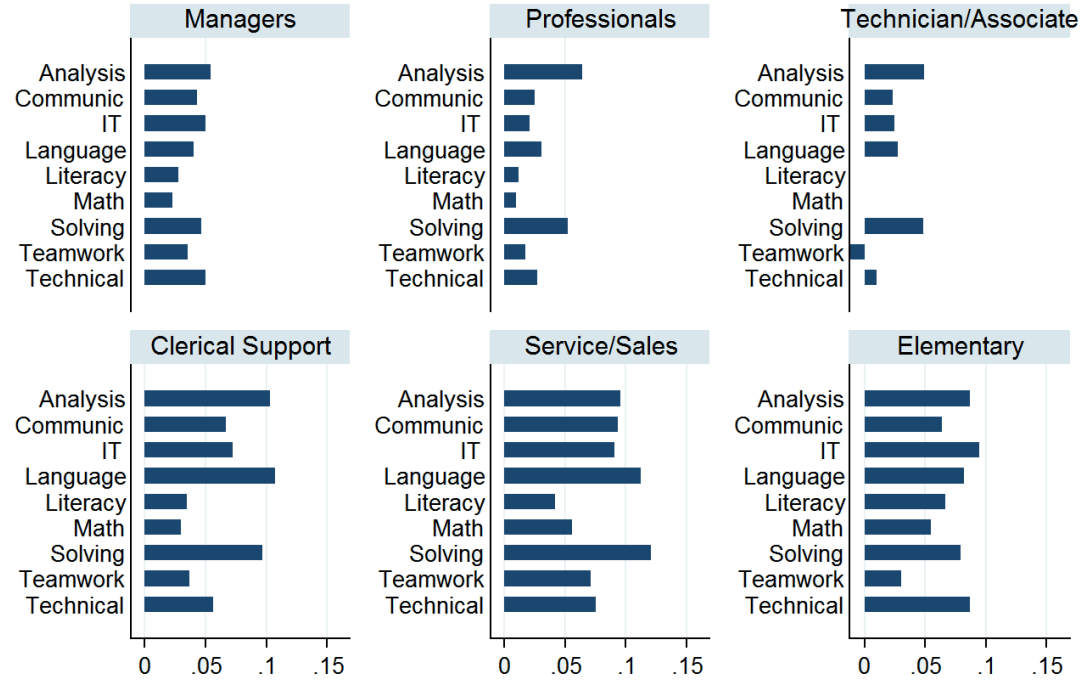
Figure 93: Deficits by Type of Skill



Source: NER 2011

152. Figure 94 shows that, across virtually all occupations and skills, it is the high-flying firms that are more likely to report skill deficits. Sometimes these differences are quite large; for example, high-flyers are around 12 percentage points more likely to report a deficit of English skills among their service/sales workers than non-high-flyers; 10 percentage points more likely among their clerical workers. *Deficits of similar magnitudes show up in analytical, problem solving, and communications skills for these mid-level occupations.*

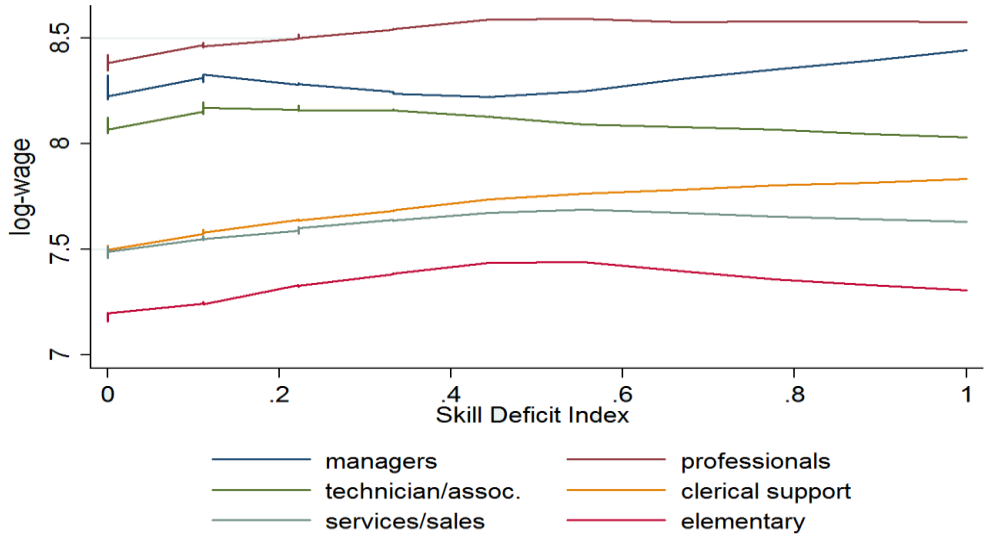
Figure 94: Do High-flyers Face Greater Skill Deficits?



Source: NER 2011

153. Are firms merely claiming skill shortages without actually without being willing to pay for more of these skills? This question can be explored by examining the link between (log) total compensation and the index of skill deficits discussed in conjunction with previous findings. Figure 95 suggests a positive, though not always *monotonic*, relationship between occupation-specific wages and the firm-level aggregate skill deficit index. Note that what appears to be a gradual slope actually represents considerable absolute earnings differences because the y-axis is in logs. Firms with greater skill deficits, therefore, *do* seem to be paying higher wages on average, presumably to retain their best workers or to lure better ones.

Figure 95: Are Firms Willing To Pay for More Skills?

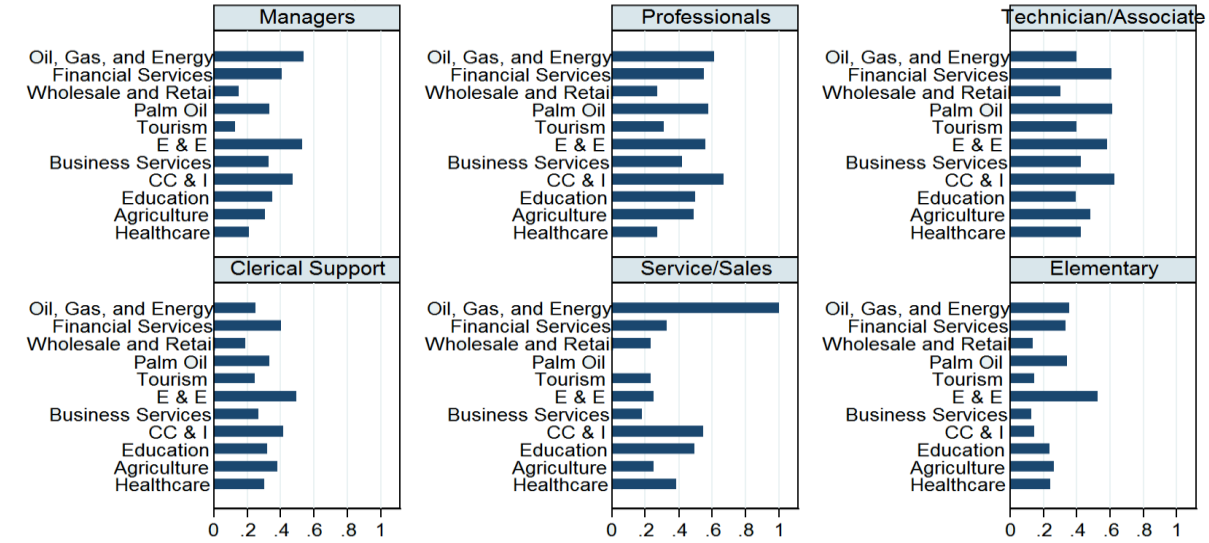


154. In sum, those firms presumably driving the knowledge-based economy of the 21st century, despite having better educated workers and paying them higher compensation, are precisely the ones facing the most acute skill shortages. The next two sections consider how firms respond to such deficits on both the intensive and extensive margins.

5.5 Training Done by Employers in the NKEA

155. Worker training takes many forms in Malaysia; on-the-job, through apprenticeships, and by specialized (public or private) training providers. Looking at the rate at which firms undertake training by occupation and sector in Figure 96, several noteworthy features emerge. In general, it is the professional and technical occupations that are more likely to receive training. Moreover, for high-skilled occupations, training is more common in the more innovative sectors, namely E&E, CC&I, OG&E, and palm oil.

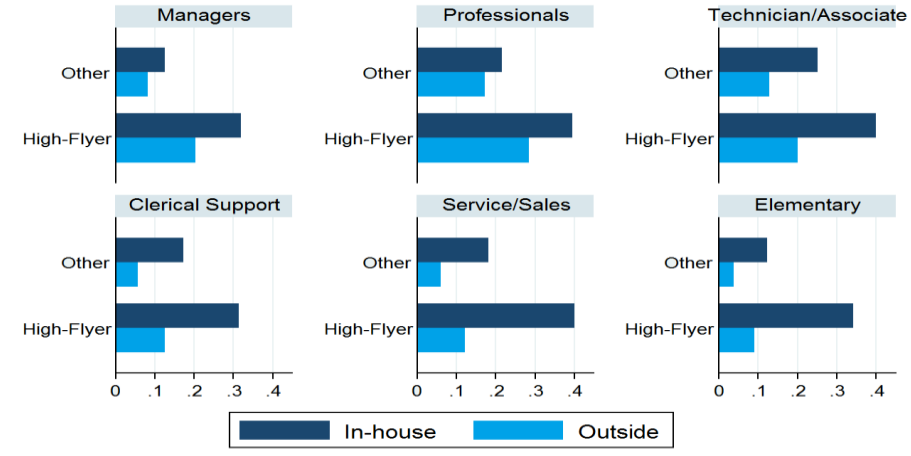
Figure 96: Rate of Worker Training by NKEA sector



Source: NER 2011

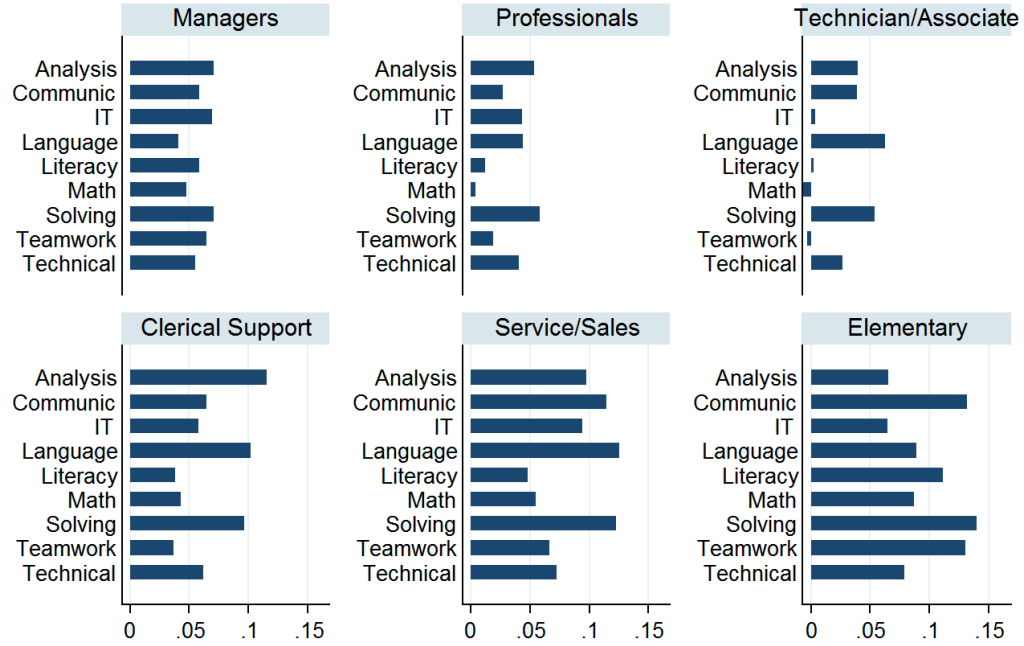
156. High-flying firms, who, as already established, face greater skill deficits, do a lot more training than non-high-flying firms. Figure 97 breaks down training into that which occurs in-house and that which is done outside the firm. Either way, high-flyers are investing more in skilling and up-skilling their workforce. A more direct exercise is to compare skill deficits across firms that train a particular category of worker against those who do no training of such workers. As illustrated in Figure 98 for practically every skill type and occupation, firms that are training are also reporting greater skill deficits. This is strongly suggestive evidence that firms resort to training as a way to overcome skill deficits.

Figure 97: High-flyers Train More



Source: NER 2011

Figure 98: Training Firms Have Higher Skill Deficits

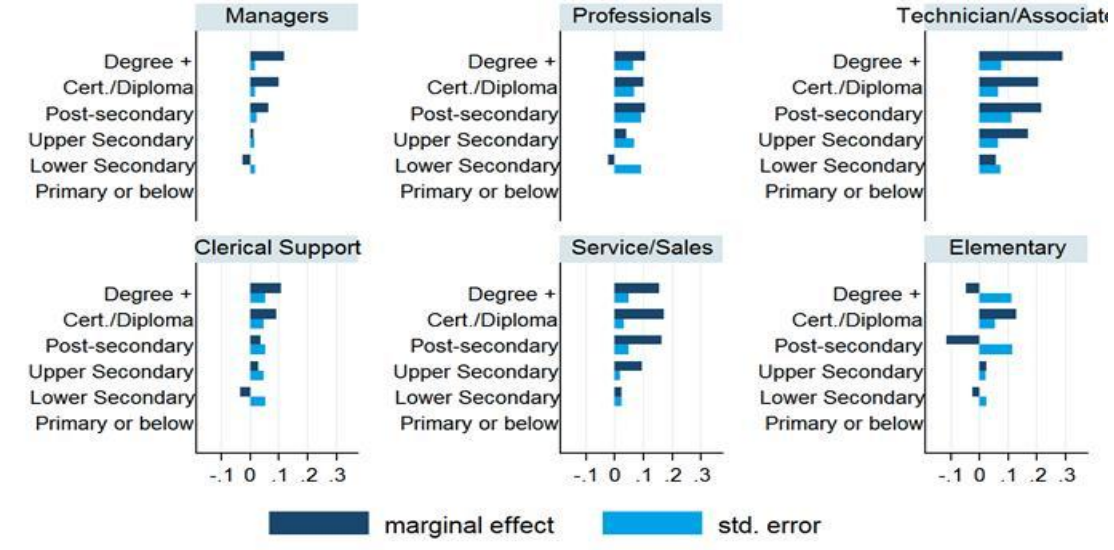


Source: NER 2011

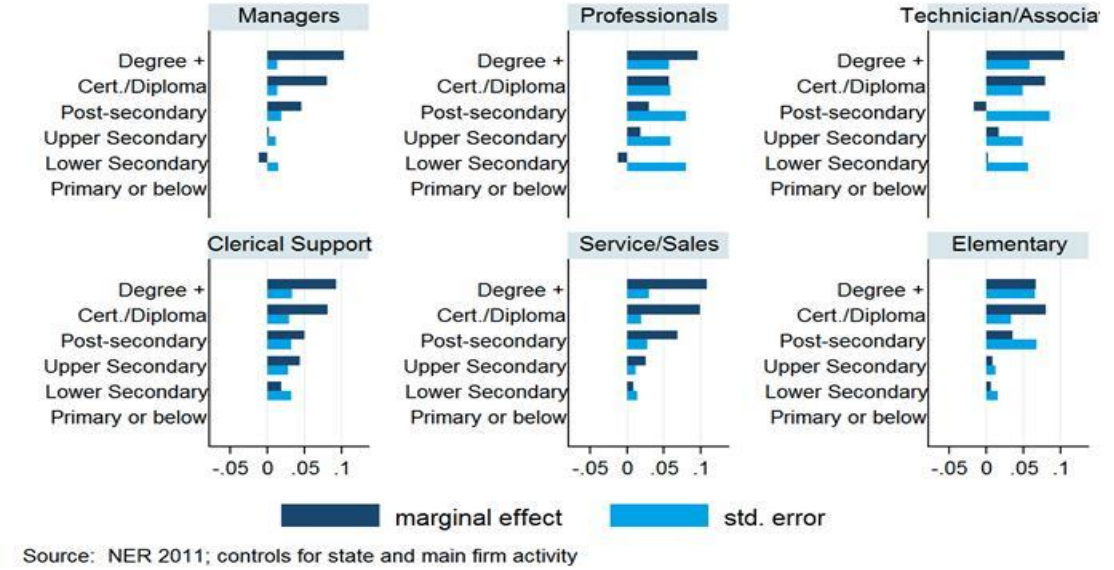
157. Presumably, firms would not undertake training without the expectation of worker productivity gains. Before investigating whether worker training leads to productivity improvements, it is critical to note that there is a significant association between worker education and training. That is, for high- to medium-skill occupations, firms with a larger proportion of highly educated workers are training a higher proportion of these workers (Figure 99); this is especially true for in-house training (top panel of figure). *Thus, in evaluating the productivity impact of training, one must be careful to control for worker characteristics as firms clearly self-select into training based on initial workforce quality.* Bearing this caveat in mind, the following paragraphs present the analysis of the training-productivity nexus[30].

[30] About 800 manufacturing firms from the Economic Census were matched based on their PSMB number to data from HRDF on firm-level training expenditures from 2007-2011.

Figure 99: Worker Training and Education



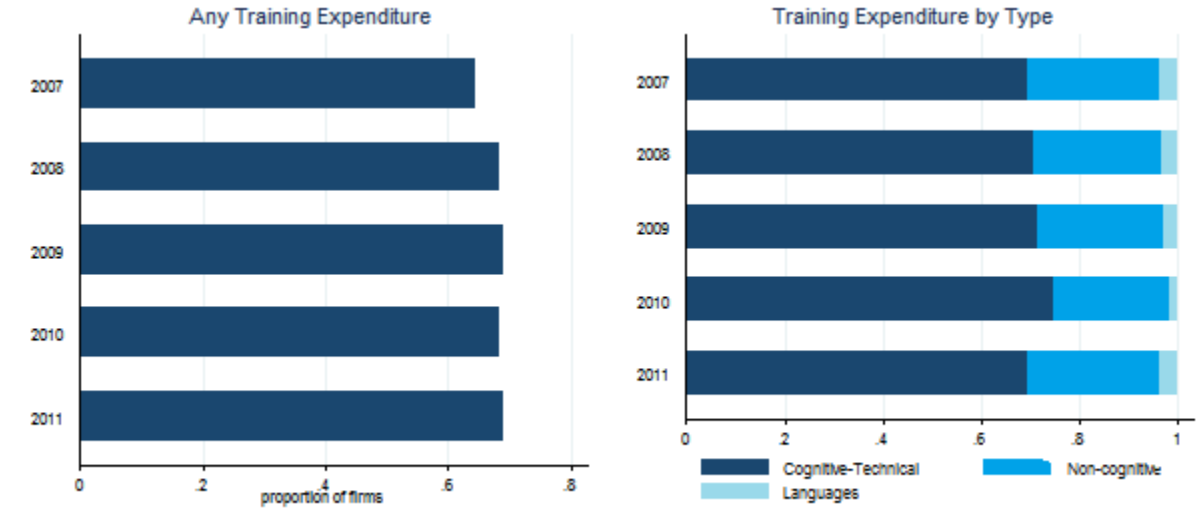
Source: NER 2011; controls for state and main firm activity



Source: NER 2011; controls for state and main firm activity

158. As seen in the left panel of Figure 100, more than two-thirds of registered firms incur training expenditures and most of these are for cognitive/technical skill enhancement as opposed to training in non-cognitive or language skills (right panel).

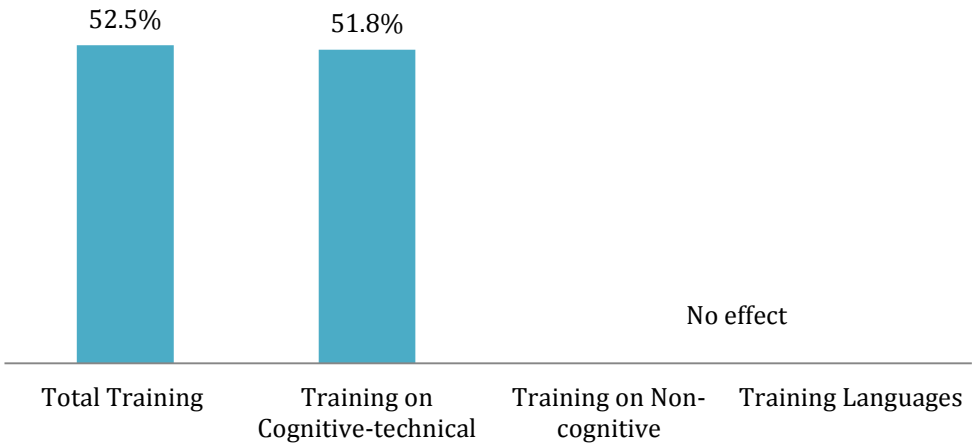
Figure 100: Training Expenditures under the PSMB



Source: Economic Census 2010 & PSMB

159. Results of a regression analysis of log value-added per worker, taking into account (or controlling for) firm size, state of operation, and worker education and occupational structure, are displayed in Figure 101 (boldness of bars indicates statistical significance). Overall, the returns to training (cumulative expenditures per worker in the three years preceding 2010, the year value-added per worker is measured) appear quite large, although virtually the entire 'bang' is coming from 'ringgits' spent on cognitive-technical skill development; training on non-cognitive skills does not have a statistically detectable impact on labor productivity.

Figure 101: Impact of Training on Labor Productivity

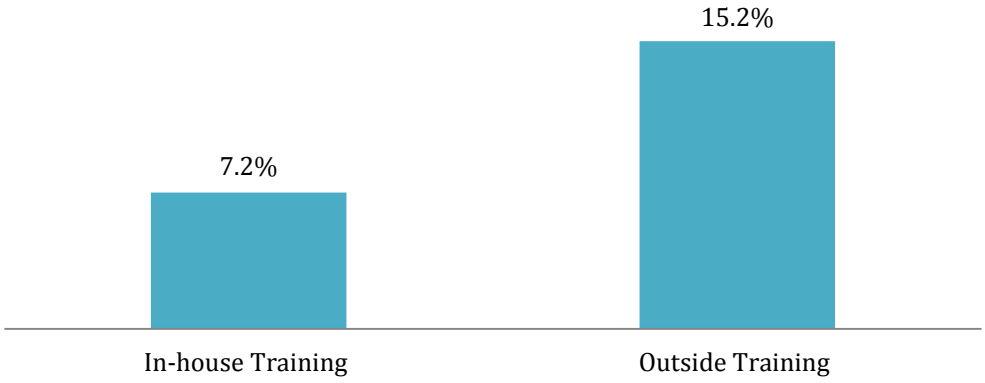


Source: Authors' analysis based on Economic Census 2010

160. A different perspective on training can be gained by looking at the totality of NER firms with matched Economic Census data; in other words, the subset of firms with value-added and training information based on the NER questionnaire. Almost 40 percent of these firms are in manufacturing. In this case, training intensity is measured not by expenditures per worker as above but by indices of in-house and outside training (i.e., weighted sums across

the six occupation categories of the proportion of workers trained by each method, where the weights are the proportion of the total firm wage-bill paid to that occupation category). As before, training is found to significantly enhance worker productivity (see Figure 102) after controlling for the same set of firm/worker characteristics. But the key result here is that outside training leads to substantially higher productivity gains than in-house training.

Figure 102: Training Types and Labor Productivity

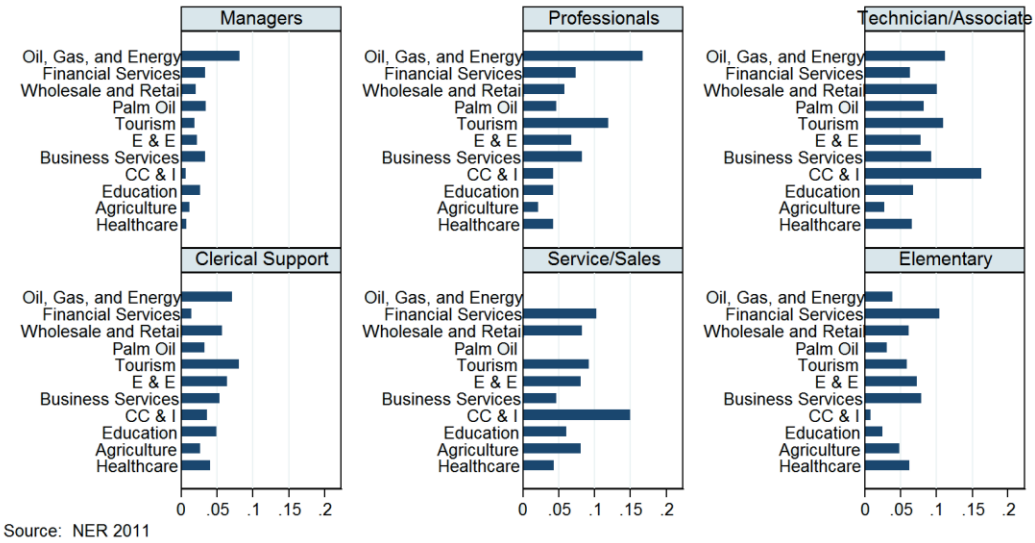


Source: Authors' analysis based on Economic Census 2010 and NER 2011 matched data

5.6 Recruitment

161. Firms experiencing growth and/or talent shortages are more likely to recruit new workers. A broad picture of job vacancy rates (ratio of positions vacant to extant workers in that occupation) across NKEA industries can be gleaned from Figure 103. In general, there are relatively more openings for professional and technical people, which are also the occupations where more training occurs. Hence, firms are aligning their skills enhancement policies on both the intensive and extensive margins.

Figure 103: Job Vacancies in the NKEA Sectors



162. Comparing, once again, high-flyers with other firms, one sees much higher vacancy rates across all occupation categories (Figure 104). So, high-flyers respond to their greater skill deficit by recruiting. Moreover, they do relatively more recruiting for occupations where skill deficits are the most acute, namely services/sales. More direct evidence for this very same phenomenon is seen in Figure 105, which compares firms with high (above 33 percent) vacancy rates in a particular occupation to firms with low vacancy rates. *For every skill/occupation combination, high vacancy firms are reporting greater skill deficits.*

Figure 104: High-flyers Have More Job Vacancies

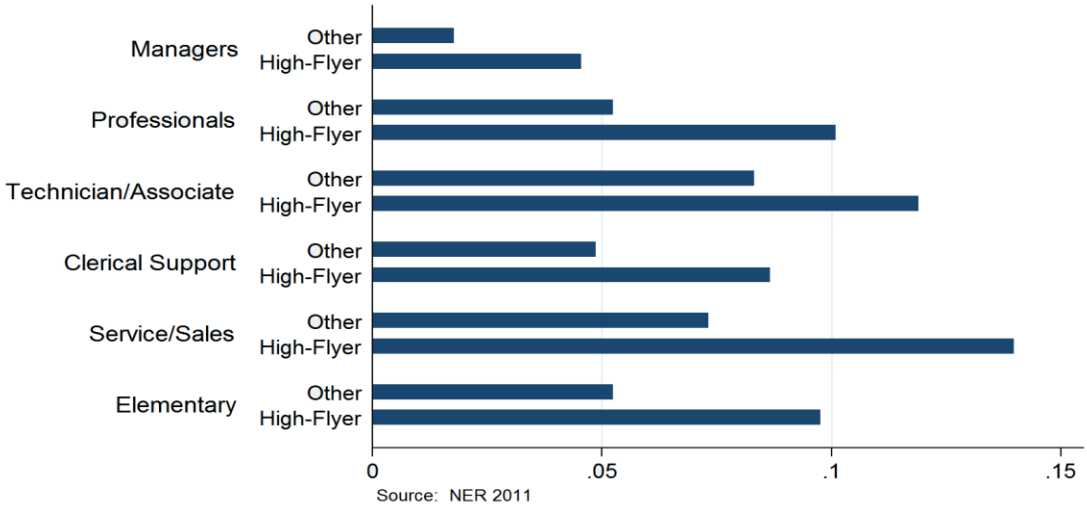
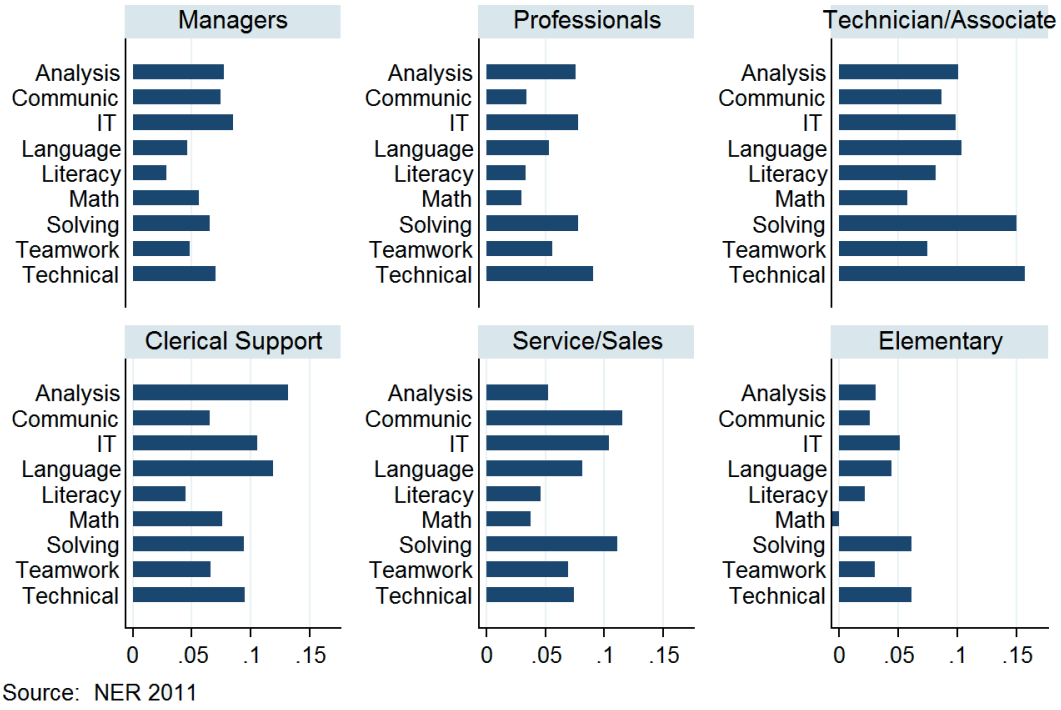


Figure 105: Firms with High Vacancy Rates Have Greater Skill Deficits



163. The main finding from this analysis is that firms are far from impotent in the face of skill shortages. Training of existing workers and recruitment of new ones will, over time, lead to a better alignment of the workforce with skill requirements. Thus, as will be discussed in Chapter 9, a critical role for the government is to not only strengthen the quality of existing publicly provided formal education but also to facilitate the process of private training wherever possible, principally by supplying information, which is to a large extent a public good.

Chapter 6: English Language as a Mode of Instruction

6.1 Introduction

164. Malaysian employers offer a wage premium for being able to communicate well not only in Bahasa but also in English. In fact, this skill relates directly to the second Pillar of a knowledge economy, as it allows workers and firms to be better integrated with the global economy. As evidenced in Chapter 5, employers in High Flyer firms expect their higher skilled workers to be able to communicate effectively in both Bahasa and English; especially in export oriented and services sectors. Even though English language skills are supposed to be taught in Malaysian schools, various changes in language related policies have had an effect on how well this skill is being imparted throughout the country. This chapter measures the impact of changes in language policy in Malaysia in 1970s and 2003.

165. The primary language of instruction in the public education system is a choice with clear tradeoffs. There is a direct relationship between language on instruction and quality of learning. Students' learning in an English-medium school system heavily depends on their English language ability as well as on the language ability of their teachers to impart the curricula. If, for instance, students encounter problems in fully understanding subjects taught in English, or teachers' pedagogical strategies are more limited when the medium is not Bahasa, the results may not be satisfactory and may negatively impact students' learning.

166. The chapter explores this complex relationship by assessing the impact of two language policy changes in Malaysia: 1) switch to Bahasa Malaysia from English in public schools in 1970, and 2) introduction of English as the main language on instruction for mathematics and science in 2003.

6.2 Evaluation of the 1970's Policy Change

167. Between 1957 and 1975 the Government implemented a series of policies aimed at standardizing education across the country. In 1957, the Government of what was then the Federation of Malaya issued the "Razak Report". Among other things, the report proposed the standardization of languages of instruction, narrowing them to just four: for Chinese schools, Kuo-yu (Mandarin) would be the language of instruction; for Indian schools, Tamil would be the medium; likewise for Malay; and English would remain as before. A series of additional reports and acts followed, including the abolition of primary school fees in 1962, refinements of the secondary entrance process in 1964 and 1967, and—crucially for this work—a conversion process for English language primary schools to switch to Bahasa Malaysia (language) that started in 1970 and concluded in 1975 (Ministry of Education Malaysia, 1975). In this part of the chapter, the focus is on the effects of the policy change on three categories of outcomes: language skills, educational attainment and labor market outcomes[31].

[31] In particular, this subsection tries to answer the following questions: Did changing the language of instruction in primary schools affect students' long-run literacy? Did changing the language of instruction in primary schools affect students' long-run educational attainment? Did changing the language of instruction in primary schools affect students' long-run wages?

Methodology

168. The method used to measure the effects of the 1970 policy change on different labor market and education outcomes is known as *regression discontinuity design*. Malaysians born in 1963 were seven years old in 1970, the year in which the policy of interest in this analysis took effect in primary schools. The econometric methodology adopted takes this into account by following three steps: 1) estimation of a trend in the outcome of interest prior to the cohort that entered school in 1970: people born prior to 1963; 2) estimation of a trend in educational attainment or wages starting with the cohort that entered school in 1970: people born in 1963 or later; 3) comparison in the outcomes between these two groups.

169. The specification used to measure the reduced-form effects of the policy change on different outcomes can be written as:

$$Y_i = \alpha_0 + \alpha_1 D_i + \alpha_2 YOB63_i + \alpha_3 D_i * YOB63_i + \alpha_4 X_i + \varepsilon_i$$

170. where, Y_i is the outcome of interest for individual *i*; D_i is an indicator for whether an individual was born in 1963 or later; $YOB63_i$ is the year of birth of the individual, normalized to zero for birth year 1963; X_i is a vector of explanatory variables; and ϵ_i is an error term. We restrict "bandwidth" in this analysis to a range of years around the cutoff for which data pass basic specification tests, discussed further in the Annex.

Data

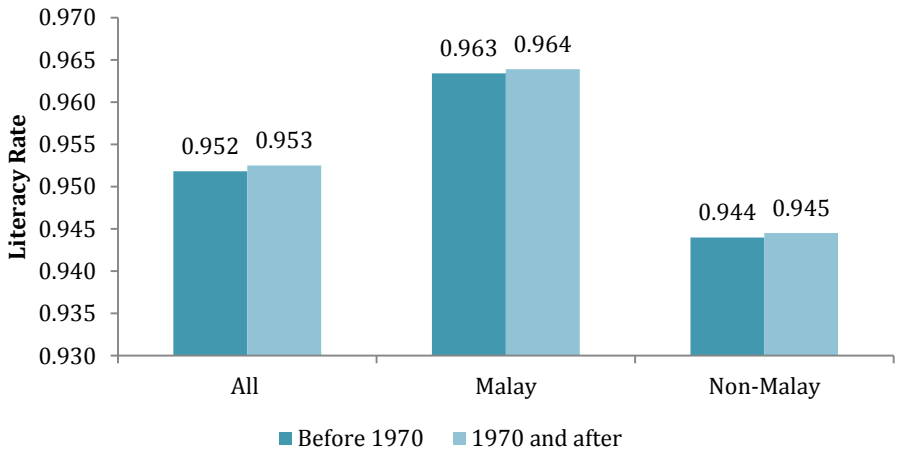
171. Among the available data sets, language fluency is measured on the second Malaysian Family Life Survey (MFLS2) and the 1980 census. All datasets include information on schooling, but only the LFS includes wages. The 1980 census is unfortunately early for this group: literacy skills appear to change at this age. The MFLS2 is later and thus this group is older. The survey asks many more questions, but the sample is smaller (see Annex 6). Both the 1980 and 2000 censuses ask about literacy, however, making analysis of literacy possible in these data sets. In addition, all datasets include schooling, though post-primary schooling is still changing for those in the 1980 census. Finally, only the LSF includes information on wages with a sufficient sample size[32].

6.3 Results

172. The change in medium on instruction did not have an impact on Malaysians' ability to read and write. In the 2000 census, there appears to be no effect of the policy change on literacy; nearly 100 percent of the population born before 1963 reports being literate. This is true also for the post-policy change cohort. Despite the fact that literacy rates differ slightly across ethnic groups, none of them experienced significant changes as a result of the introduction of the new policy (Figure 106).

[32] Three main sources of data were identified for this analysis: four rounds of the Malaysian Labor Force Surveys (LFS); the second Malaysian Family Life Survey (MFLS2); and two years of the Malaysian Census (1980 and 2000). Those born in the cutoff year, 1963, would be different ages in each dataset: during the four years (2007-2010) of LFS used these people would be between 43 and 47 years old; in the MFLS2, collected 1988-1989, they would be between 24 and 26 years old; and they would be 16-17, 27-28, or 36-37 in each of the census rounds (Annex 6 has more information).

Figure 106: Impact on Literacy (Census 2000)



Source: Authors' analysis based on Census 2000

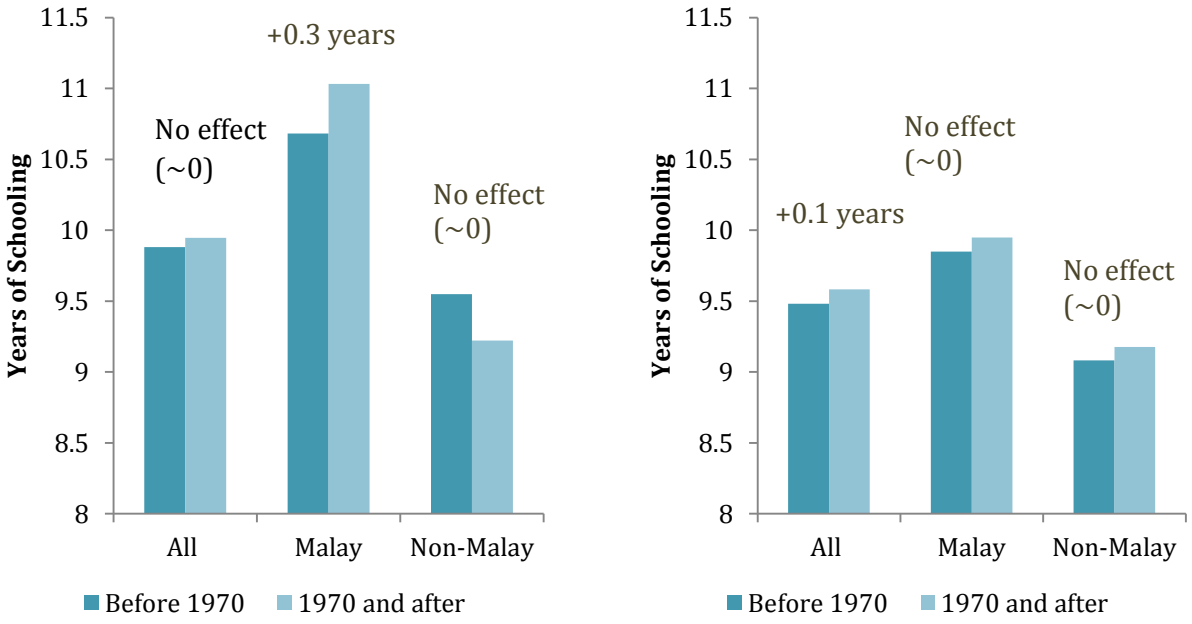
173. The impact of the policy change on schooling was small and positive. Ethnic Malays are the ethnic group that seems to benefit the most. Results based on the LFS show that, while the policy change did not alter significantly schooling levels for the population as a whole and for the non-Malay ethnic group, it resulted in a 0.3 years increase in schooling for ethnic Malays (Figure 107 – left panel). On the other hand, Census data show that the impact was positive for the whole Malaysian population (0.1 years), but minimal when measured on the two distinct ethnic groups.

174. Such divergence between the two data sources is likely due to the fact that, differently from the LFS, the Census also includes data on non-wage earners[33]. Despite these differences, the pattern that emerges is that the policy change had a small positive effect on Malaysians' schooling, with a stronger impact on ethnic Malays. In order to understand better these patterns, the next step is to understand how the 1970 change influenced the probability of completing different levels of schooling.[34]

[33] As shown in Chapter 4, wage-earners and non-wage earners have very different profiles, including their ethnic distribution. Since non-wage earners, and especially self-employed are mainly Malaysians of Chinese ethnicity, it is likely that this cohort of non-wage earners born after 1963 has also been affected by the changes introduced as part of the New Economic Policy launched in 1971.

[34] The following results on the probability of completing different schooling levels are based on Census data. However, the last 4 columns in Table 4 in the Annex shows that same findings emerge from LFS data.

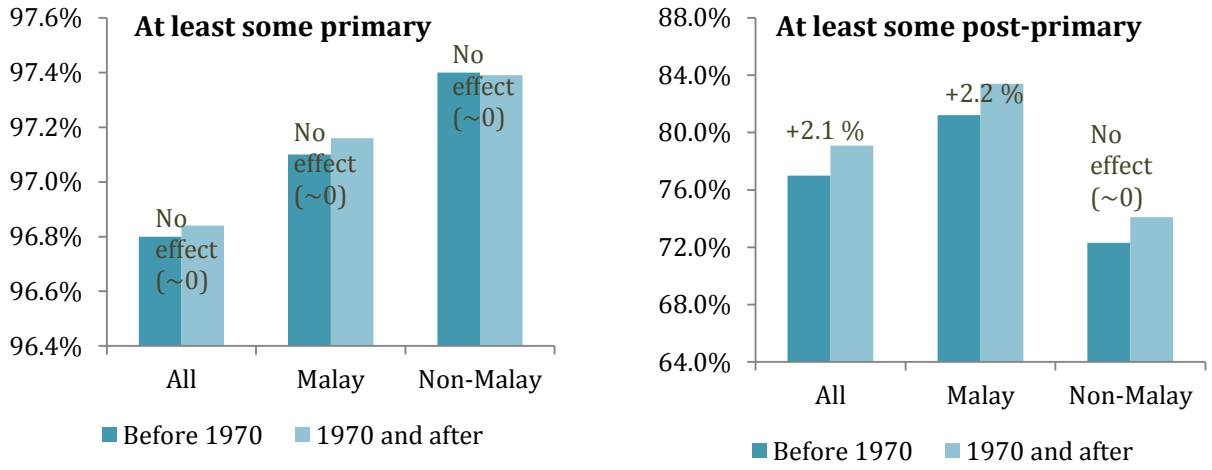
Figure 107: Impact on Years of Schooling (LFS - left panel, Census – right panel)

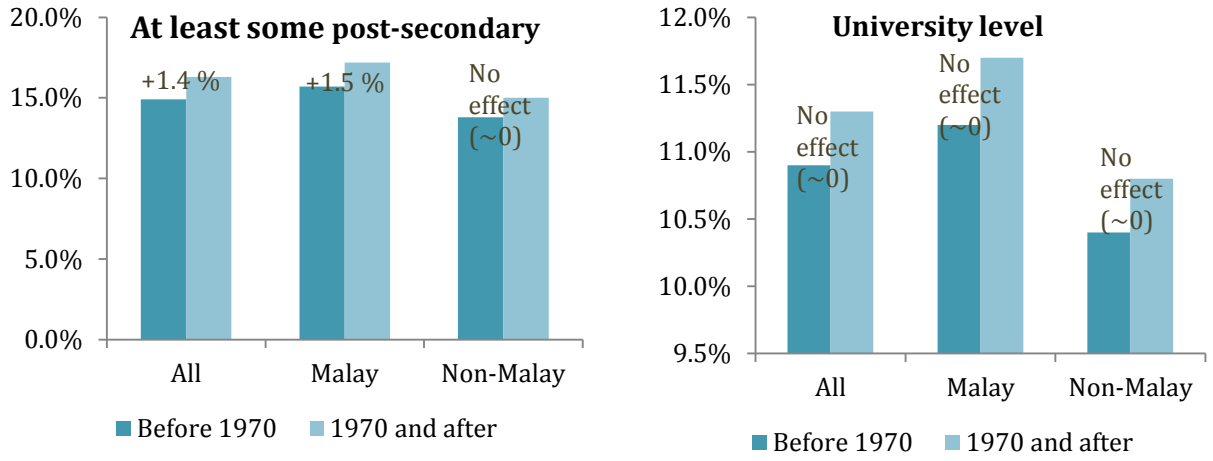


Source: Authors' analysis based on Malaysian LFS 2007-2010 (left panel) and Census 2010 (right panel)

175. The introduction of Bahasa Malaysia as a language of instruction did not have an effect on the probability of attending primary school or of reaching university level. The absence of an effect on the probability of going to primary school should not be interpreted as a bad outcome because the main reason for the lack of measurable effect is that nearly 100 percent of the population reports at least having gone to primary school; therefore, there is little room for there to be an effect. On the other hand, the negligible impact on university education is probably due to the fact that at this high level of education the language of instruction does not play a crucial role in students' schooling decisions (Figure 108).

Figure 108: Impact on Probability of completing different Schooling levels, Census 2000



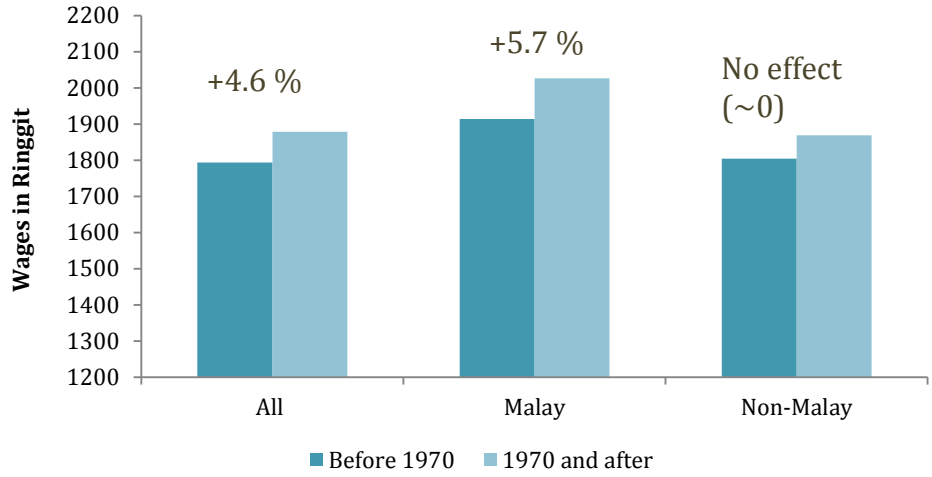


Source: Authors' analysis based on Malaysian Census 2000

176. The introduction of Bahasa Malaysia as the language of instruction increased the probability of reaching post-primary and post-secondary schooling, however. The choice of language of instruction is likely to have an impact on students' learning and, hence, on the level of instruction that is optimal for them to acquire. In line with this hypothesis, students more fluent in Bahasa Malaysia than in English likely decided to pursue further studies after the 1970 policy change. Results confirm this conjecture. Using the Census data, results show this to be true at the post-primary and post-secondary level. The switch to Bahasa Malaysia as the medium of instruction led to a 2.1 percent increase in the probability of completing at least some post-primary and to a 1.5 percent increase in the probability of reaching post-secondary level. The effect is stronger for ethnic Malays, while it is negligible for the other groups.

177. Results based on the LFS show that the 1970 change resulted in an average wage increase for Malaysian workers of 4.6 percent. The effect, however, is clearly driven by the large impact on wages of ethnic Malays (5.7 percent) in particular, as the wage impact on other ethnic groups was minimal (Figure 109).

Figure 109: Impact on Wages (LFS 2007-2010)



Source: Authors' analysis based on Malaysian LFS 2007-2010

178. The 1970 policy change is likely to have affected both the quantity and the quality of education acquired by Malaysian students. The estimated wage increase is large relative to the corresponding change in schooling. This indicates that the policy change did not only affect the quantity of education acquired, but also the quality of learning: perhaps students were able to learn more in each additional year of schooling when lessons were imparted in their own language or when lessons were not imparted in a language in which teachers struggled to teach well.

179. The main message of this section is that the change in Malaysia's national policy in 1970 clearly benefited ethnic Malay children, both in school attainment, and in eventual wages. The policy change did not alter the fraction of the population that was literate, nor did it change the fraction of the population in peninsular Malaysia that attended any school at all, since both of those figures were already close to 100 percent. Rather, it allowed the more academically able ethnic Malay students to progress further in their education.

180. The results shown in this section suggest that adopting a medium of instruction that teachers and learners know well improves learning, especially at primary and secondary levels. Fluency in English is an important characteristic for the workforce, and this was evidenced in the previous chapters of this report. However, evidence shows that students' learning is significant higher when education is provided in the language in which teachers are most proficient and the language to which students are more regularly exposed. For this reason, the key lesson that emerges thus far is that there are clear economic benefits (higher quality workforce) resulting from adopting Bahasa Malaysia as the language of instruction in primary and secondary schools. It is important to caution policymakers from misinterpreting these results to say that teaching English language is not important; on the contrary, English as a foreign language is increasingly important, especially in an increasingly globally linked economy. Therefore, clear channels for teaching English as a second language should accompany basic education so that students are better able to compete globally. And, meanwhile, the government should consider investing in increasing teachers' English proficiency so that they can eventually be able to teach in English.

6.4 Evaluation of the 2003 Policy Change

181. In 2003 English was reintroduced as the language of instruction for mathematics and science in primary and secondary schools[35]. The policy change in 2003 was designed to help the younger generation of Malaysians acquire new scientific knowledge more easily (Gill 2007) as well as to improve their English language fluency. As a result, students beginning the first grade (standard one), seventh grade (form one), and twelfth grade (lower six) in 2003 would begin learning mathematics and science in English for the rest of their schooling years. The rest of students would instead experience the switch only when they started the next level of education.

182. This part of the chapter evaluates how the change in the language of instruction for mathematics and science from Bahasa Malaysia to English affected the performance of Malaysian students—as measured by students' standardized test performance at lower secondary level. Such a policy change could have potential long-term implications on the human capital and skills of the Malaysian labor force given the interrelation between language proficiency, skills acquisition, and labor market performance. A full review of the literature is in Annex 6.

[35] On May of 2002, the then Prime Minister of Malaysia, Dr. Mahathir Mohammad, announced that the language of instruction for mathematics and science in all national schools would switch from Malay to English in 2003 (Gill 2007).

Data and Methodology

183. The analysis is based on three waves of data from the Trends in International Mathematics and Science Study (TIMSS). TIMSS is an international assessment of mathematics and science given to fourth-grade and eighth-grade students every four years since 1995. Forty-five economies participated in TIMSS 1995 and the number of participants increased to roughly 60 in 2007. Malaysian eighth graders have been participating in the study since 1999.

184. TIMSS samples a nationally representative set of schools from each participating economy, and then samples a set of students within one or several classes of each school. Students selected to participate in TIMSS are given mathematics and science tests that last 90 minutes each. In addition to assessing students' achievement in mathematics and science, TIMSS also collected information about characteristics of students, characteristics of teachers, as well as characteristics of schools through survey questionnaires.

185. The focus here is on changes in the test scores of eighth graders between 2003 and 2007. Eighth graders in 2003 were not affected by the policy change, as they learned mathematics and science in Malay during their primary education and most of their secondary education. On the other hand, the younger cohort of eighth graders in 2007 was affected by the policy change. They learned mathematics and science in Malay, Chinese, or Tamil as the language of instruction when they were in primary school, but as they entered secondary school, the subjects were taught in English instead. Thus, changes in the test scores of these two different cohorts of students are used to understand the impact of the policy change. In addition, even if the focus is on years 2003 and 2007, variation between 1999 and 2003 is used to select the country representing the comparison group.

186. Simple descriptive statistics show that the performance of Malaysian students fell, though resources increased between 2003 and 2007. Table 13 presents summary statistics of the relevant variables from the Malaysian sample by TIMSS year and subject. There are 5314 students in the 2003 and 4466 students in the 2007 samples. Each student's raw scores are divided by the total scores to generate the variables *pct math* and *pct science* that measure students' achievement in mathematics and science, respectively. Table 14 shows characteristics that could possibly hinder a school from effectively delivering mathematics and science education. These school characteristics include several variables indicating whether a school suffers from shortages of instructional materials, computer hardware, computer software, library materials, and scientific equipment.

Table 14: Summary Statistics of Relevant Variables

	2003				2007				Difference
Variables	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean
Pct math	0.469	0.202	0.034	0.983	0.418	0.207	0	0.972	-0.051
									(0.004)***
Pct math - Malay	0.422	0.178	0.034	0.950	0.372	0.179	0	0.971	-0.050
									(0.005)***
Pct math - non-Malay	0.516	0.214	0.063	0.983	0.461	0.220	0	0.972	-0.055

									(0.006)***
Pct science	0.431	0.165	0	0.938	0.387	0.182	0	1	-0.044
									(0.004)***
Pct science - Malay	0.410	0.150	0	0.875	0.374	0.162	0	0.886	-0.036
									(0.005)***
Pct science - non-Malay	0.453	0.175	0	0.938	0.400	0.197	0	1	-0.053
									(0.005)***
Malay	0.507	0.500	0	1	0.486	0.499	0	1	-0.021
									(0.011)*
Shortage - inst. materials	0.192	0.394	0	1	0.127	0.327	0	1	-0.065
									(0.008)***
Shortage - supplies	0.211	0.407	0	1	0.094	0.268	0	1	-0.117
									(0.008)***
Shortage - buildings	0.185	0.398	0	1	0.157	0.357	0	1	-0.028
									(0.008)***
Shortage - heat & light	0.129	0.338	0	1	0.138	0.322	0	1	0.009
									(0.007)
Shortage – inst. space	0.178	0.392	0	1	0.171	0.373	0	1	-0.007
									(0.008)
Shortage - teachers	0.192	0.385	0	1	0.125	0.319	0	1	-0.067
									(0.008)***

Notes: Sampling weights are used in calculating the means. Robust standard errors are reported in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%

187. Comparing the mean differences of variables in Table 14, one notes that the performance of Malaysian students fell, while resources increased between 2003 and 2007. The younger cohort scored an average of 5.1 and 4.2 percentage points worse than the older cohort in mathematics and science, respectively. Furthermore, the policy change appears to affect Malay and non-Malay students differently.

188. The econometric approach used to estimate the effect of the 2003 language policy change on the mathematics and science achievements of eighth graders is known as the difference-in-difference approach. It entails the following steps: 1) estimation of the mean difference in test scores between the two Malaysian cohorts of interest; 2) estimation of the mean difference in test scores between two cohorts of students from a set of comparable countries; and 3) comparison of the two estimated mean differences. The measurement equation[36] takes into account various school characteristics. These school characteristics

[36] The differences-in-differences specification takes the following form: $test_{isjt} = \alpha_0 + \alpha_1 Post_t + \alpha_2 Malaysia_i + \delta(Post_t \times Malaysia_i) + \beta' x_{sjt} + \varepsilon_{isjt}$ The outcome variable

include whether there is a shortage of instructional materials, the total items of shortages in mathematics related materials, and the total items of shortages in science related materials.

189. The countries forming the comparison group are identified on the basis of similar trends in test scores of students between 1999 and 2003. For this differences-in-differences specification to identify the causal effect of the language policy on achievement, it is necessary to find a set of control countries with similar trends in the test scores of students taking TIMSS 1999 and TIMSS 2003. Four control countries for mathematics and three control countries for science satisfy this parallel pre-treatment trend assumption. In particular, Iran, Cyprus, Japan, and Russia are used as control countries for mathematics achievement, while Israel, United States, and Singapore are used as control countries for science achievement[37].

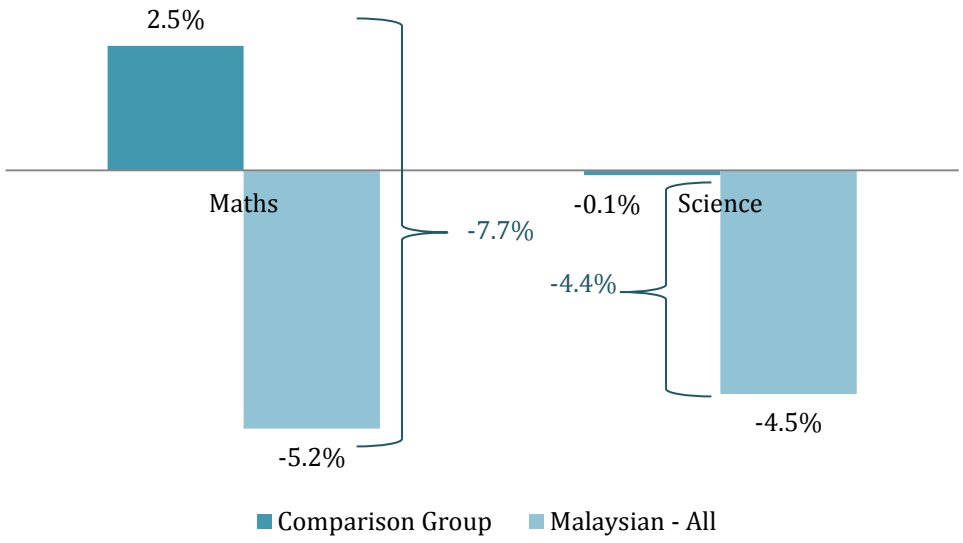
6.5 Results

190. The language policy change had a negative impact on the mathematics achievement of eighth graders. Results show that while average TIMSS scores in mathematics increased by 2.5 percent for students in countries in the control group, the performance of Malaysian eighth graders deteriorated by 5.2 percent (7.7 relative to the control group). Similarly, Malaysian students experienced a decline in their science achievement by 4.5 percent (4.4 percent relative change) (Figure 110). This evidence suggests that the language policy change introduce in 2003 had a negative impact on students' performance. Among the potential factors determining this trend, students' and teachers' language ability are likely to have played an important role. Switching the language of instruction from a familiar (Bahasa Malaysia) to a less familiar (English) language may have had a negative impact on students' ability to learn; at the same time, given the rapidity of the change, there might have been insufficient time to enable teachers to acquire the skills necessary to teach in a different language.

$test_{isjt}$ is the achievement of student *i* in school *s* of country *j* in year *t*. *Post* takes the value of 1 if the student is in TIMSS 2007 sample and 0 if the student is in TIMSS 2003 sample. *Malaysia* takes the value of 1 if the student is a Malaysian student and 0 if the student is a non-Malaysian student. The coefficient of interest is δ, which measures the causal effect of the language policy change on achievement. The vector x includes school characteristics that enter the regression as additional control variables. The error term ε captures any unobservable that may have an effect on the dependent variable.

[37] We include more than one control country for each subject so that the treatment effect identified is less susceptible to any problematic variation in a specific control country. The parallel pre-treatment trends also hold well when we include the additional school characteristics as control variables.

Figure 110: Impact of Policy Change on TIMSS test scores – All Malaysians

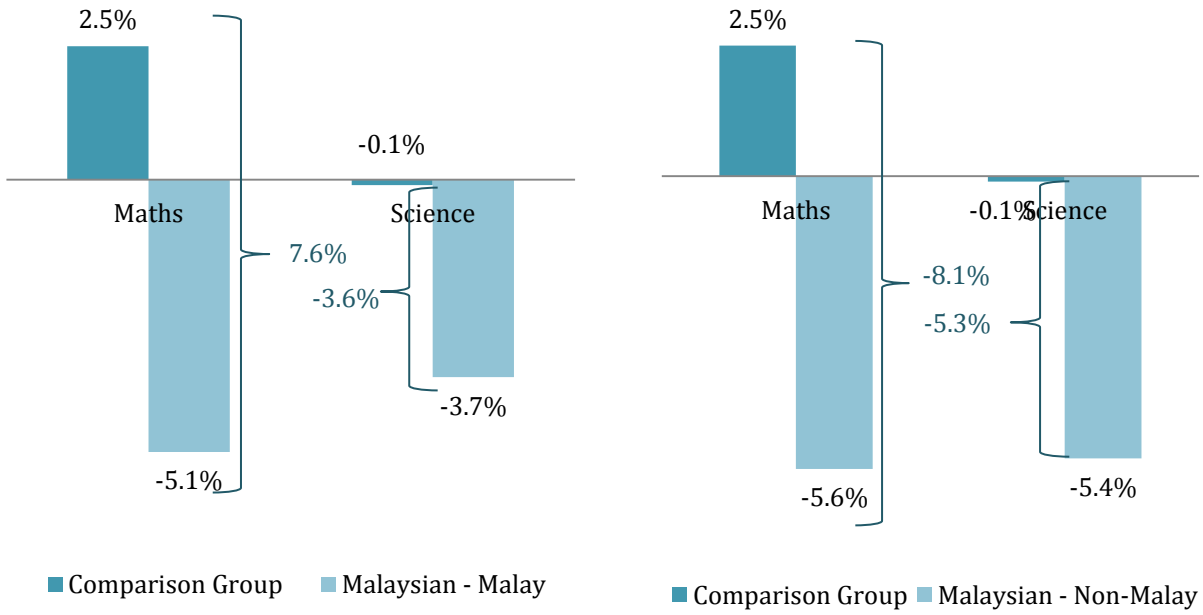


Source: Authors' analysis based on TIMSS data 2003 and 2007

191. The effect of the policy change on the TIMMS scores of two different ethnic groups is also explored[38]. The effects were heterogeneous across ethnic groups. Figure 111 shows that as a result of the policy change, mathematics TIMSS scores decreased by 5.1 and 5.6 percent for Malays and non-Malays, respectively. The same pattern is visible in science, in which students' performance deteriorated by 3.7 percent for Malays and by 5.4 percent for non-Malays. One possible explanation for these results could be related to the familiarity of the different ethnic groups with the two languages. Ong and Lan (2008) reveal that at the time of the policy change, teachers needed to translate materials from English into Malay, as most students were not proficient in English. As a result of this practice, the negative effects of the policy change would be more mitigated for Malay students (whose mother tongue is Bahasa Malaysia) than for non-Malay students (for whom Bahasa Malaysia is a familiar non-mother tongue language).

[38] The following additional two differences-in-differences specifications are estimated: $test_{isjt} = \alpha_0 + \alpha_1 Post_t + \alpha_2 Malay_i + \delta(Post_t \times Malay_i) + \beta' x_{sjt} + \varepsilon_{isjt}$ and $test_{isjt} = \alpha_0 + \alpha_1 Post_t + \alpha_2 non-Malay_i + \delta(Post_t \times non-Malay_i) + \beta' x_{sjt} + \varepsilon_{isjt}$. These two specifications are similar to (Eq. 1). The variable *Malaysia* is replaced with *Malay* in Eq. 2 and with non-Malay in Eq.3. The dummy variable *Malay* takes the value of 1, if the student is ethnic Malay, and takes the value of 0 if the student is in a control country. Similarly, the dummy variable *non-Malay* takes the value of 1, if the student is not ethnic Malay, and takes the value of 0 if the student is in a control country. By comparing how the magnitude of δ differs in the three different models is possible to identify the effect of the policy change on the different ethnic groups

Figure 111: Impact of Policy Change on TIMSS scores – Malay (left) and Non-Malay (right)



Source: Authors' analysis based on TIMSS data 2003 and 2007

192. To summarize, the results indicate that the language policy change in 2003 significantly lowered the mathematics and science achievement of Malaysian eighth graders. The effects are more pronounced for non-Malay students than for Malay students. The negative effects are likely driven by the disruption in learning from switching the language of instruction, the use of a non-mother tongue language in which students are not proficient, and the rapidity of the change that did not leave enough time to update the skills of the teaching staff.

193. The government abolished the policy of using English in the instruction of mathematics and science in 2012. Although the new policy change implies that the new generation of students, especially Malay students, will be able to learn mathematics and science in the language in which they are proficient, some students will again experience some disruption that could be potentially detrimental to their learning and skill acquisition. The clear lesson that emerges is that it is important for the government to gradually phase out any policy change so as to minimize the potential harm on students experiencing a switch in the medium of instruction. This point should be emphasized in the new Education Blueprint (launched in 2013).

Chapter 7: Simulating Policy Interventions Aimed At Optimizing Workforce Planning and Skills

7.1 Introduction

194. This Chapter responds largely to the third Pillar of a knowledge economy, a modern information infrastructure to monitor workforce needs and the ability to make the necessary policy reforms to respond to labor market needs. The analysis in this chapter carries out projected workforce needs, given today's scenario, and investigates outcomes of policy interventions aimed at optimizing and adapting the Malaysian workforce. It does so using a Computable General Equilibrium model specifically built to assess overall workforce needs.

195. The analysis includes the projected workforce until 2020[39], under the assumption that no policy changes will take place and the economy will continue to function as it is. These *projections* are called the reference scenario in the rest of the chapter. The reference scenario constitutes a basis on which various policy interventions are modeled (or simulated) and outcomes estimated. The main priority of the chapter is to investigate how wages, growth rates, and employment are affected by skills-enhancing policies, both at the macro and the sub-sectoral level.

196. Complexities related to the number of skills, economic sub-sectors, and rapid transformation of the Malaysian economy, make the modeling exercise difficult. Given the large number of skill categories and economic sectors in the model, it is important to verify that the predicted evolution of the main variables tracks closely the observed evolution of these same variables. Normally, CGE models are not used to forecast, but since the Malaysian economy has gone through a remarkable structural change in recent years–especially in terms of increasing average education levels and migrant labor–it was essential that the model reflect this transformation in an as accurate a manner as possible, ensuring that the driving forces of the economy are present in the model. In order to do so, data on exogenous variations in export demand, government consumption, debt and other specifics had to be collected or estimated. Since the base year is 2005, and data is available through 2011, a dynamic calibration of the model was possible. The result from this exercise is that the reference scenario is reasonably in line with the LFS figures and the evolution of the main variables at the macro and sector levels. Thus, key policies can be studied using the macro CGE model.

7.2 Database Construction

197. Inputs to the model are from various data and information sources; most of them obtained from the Department of Statistics and international organizations. There are at least nine distinct data sources used (see below). The Social Accounting Matrix was created from the 2005 input – output tables provided by the Department of Statistics of Malaysia (DOS). A social security contributions account has been added, with a fixed percentage of employer and worker contributions being drawn from labor income. Total employment is taken from the 2007 LFS, the first survey for which a wage module was available. It represents wage earners in each sector, with the exception of the agricultural sector, where employment refers to all employed due to the particular nature of this sector (hosting many

[39] Year of the Social accounting matrix.

informally employed workers), and health (where employment corresponds to the estimated amount of wage earners for 2005).

Data Sources Used for the Macro-CGE Exercise:

1. *LFS surveys, from 1990s – 2011. (Wage module from 2007 onwards) (DOS)*
2. *Household Income Survey 2007 (DOS)*
3. *Intake, graduates and enrolment for different educational cycles for 2009-2010.*
4. *Data from 2008 HEM model (Macro CGE model by Econtech)*
5. *Input-output tables 2005 (DOS).*
6. *Sectoral productivity growth rates (Malaysia Productivity Corporation)*
7. *National Accounts & Capital Stock Statistics (DOS)*
8. *Data on debt and debt sustainability (IMF Article IV Staff Report)*
9. *Others: UNESCO, Ministry of Finance, Bank Negara. WHO, the World Bank Databank.*

198. Investment related information was taken from the 2005 Input-Output (IO) table and portioned out to the destination sectors according to sector[40,41]. A caveat is that current results likely fail to accurately capture some sub-sectoral dynamics which are due to relatively high or low investment with respect to sector size. World and local growth rates are taken from the World Bank Databank.

199. Total value added (including social security benefits) in each sector is taken from the 2005 IO table. Wage related data come from the LFS. In the *Agriculture*, *Health* and *Education* sectors, aggregate wage bills are those of the 2005 I-O tables. In remaining sectors, wage bills are taken from the LFS 2007 by multiplying mean wages by skill and industry with the number of workers of that skill and industry (the difference between these and the original wage bill is imputed from capital remuneration). Thus, mean wages and wage earners are kept in accordance with the LFS in all except the three sectors mentioned. For those three sectors the standard methodology could not be used since the imputed wage bill would necessitate a *negative* capital remuneration. The original wage bill is thus kept, and wages are imputed and not equal to those of the LFS.

200. Twenty-three economic sectors were identified for the analysis (Table 15); these sectors align closely with the main economic sectors in Malaysia, including the NKEAs. For the large majority of skill groups, economic sub-sectors, and citizenship (migrant-foreign) groups, the data are large enough to result in accurate estimations.

[40] Information from a report titled "National Accounts Capital Stock Statistics" by the Department of Statistics proved very useful for this exercise.

[41] Since the data reflects a higher aggregation than the one used for the estimation it is assumed that investments are distributed among the sub-sectors according to their weights in production Ideally, an investment *origin-destination* matrix would have been used, but such a matrix was not available.

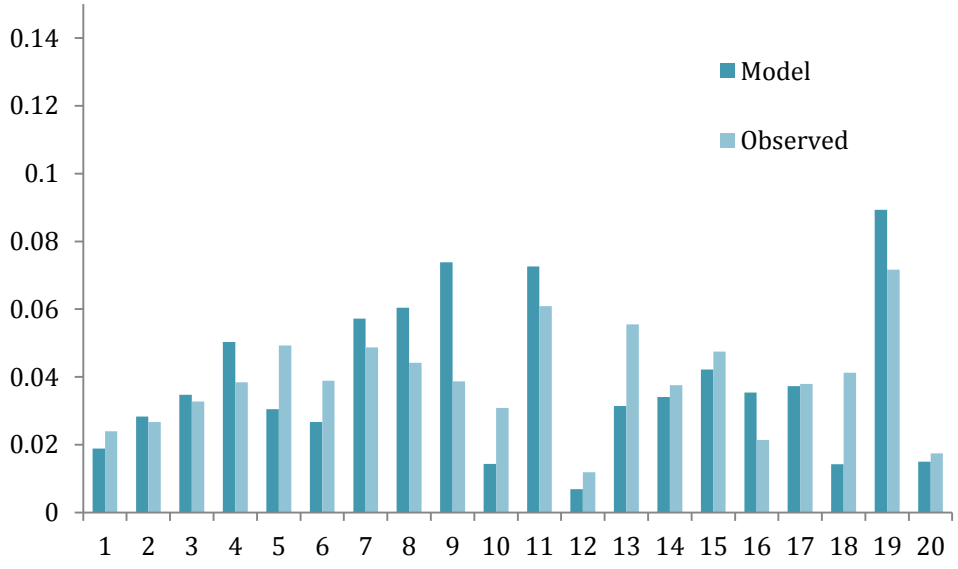
Table 15: Economic Sectors

	1	Agriculture		13	Wholesale-retail
	2	Oil & Gas		14	Accommodation and restaurants
Manufacturing	3	Mfg Food-beverage-tobacco	Services	15	Logistics
	4	Mfg Textile		16	Post and telecom
	5	Mfg Wood		17	Finance
	6	Mfg Paper-furniture		18	Real estate
	7	Mfg Chemical-rub		19	Business services
	8	Metal-machinery-equip		20	Education
	9	Mfg Electronics and electrical		21	Health
	10	Mfg Transport equip		22	Other services
	11	Utilities		23	Public administration
	12	Construction		...	

201. Data are excluded for groups with insufficient sample and when mis-measurement is a risk. All workers were assigned to 23 economic sectors and estimates were done accordingly. To the extent possible, all NKEAs were assigned to a category where they could be identified in the analysis.

202. Initial *Unemployment rates* by skill level were computed from the LFS. Figure 112 shows model predictions for unemployment in 2011 compared to estimates obtained from the LFS. Sectoral dynamics between 2005 and 2011 are reflected in Figure 114; the actual evolution can be compared with the evolution obtained from the simulated (CGE) data using LFS.

Figure 112: Unemployment by Skill in 2011, Simulated and Actual

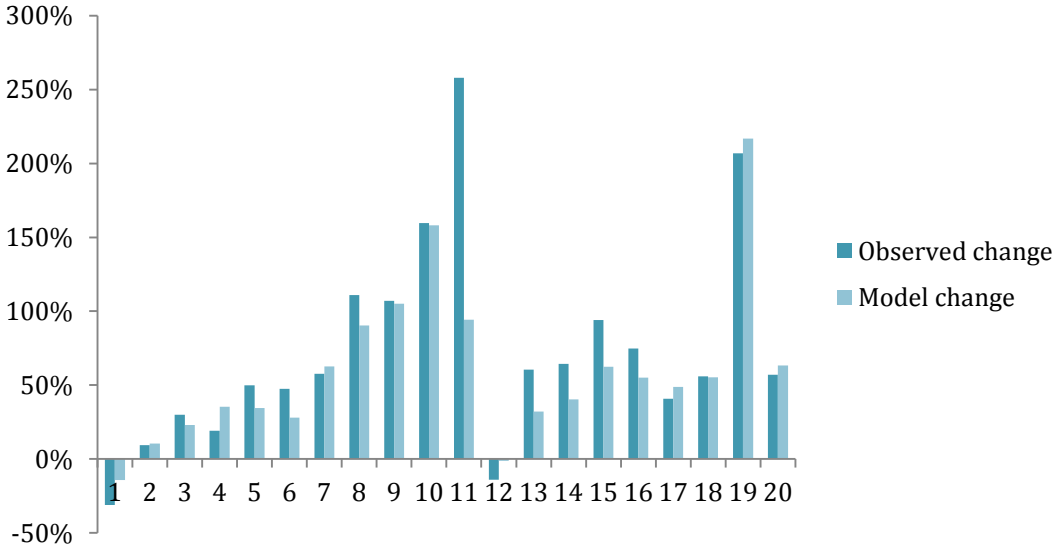


Source: Department of Statistics, Labor Force Survey and Author's own calculations using various sources
Notes: The horizontal axis represents 20 different skills, see Table 16 for details

Details on Skill Levels

203. Data on enrolment, *intake* and graduates for each cycle were available for 2009 and 2010 from the Ministry of Higher Education, Ministry of Education, WHO, and UNESCO. This data is used to calculate (for each cycle) the drop-out rates and the share of graduates who move to the next cycle. For some skills, the shares and rates obtained were not reasonable, and were modified to reflect more reasonable numbers. Enrolment data for 2005 is estimated in order to reproduce 2009-2010 numbers. Mortality rates by skill are obtained using age composition by skill, combined with WHO life tables. Entrants into primary school are taken from UNESCO data. The educational dynamics generate an evolution of the labor force between 2005 and 2010 that can be compared with the evolution obtained from the LFS (Table 16 lists all 20 skill levels and Figure 113 shows how the simulated and actual estimates compare).

Figure 113: Evolution of Local Labor Supply by Skill Level, Simulated and Actual (2005-2011)



Source: Department of Statistics, Labor Force Survey and Author's own calculations using various sources
Notes: The horizontal axis represents 20 different skills, see Table 16

Table 16: Twenty Skill Levels

Twenty Skill Levels		
		Lower Skill
Secondary or less	1	UPSR/UPSA equivalent
	2	PMR or equivalent
	3	SPM or equivalent
	4	STPM or equivalent
		Medium Skill
Certificate/Diploma	5	Arts & Humanities
	6	Social science, business, law
	7	Science, math, IT
	8	Engineering
	9	Agriculture
	10	Health
	11	Services
	12	Education
		Higher Skill
University Degree	13	Arts & Humanities
	14	Social science, business, law
	15	Science, math, IT
	16	Engineering
	17	Agriculture
	18	Health
	19	Services
	20	Education

204. Skills are *considered* in three different dimensions: the level of education of the workforce, the contents of education (field of study), and the age of the workforce. There are three main categories of skills: lower, medium and higher skills. The principal difference between them is the level of educational attainment: secondary or lower for the "lower" skill category, certificate/diploma for the "medium" skill category, and university degree for the "higher" skill category. The lower category mixes no formal education with education levels that impart lower generic lessons and content. Reported results often make a distinction between having no formal education and having low levels of education. The medium skill category is composed of all those in the labor force with some technical certificate or diploma level, in eight distinct fields of study. Even though there is a category called services, some critical service degrees such as IT, mathematics, sciences, health, education, business, and law are not included in this category. Instead, it refers mostly to training for the tourism industry, customer service, sales and retail, and personal services among others. The higher skills category includes all university degree holders and beyond, in similar learning areas as those in the medium category.

Educational dynamics

205. Data available on education were used to estimate the transition rates through the educational system, enabling projections of the evolution of workforce skills. These

transition rates, however, are likely to depend on returns to education. As a result, a module was added to the model to capture the linkages between the demand for and the returns to education. In particular, prospective students choose to pursue vocational versus academic degrees depending on the relative remuneration of the respective educations. As such, changes in wages will have an impact on the percentage of students who choose vocational rather than academic degrees.

206. Similarly, the choice of a field of study is endogenous. All other things being equal, an increase in the wages of graduates from a particular field of study should increase the demand for education in that particular field of study. Thus, after the initial choice of the vocational versus the academic track, students choose a field of study according to initial preferences and expected wages in each field.

207. Whereas relative wages determine the composition of demand for education by field of study, the supply of education is a policy tool. An increased demand for education of a particular kind will only have an effect on the labor force composition if it is met by increased availability of education. As such, the model dynamics with respect to education are determined by demand and supply of educational services jointly. Ideally, to capture the supply of educational services, the number of places available in each field of study would have been used. However, this number was not available. It is therefore assumed that the initial number of places available corresponds to the number of students enrolled.

208. Each year, students desiring to enter a program in a particular field are confronted with the number of places in that field. Should there be excess demand, remaining students are considered as applicants to the second most desirable field of study. The ranking of fields is based on the expected returns to education in each field. A more detailed description of the educational dynamics is available in Annex 8.

Parameterization of the Model

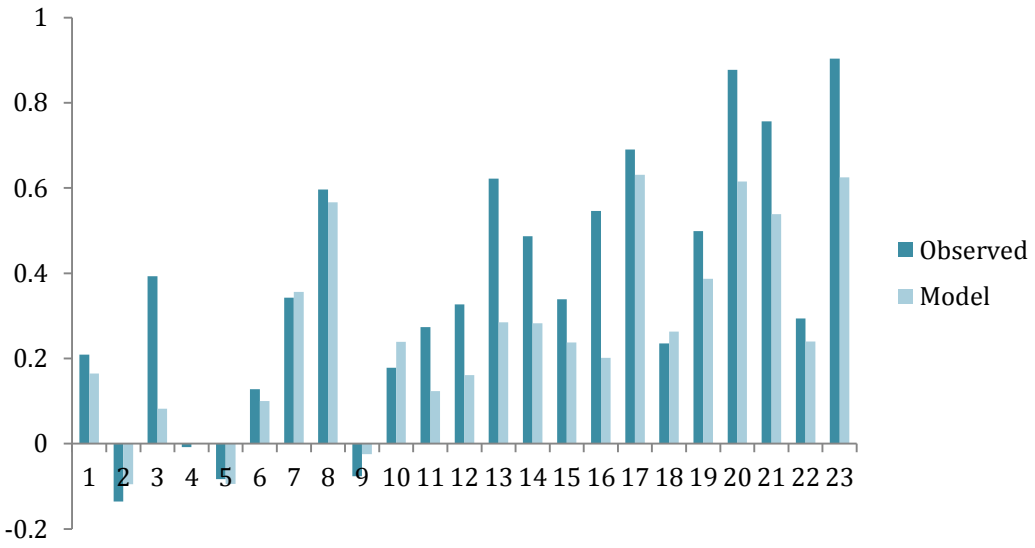
209. The difficulty in accurately retracing Malaysia's growth trajectory is due to the high number of different skill levels and subsectors used in the analysis. There have been many changes in the educational attainment levels *and* the fields of study being considered and used in the model over the last decade. Parameters that could not be estimated from data were calibrated to capture the evolution of the main macroeconomic variables in the data.

210. For example, a comparison of 2005 and 2010 data on sectoral growth shows that Public Administration, as well as the Health and the Education sectors, have experienced high growth. This growth is likely to be the result of political decisions rather than market forces, and should as such be treated as exogenous.

211. Variability in sectoral growth rates also arises due to changes in world demand for Malaysian exports. As such, the composition of Malaysian exports has also changed during our reference period. Notably, the world demand for electronic components has fallen. Thus, the export demand parameter has been modified in order to arrive at more reasonable sectoral growth rates. Finally, the coefficient of correlation between the growth rates obtained and growth rates found in the "Annual National Accounts: Gross Domestic Product 2005-2011" report from the DOS is 0.9 (Figure 114 shows the growth rates obtained from the model compared to DOS figures)[42].

[42] Investments originally proved extremely sensitive to the 2009 crisis, dropping significantly more than what data showed. It seems reasonable to assume -especially since emerging markets were seen as a relatively safe investment

Figure 114: Sectoral Growth Rates: Actual Versus Predicted (2005-2011)



Source: Department of Statistics, Labor Force Survey and Author's own calculations using various sources
Notes: The horizontal axis represents 23 different sectors, see Table 14

212. Elasticities of substitution between different labor bundles were estimated econometrically. The LFS data allows for elasticities of substitution in the demand for labor to be estimated across various labor bundles. Elasticities were thus estimated for the full production structure, allowing for different degrees of substitutability between locals and migrants according to their skill level, and between locals of different skill levels.

213. Exogenous variables are expected to follow their current trend, except when evidence suggests otherwise. Where projections and policy plans exist, they were incorporated into the model. An essential hypothesis of the model is that of skill-biased technological change. This hypothesis implies that technical progress is of the kind that favors skilled labor over unskilled labor, as it increases the relative productivity of the former. This is very much rooted on the country's aspirations of becoming a knowledge based economy driven mostly by high-value added activities. As such, the development of Information Technology is a skill-biased process, where computers are complements to analytical and interactive workers, while being substitutes to manual and repetitive tasks (Spitz, 2004). In the Malaysian case, the hypothesis of skill-biased technical change seems plausible, since a radical shift in the skill composition of the workforce towards higher skilled workers (Chapter 2) has not radically decreased the returns to education (Chapter 3).

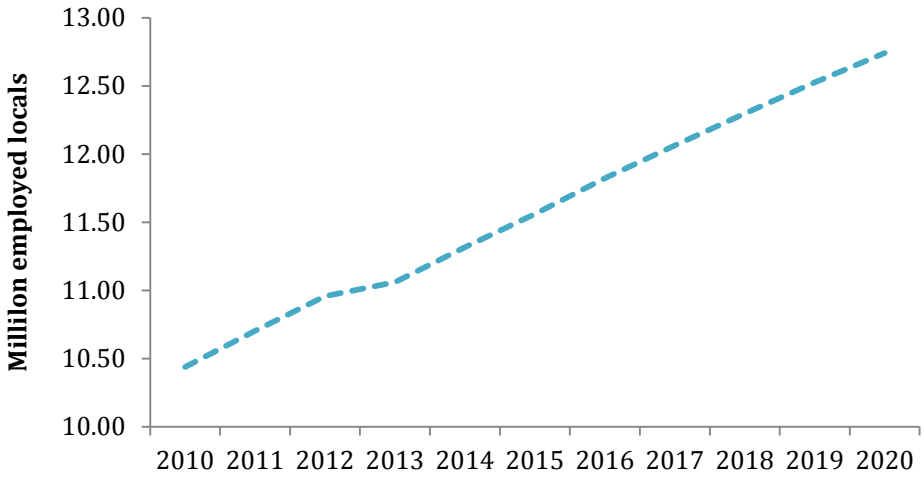
7.3 Results From the Reference "Projected" Scenario

214. Using current trends as hypotheses for the evolution of exogenous variables, a reference scenario is constructed to project the evolution of Malaysia's economy up until 2020. In this reference scenario, local employment (defined as employment of Malaysian citizens, both wage earners and self-employed) is expected to increase from around 10.5 million to 12.7 million (Figure 115). This estimate excludes foreign labor; but once local and labor demand

option during the global downturn -that foreign direct investment soared during this time. Modeling an exogenous increase of foreign direct investment (FDI) for the year 2009 permits investment to remain closer to its level in the National Account Statistics.

is summed, the total labor demand is expected to increase from 11.9 million people to 15.3 million people. The increase reflects expected labor demand and it is conditional, among other things, on policies and labor costs faced by employers (such as minimum wages and migrant levies, which affect the workforce composition) remaining constant.

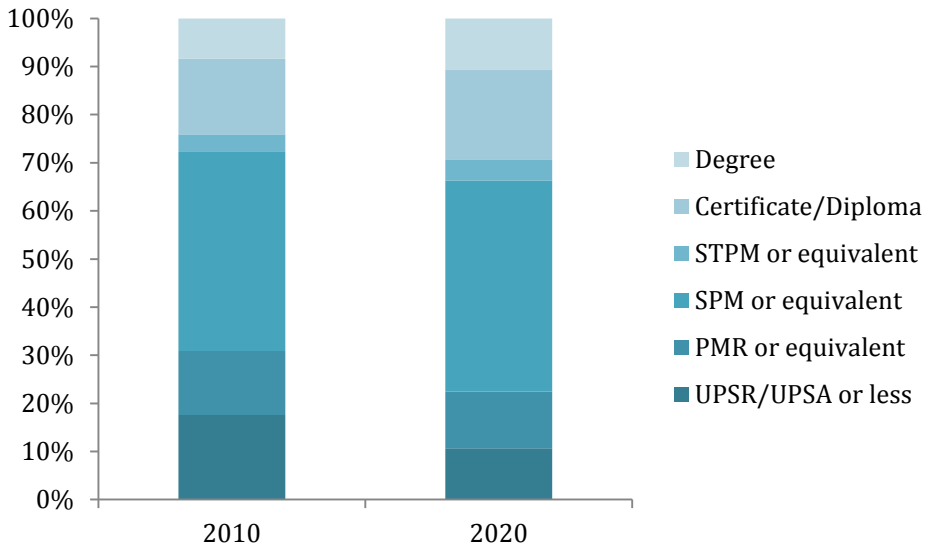
Figure 115: Evolution of Total Local Employment, 2010-2020



Source: Author's own calculations using various sources

215. Malaysia's extraordinary trend of a constantly increasing share of tertiary educated people in the workforce is expected to continue. University degree holders in the labor market are expected to increase by 50 percent, while holders of vocational certificates and diplomas are expected to increase by 42 percent. By 2020, the share of tertiary educated is expected to have increased by 5 percentage points (Figure 116). Annex 7, Table 2 reports detail labor demands by skill level, in the projected scenario, until 2020.

Figure 116: Composition of local labor force, 2010 and 2020



Source: Author's own calculations using various sources

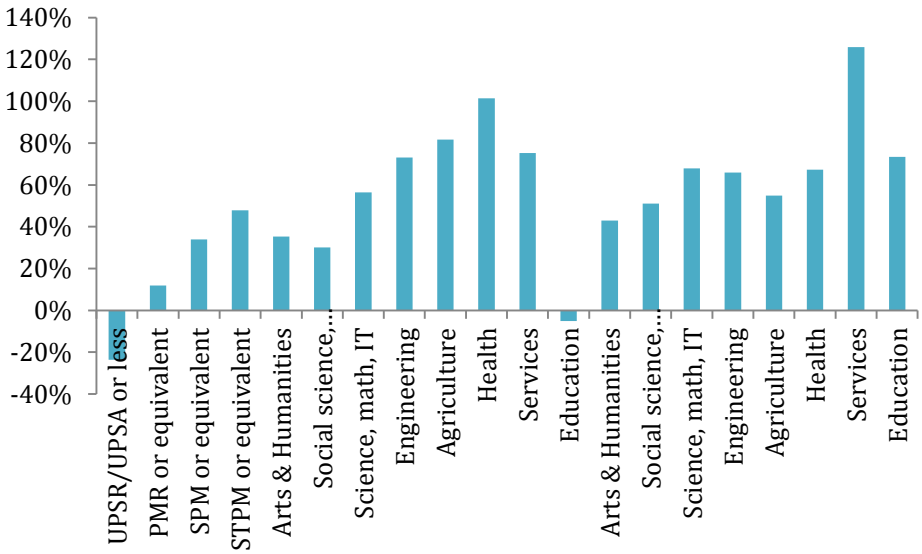
216. The growth of the total labor force in the reference scenario, which is mainly due to population growth, is also a result of transitional effects from the recent redefinition of the retirement age (from 55 to 60 years old). Also, in this scenario, the share of Malaysians with less than a tertiary education is expected to drop, since at present time, the annual share of labor force entrants with some tertiary education is higher than the equivalent share in the labor force. In absolute numbers, however, low skilled workers are expected to increase –an evolution that is mainly driven by high school graduates joining the labor force.

217. For the tertiary educated, the model results indicate that graduates from "Social Science, business and law", "Science, Math, IT" and "Agriculture" (in the case of university degree holders) are relatively well absorbed by the market, facing sharper unemployment decreases and larger wage increases. As these outcomes are internalized by prospective students, there is a shift in demand for these fields of study. Similarly, as the future prospects of degree graduates in fields "Health", "Services" and "Education" (for university degree holders) are deteriorating in relative terms, there is a drop in demand for these fields of study. However, since educational dynamics are dependent on both supply and demand, and the relative shares of places by field of study are fixed in the reference scenario, the effects of the demand shift are limited to those possible within the current distribution of places.

218. Medium skilled workers are expected to increase, partly due to a high present enrolment in tertiary education and partly because of increasing wage premia for Certificate/Diploma holders. Interestingly, the recently introduced minimum wage, which mainly concerns low-skilled labor, is likely to limit the wage premia of tertiary graduates, putting downward pressure on the demand for tertiary education in the future. At the same time, the endogenous wage increases obtained in the reference scenario are less poignant for high-skilled workers, which indicates that if all things remain the same in the economy, the relative increase of degree holders might slow down in the future. However, since it takes several years to complete a degree, the full effect of this is not likely to be felt by 2020.

219. On the evolutions by field of study, the lion's share of Figure 117 originates in the enrolment rates and employment activity rates of youth. The rest is due to wage shifts endogenous to the model. Overall, wages received by university degree holders in the services sectors encouraged them to demand that field of study more between 2005 and 2011, and this trend continues until 2020. As such, there is a 120 percent increase in degree holders in the services field between 2010 and 2020.

Figure 117: Projected Change in Supply Of Labor By Skill Group, 2010-2020



Source: Author's own calculations using various sources

7.4 Simulation Results

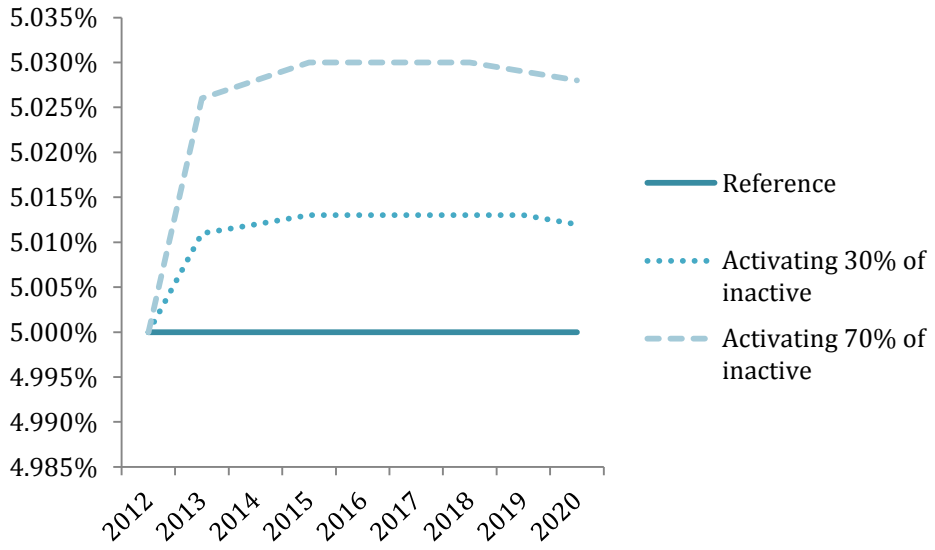
Effects of an increase in the employment rate of graduates from tertiary education

220. The first set of simulations carried out concern employment (activity) rates of different skill groups; this simulation links back to the analysis in Chapter 2, where unemployment and inactivity rates of tertiary educated graduates, mainly young and female, was shown to be higher than desired in a dynamic economy with a knowledge-based focus.

221. Increasing employment rates of skilled workers is a cost-effective way of increasing the skill level of the workforce, since it requires no additional training. Targeted workers thus do not have to be immobilized during training, and can immediately join the labor force. The simulation carried out aims to increase employment rates of medium and high skilled graduates (holders of certificates, diplomas and degrees) at the time of their graduation. Examples of policy simulations include programs to promote labor force participation and retention among female graduates. To simulate this potential initiative the model includes two simulations; the first one activates participation rates by 30 percent of the inactive tertiary graduates, while the second one activates 70 percent of inactive tertiary educated graduates.

222. Simulations show that activating inactive skilled graduates is growth enhancing, albeit with results of relatively low amplitude. It shows that decreasing the inactivity rate by 70 percent among skilled graduates (who represent a small fraction of the total number of skilled workers) adds an average of about 0.03 percentage points to real GDP growth per annum (Figure 118).

Figure 118: Real annual GDP Growth, 2012-2020

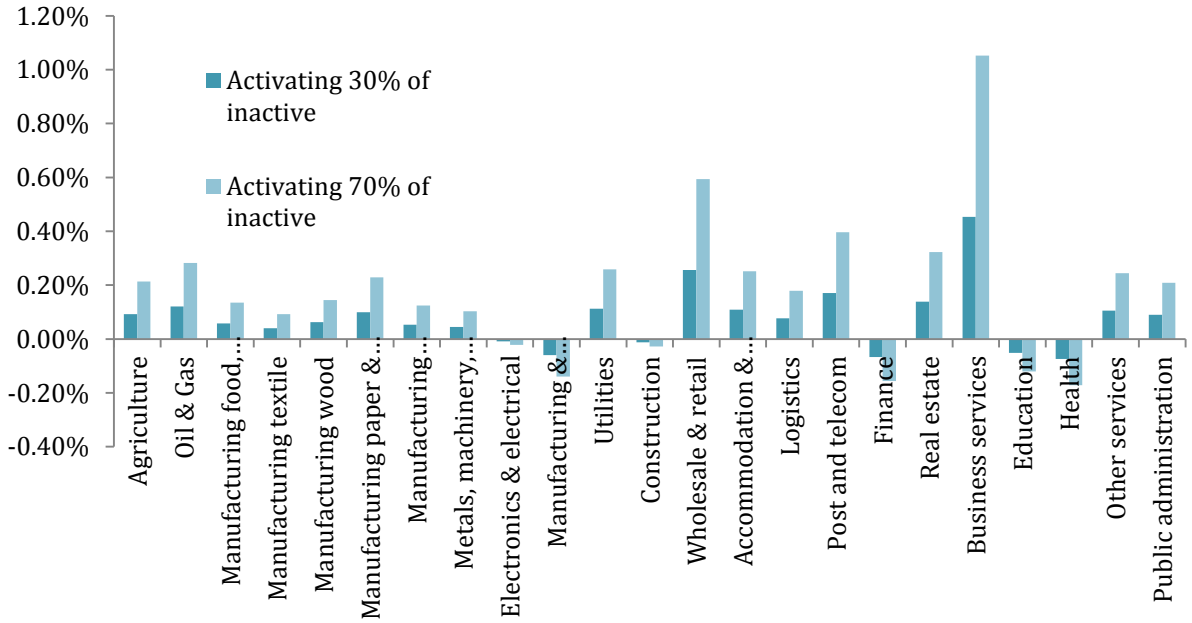


Source: Author's own calculations using various sources

223. The introduction of more skilled Malaysian workers in the economy leads to increased investment. Interestingly, it also leads to increased demand for migrant labor; a report focused on the effect of migration on labor in Malaysia (World Bank, 2013) shows that employment of foreign workers results in job creation for Malaysians, especially in the middle and higher educational categories. One reason is that foreign workers bring skills that are complementary to local works. This finding is also in line with evidence from around the world, which shows that migrant workers help skilled local workers move up in the value chain.

224. At the sub-sectoral level, service sectors benefit the most from the increased supply of skilled labor since they are, on average, more skill intensive than manufacturing sectors. Figure 119 shows how individual sectors are affected by the policy to increase participation rates. Some sectors, such as Finance and Manufacturing and Transport, experience slight negative effects linked to the composite production price. While production in these sectors does grow, value added slightly falls behind as a result of unfavorable changes in the relative prices of inputs and outputs. The Business sector benefits quite dramatically, by activating the policy.

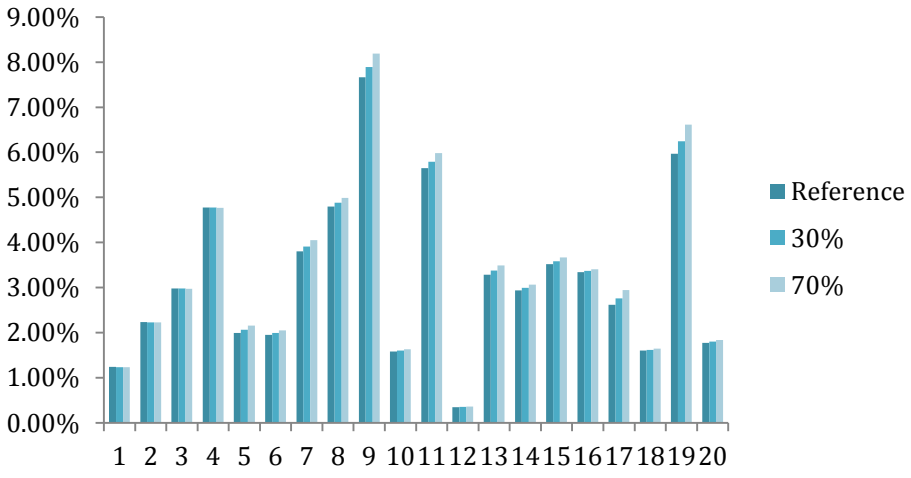
Figure 119: Growth Differentials at the Sub-Sectoral Level, 2010-2020



Source: Author's own calculations using various sources

225. Overall unemployment slightly increases as more skilled workers are activated; but the negative effect is small (and likely short term). If the graduate inactivity rate is lowered by 70 percent, the estimated unemployment by 2020 is only 0.04 percentage points higher than in the reference scenario. However, this aggregate figure hides disparate effects on skill groups. As Figure 120 shows, the unskilled benefit from the increased labor force participation of skilled graduates, whereas skilled workers suffer a loss. Furthermore, the decrease is higher for those skill groups who already suffer from relatively high unemployment. It should be noted, though, that the reference scenario depicts a downward trend in unemployment, attaining 2.9 percent in 2020. The results of the current simulation are marginal and will not severely affect that trend.

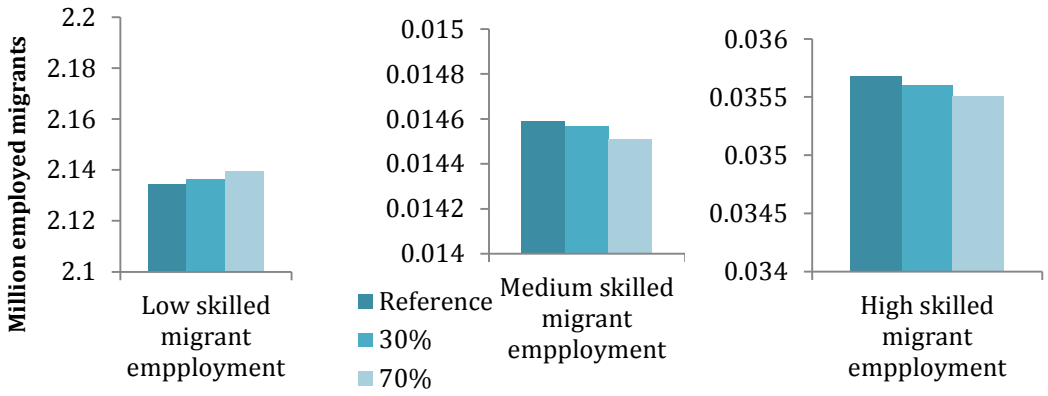
Figure 120: Unemployment by skill, 2020 Projected



Source: Department of Statistics, Labor Force Survey and Author's own calculations using various sources
Notes: The horizontal axis represents 20 different skills, see Table 15.

226. The positive employment effects for low-skilled labor are due to their complementarity with skilled labor in production. Although not all of the newly activated skilled workers are absorbed by the market, most are absorbed, and they create employment opportunities for low-skilled workers down the production chain. Another effect of the increase in skilled labor supply is an increased demand for unskilled migrant labor. Figure 120 shows how demand for skilled (vocational and above) and unskilled migrants reacts to the activation of 70 percent of inactive graduates. It can be seen that low-skilled migrants, who are complementary to skilled labor, see their employment prospects improve. At the same time, skilled migrants which are substitutes to local skilled workers are seeing their numbers decrease.

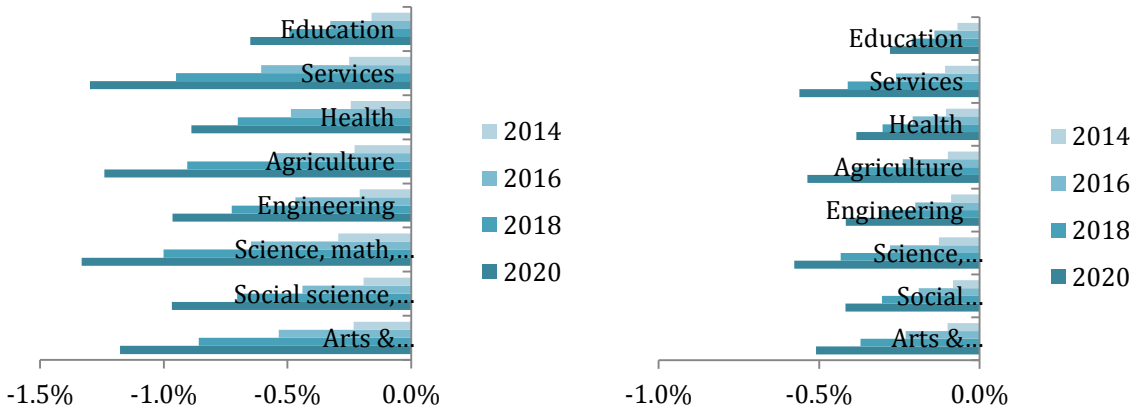
Figure 121: Projected Migrant Employment, 2020



Source: Author's own calculations using various sources

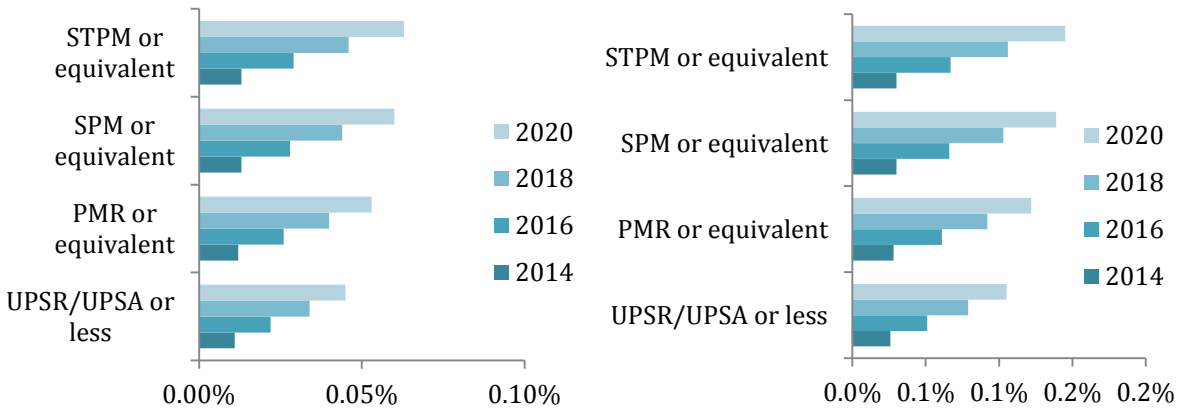
227. The increased supply of skilled labor puts a downward pressure on medium and high-skilled wages. As can be seen in Figure 121, wages of medium skilled workers tend to decrease relatively to the reference scenario, as more and more skilled graduates enter the labor force. For some categories, activating 70 percent of inactive graduates leads to 1.5 percent lower real wages by 2020. The same results are observed for high-skilled workers. For workers with secondary education and less, however, the increased participation rate of tertiary graduates leads to modest wage increases. In the 70 percent scenario, wages of low-skilled workers are expected to grow an additional 0.1 percent by 2020 (Figure 122).

Figure 122: Change in Av. Wages Medium skilled, 30% right 70% left



Source: Author's own calculations using various sources

Figure 123: Change in Av. Wages Low skilled 30% right 70% left



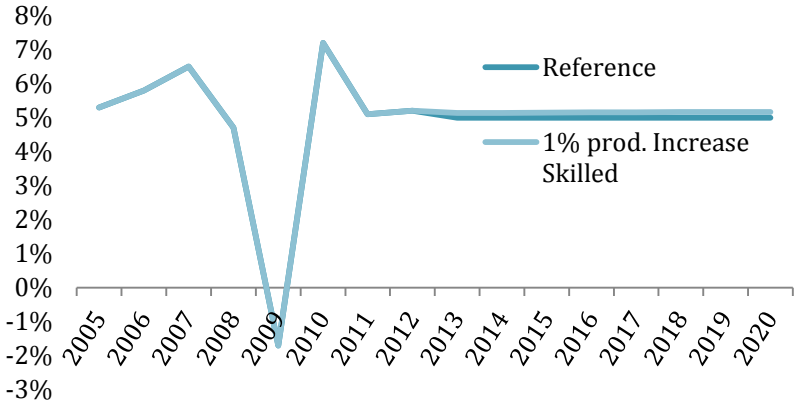
Source: Author's own calculations using various sources

Effects of a productivity increase of skilled workers

228. An increase in the productivity of high skilled workers permits increased growth, reduced unemployment and higher wages. Increasing productivity of skilled workers can be achieved through various ways; some of the most suitable ways are discussed in Chapter 9. These include, for instance, increases in the quality of education, improvements of infrastructure/technology, or better job-specific training. Simulation results show that when productivity of skilled workers increases by one percent yearly, it catalyzes sectoral skills-neutral productivity growth already taking place.

229. The productivity increase results in an annual growth increase of about 0.1 percentage points by 2014, and 0.2 percentage points by 2020. Skilled worker productivity increases boost output per worker, making them more attractive for firms to employ, and so allow for higher growth (Figure 123).

Figure 124: Projected Annual Growth Rates With and Without A 1% Increase In Productivity



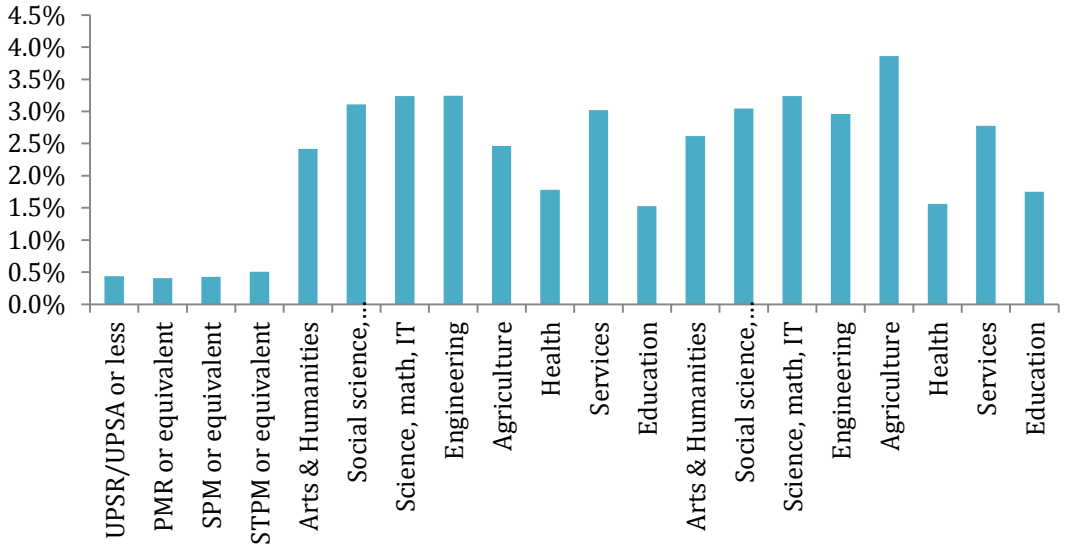
Source: Author's own calculations using various sources

230. The impact on low skilled workers depends on the degree of substitutability between skilled and unskilled workers. In the general case, if low skilled workers are complementary

to high skilled workers in production, an increase in the productivity of the latter should enhance employment prospects of the former and lead to increased wages and less unemployment for low-skilled workers. It should be noted however, that sectoral transformations and trade-offs render outcomes less foreseeable. If skill-biased productivity increases induce structural change, low-skilled workers might end up on the losing end. Behar (2008) looks at the issue in South Africa and finds skilled and unskilled workers to be complements at the aggregate level.

Figure 125: Evolution of Wages with A 1% Annualized Productivity Increase

(Productivity increase is solely applied to the tertiary educated), by 2020



Source: Author's own calculations using various sources

231. Wages of both skilled workers and unskilled workers increase when productivity of skilled workers rises. However, the increase among lower skilled workers is modest (Figure 124), such that increasing wage inequalities can be expected. Projected unemployment figures follow the same pattern as wages, decreasing significantly for the medium and high skilled, and seeing a very modest decrease in the low skilled segments. Skill-biased technical change has often been advanced as an explanation for the increasing wage equalities in the US over the last decades (Hornstein, Krusell, Violante, 2005).

Effects of a reorientation towards science programs

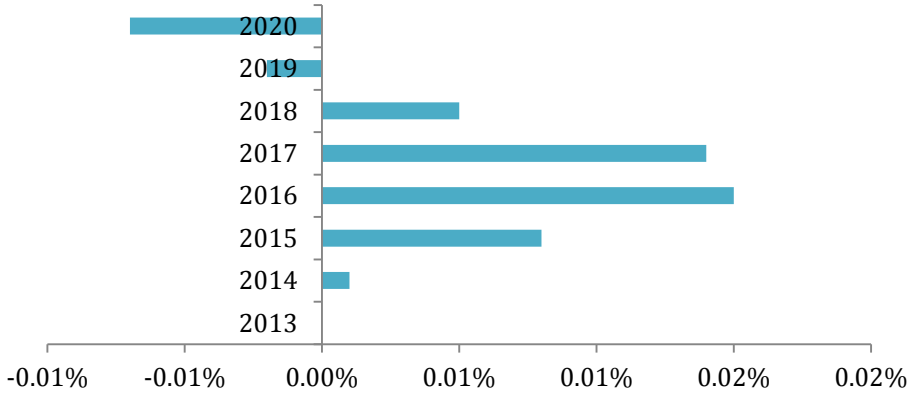
232. This simulation aims to study the impact of a reorientation of tertiary graduates toward the natural sciences. It simulates an annual increase of five percent in the number of places available to prospective students in these fields, and a simultaneous decrease of five percent in the number of places available in the Arts and Social Sciences fields. The four fields characterized as Sciences for the purpose of the modeling exercise are Science, Math and IT, Engineering, Agriculture, and Health.

233. Steering candidates toward science fields rather than arts is likely to have a positive impact on the economy if the supply of science skills constitutes a bottleneck in the Malaysian context. Thus, if the relative supply of science graduates increases at a slower

pace than relative demand for these graduates on the employers' side, firms are likely to face skill deficits; increasing the supply of those skills is likely to be growth enhancing. On the other hand, steering candidates toward science fields means steering them away from other fields where bottlenecks might be equally present. Chapter 4 used wage premia to estimate over and undersupply of occupations. It showed that workers in occupations associated with high skills have been in oversupply in general, while medium-skill occupations have been undersupplied in the recent period.

234. The impact of a reorientation toward the science fields on GDP growth is positive in the short term, and negative in the medium term. This suggests that a reorientation is beneficial in vocational skills, where the effects start to be felt after some two years. On the contrary, as can be seen in Figure 125, reorienting degree holders does not seem to create growth enhancing sectoral shifts since the positive effect from vocational graduates wears off and completely disappears over time. This result is partly due to the hypothesis of constant activity rates by field of study. By reorienting places in vocational schools, the overall activity rate of graduates is increased, while it is decreased for degree graduates.

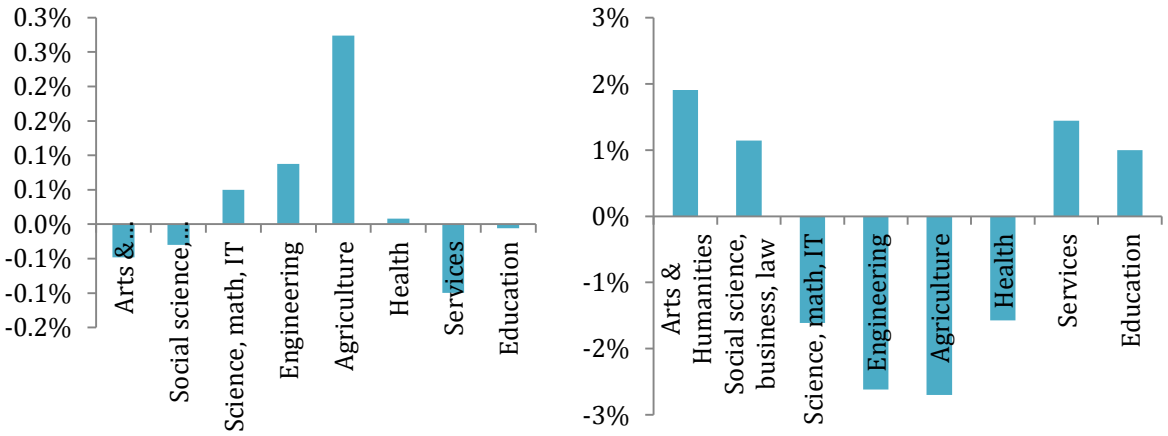
Figure 126: Change In GDP Growth After Reorientation Of Study Places



Source: Author's own calculations using various sources

235. Overall, unemployment increases for skilled workers in sciences fields, while it decreases for skilled workers in other fields. The shift in the relative supply of skilled workers is also reflected in a shift in relative wages (Figure 126). At the sub-sectoral level, the demand for labor increases in all sectors but two (Education and Other services). Furthermore, in all sectors, following the change in relative supply, there is a tendency to substitute skilled workers trained in the Arts fields with skilled workers trained in the Sciences. The next chapter explores various options to make possible the desirable results identified in these simulations.

Figure 127: Change In Unemployment (Left) And Wages (Right) Of Medium-Skilled, 2020



Source: Author's own calculations using various sources

Chapter 8: Assessment of Skill Forming Policies, Benchmarking and Learning from International Practices

8.1 Introduction

236. Workforce development (WfD) is not an end in itself but an input toward the broader objectives of the country that underscore a knowledge economy – increasing employability and productivity; relieving skills constraints on business growth and development; and advancing economic growth and social wellbeing. Three of the four Pillars of a knowledge economy fall in the institutional realm, and they are critical to the strength of the fourth Pillar.

237. Action has been translated into sustained advocacy for workforce development (WfD), at all levels of the formal education system, by Malaysia's leadership at various levels. Among all formal education levels, there has been special emphasis on Malaysia's technical and vocational education and training (TVET) system, which was born out of a combination of ambition and necessity, and has a crucial role to play in WfD. Performance of the TVET system is especially relevant in light of weak performance in basic subjects relative to international benchmarks and comparable contexts.

238. To inform ongoing policy dialogue on these important issues, this chapter presents a comprehensive diagnostic of the country's WfD policies and institutions. The results are based on a new World Bank tool designed for this purpose known as SABER-WfD. The tool is part of the World Bank's initiative on Systems Approach for Better Education Results (SABER)[43] whose aim is to provide systematic documentation and assessment of the policy and institutional factors that influence the performance of education and training systems. The SABER-WfD tool encompasses initial, continuing and targeted vocational education and training that are offered through multiple channels, and focuses largely on programs at the secondary and post-secondary levels.

239. SABER's focus is on policies, institutions, and practices in three important functional dimensions of policy-making and implementation—strategic framework, system oversight, and service delivery. Because these aspects collectively create the operational environment in which individuals, firms, and training providers, both state and non-state, make decisions with regard to training, they exert an important influence on observed outcomes in skills development. Strong WfD systems have institutionalized processes and practices for reaching agreement on priorities, for collaboration and coordination, and for generating routine feedback that sustains continued innovation and improvement. By contrast, weak systems are characterized by fragmentation, duplication of efforts and limited learning from experience.

240. The tool is based on a framework[44] that identifies three functional dimensions of WfD policies and institutions:

(1) ***Strategic framework***, which refers to the praxis of advocacy, partnership, and coordination in relation to the objective of aligning WfD in critical areas to priorities for national development;

[43] For details on SABER see http://www.worldbank.org/education/saber.
[44] For an explanation of the SABER-WfD framework see Tan *et al*. 2013.

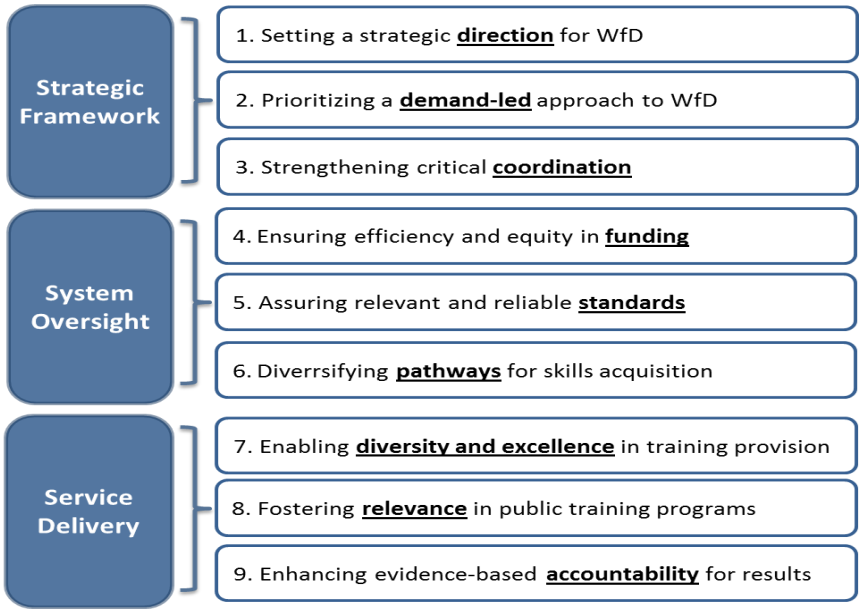
(2) ***System Oversight***, which refers to the arrangements governing funding, quality assurance and learning pathways that shape the incentives and information signals affecting the choices of individuals, employers, training providers and other stakeholders; and
(3) ***Service Delivery***, which refers to the diversity, organization and management of training provision, both state and non-state, that deliver results on the ground by enabling individuals to acquire market- and job-relevant skills.

8.2 Summary of the Methodology

241. Taken together, these three dimensions allow for systematic analysis of the functioning of a WfD system as a whole. The focus in the SABER-WfD framework is on the institutional structures and practices of public policy-making and what they reveal about capacity in the system to conceptualize, design, coordinate, and implement policies in order to achieve results on the ground. Each dimension is composed of three Policy Goals that correspond to important functional aspects of WfD systems (Figure 127). Policy Goals are further broken down into discrete Policy Actions and Topics that reveal more details about the system.[45]

242. Information for the analysis is gathered using a structured SABER-WfD Data Collection Instrument (DCI). The instrument is designed to collect, to the extent possible, facts rather than opinions about WfD policies and institutions. For each Topic, the DCI poses a set of multiple choice questions that are answered based on documentary evidence and interviews with knowledgeable informants. The answers allow each Topic to be scored on a four-point scale against standardized rubrics based on available knowledge on global good practice (Figure 128). Topic scores are averaged to produce Policy Goal scores, which are then aggregated into Dimension scores.[46] The results are finalized following validation by the relevant national counterparts, including the informants themselves.

Figure 128: Functional Dimensions and Policy Goals in the SABER-WfD Framework

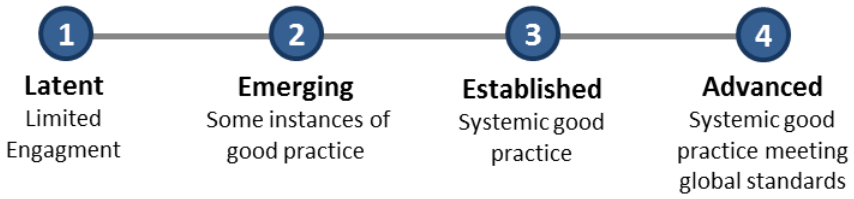


Source: Tan et al. 2013

[45] See Tan et. Al. 2013 for an overview of the structure of the framework.
[46] Since the composite scores are averages of the underlying scores, they are rarely whole numbers. For a given composite score, X, the conversion to the categorical rating shown on the cover is based on the following rule: $1.00 \leq X \leq 1.75$ converts to "Latent"; $1.75 < X \leq 2.50$, to "Emerging;" $2.50 < X \leq 3.25$, to "Established;" and $3.25 < X \leq 4.00$, to "Advanced."

243. This chapter summarizes the key findings of the SABER-WfD assessment for Malaysia and also presents the detailed results for each of the three functional dimensions.

Figure 128: SABER-WfD Scoring Rubrics

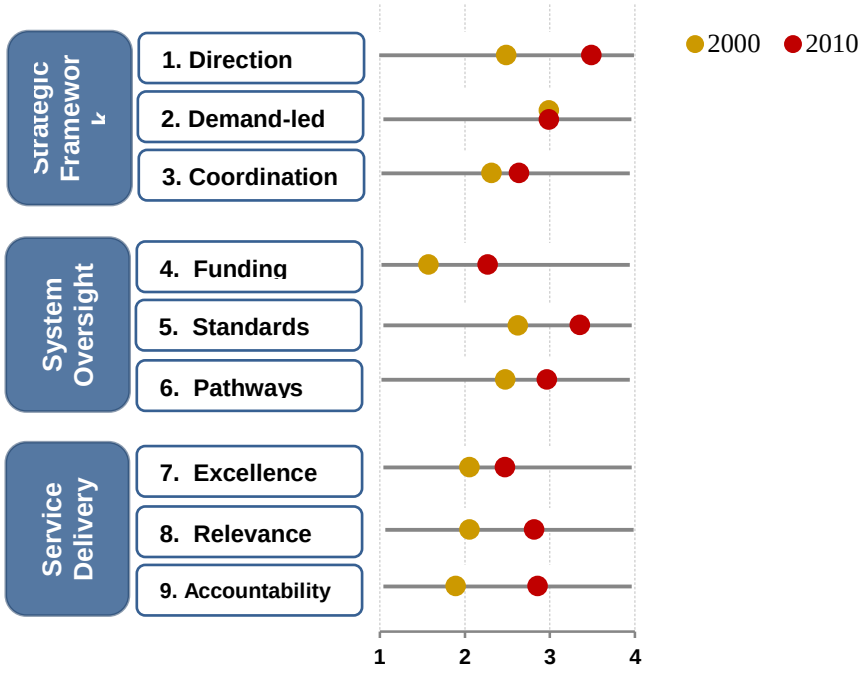


Source: Tan et al. 2013.

8.3 Key Take Away Messages

244. Given the level of detail of this chapter, a summary of the main findings is provided here. Malaysia achieved an **Established** level overall, with an average score of 3.1 out of a possible 4.0 in 2010. Figure 130 shows the distinct results for the three Functional Dimensions in the SABER-WfD framework by Policy Goal. In the first dimension, Strategic Framework, Malaysia ranked within the **Established** level (3.1); in the second dimension, System Oversight, it ranked about midway between the **Emerging** and **Established** levels (2.6); and in the third dimension, Service Delivery, its score is also midway between the **Emerging** and **Established** levels (2.7).

Figure 129: Malaysia's Dimension Level Scores

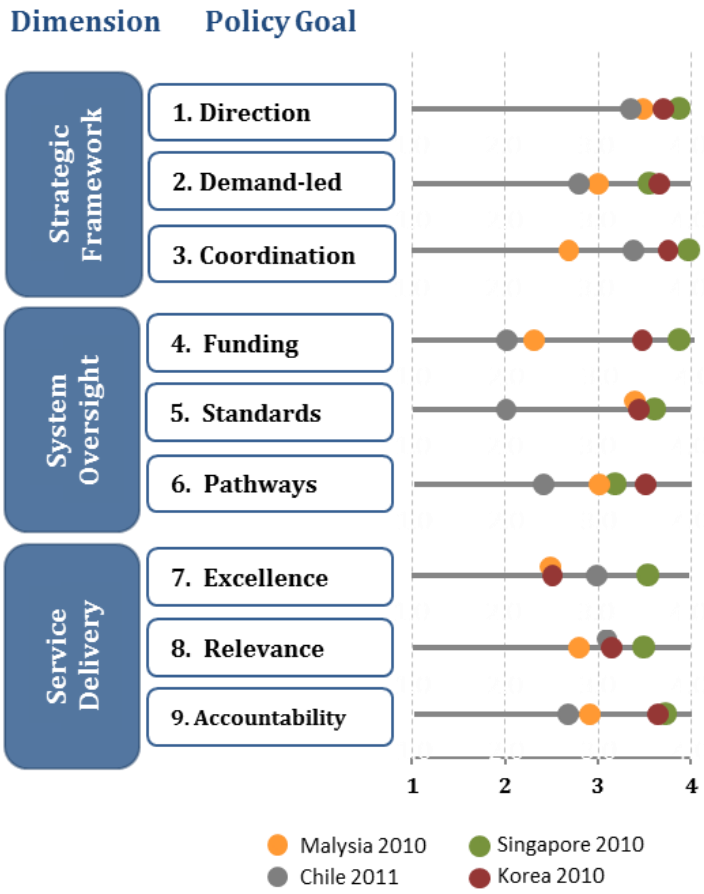


Source: World Bank, 2013

245. The results point to recognizable progress in most areas between 2000 and 2010; however, they do not look stellar when compared to other benchmark or comparator

countries (Figure 130). The ability to formulate a strategic vision for WfD to support economic development, and policies and institutions to support that vision, emerge as the strongest. Capacity appears weakest in the area of system oversight, and only slightly stronger in the area of implementation.

Figure 130: Comparison With Other Countries



Source: Authors' construction

246. Malaysia's old model of public sector focus has been tempered by the recent incorporation of industry in the design and implementation of programs. However, another important group of stakeholders – the workers – have found limited voice in this process.

247. This period also saw improvements in assessing skill requirements, as well as more rational recurrent funding of Continuing Vocational Education and Training (CVET) that reflect more attention to industry needs. Harmonization of standards has been achieved through the expanded coverage of the National Occupational Skills Standard (NOSS) and the Malaysian Qualifications Agency (MQA) for public and private providers. Hence, certification of skill standards under these systems now gives programs better acceptance. Diversification of pathways and articulation criteria for training, including prior learning, has improved access to and options for WfD.

248. Foremost among Malaysia's challenges is the fact that policy formulation and announcements have not yet been supported by commensurate attention to implementation and monitoring of programs. Evaluations are thus somewhat limited in

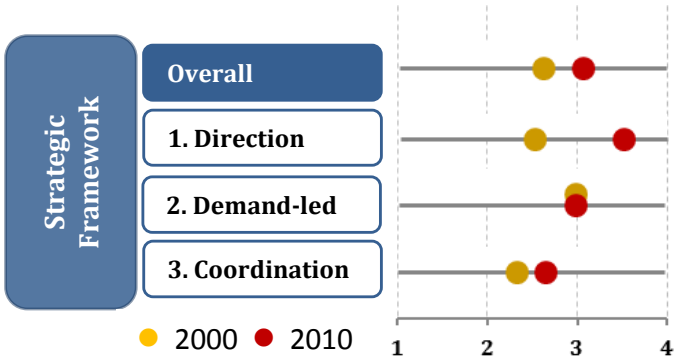
their ability to speak to efficiency aspects of funding. And while allocations provide clues as to the equity aspects of funding, evidence of more explicit consideration of this criterion is lacking. Institutional issues like reporting, the dissemination of data, and forms of assessment, are less well coordinated than the numerous institutions involved in WfD. Issues like geographical distribution of programs that may have implications for duplication of programs, and efficiency/equity issues mentioned earlier also require more concerted attention. The following sections will present in greater detail the results for each dimension of the framework, including strengths and weaknesses for each area.

8.4 Detail of the Analysis: By Each Dimension Assessed

8.4.1 Dimension 1: Strategic Framework

249. The Strategic Framework dimension encapsulates the articulation of a strategic direction for WfD and the underlying framework for carrying it through. Malaysia achieved an Established level in 2010 overall, which implies sustained advocacy for WfD to support economic development (score 3.1), a substantial improvement over its performance in 2000 (score 2.5). This score indicates progress in advancing the following three Policy Goals: (i) articulating a strategic direction for WfD (3.5), (ii) fostering a demand-driven approach in WfD (3.0), and (iii) ensuring coordination among key WfD leaders and stakeholders (2.7) (Figure 131).

Figure 131: Strategic Framework Scores, 2000 and 2010



Source: World Bank 2013.

250. Malaysia's centralized system of government, despite being a federation, together with a ruling party with a solid majority in parliament, has bestowed the central government with the authority to make and implement policies. Its institutions have the capability and experience to formulate policies. Coordination remains a not insignificant challenge, and the survey covered five major ministries that provide TVET. In addition to institutional factors detailed in this section, a quick succession of major policy statements and initiatives were released in 2010 – the New Economic Model, the Tenth Malaysia Plan and the Economic and Government Transformation Programs (ETP and GTP)[47], each with a plethora of recommendations for moving the economy forward. Ensuring the consistency of these initiatives is the challenge at all levels.

47

251. How does Malaysia compare to high-income countries in the region or countries with similar growth goals, in this dimension? Singapore, whose efforts to enhance WfD started in the 1970s, is at a Highly Advanced level given its holistic approach to WfD, which is deeply integrated with national policy and economic development strategies. There is clear leadership and funding to sustain initiatives, which are based on adaptable forecasting models involving a wide range of stakeholders. Singapore places strong emphasis on matching skills demand and supply with economic needs. Korea is also in the highly advanced stage as a result of consistent efforts over time to create appropriate WfD policies. It benefits from top-level commitment (public and private) to WfD, formal and informal mechanisms for stakeholder coordination, and extensive data collection that feeds back into the policy process. Another high-middle income country, Chile, scores similarly to Malaysia at the Established level. There is wide support among leadership in all sectors, but cross-sectoral perspectives are lacking, and thus may lead to overlap in sector-based WfD policies. Coordination is a challenge in this respect, as is the ability to set policy priorities, particularly those based on a solid forecasting model.

252. Differences aside, Strategic Framework is the strongest performing dimension in all four countries; also, fostering a demand-driven approach is the Policy Goal with the weakest performance across the board.

Policy Goal 1: Articulating a Strategic Direction for WfD

253. Policy Goal 1 assesses the extent to which leaders in government, and also increasingly in the private sector, provide sustained advocacy for clear WfD priorities through institutionalized processes. This Policy Goal saw the greatest improvement within the group, with its score rising from 2.5 to 3.5. This reflects progress in two underlying aspects of high level leadership for WfD: clarity of strategic focus in aligning WfD to the country's economic agenda, and sustained advocacy for implementation of the agenda.

254. Several factors have led to better articulation of a strategic direction for WfD. First, there has been sustained commitment among top leaders in the country. This commitment has benefitted from a defined vision for the country's future, as spelled out in strategic documents (see Vision 2020), and implemented through successive medium-term development plans. Another example is the ETP which places human capital development at the center of the strategy.

255. Commitment to a strategic direction for WfD can be traced back several years. The Seventh Malaysia Plan (1996-2000) focused on vocational education at the secondary level, with conversion of vocational secondary schools into secondary technical schools (Malaysia 1996). The Ninth Malaysia Plan (2006–2010) put more focus on initial vocational education training (IVET) (Malaysia 2006), and under the Tenth Malaysia Plan there is much greater emphasis on TVET, including IVET (Malaysia 2010). However, contrary to the Seventh Plan, technical schools at the secondary level were to be rebranded as vocational schools and a new program for vocational education established. Education was also designated as a "National Key Result Area" (NKRA) under the Government Transformation Plan (GTP) launched in January 2010.[48] Specifically focused on the role of the private sector, the National Dual Training System (NDTS), a 2-year program consisting of 70-80 percent

[48] The NKRA are Reducing Crime, Fighting Corruption, Improving Student Performance, Raising Living Standards of Low-Income Households, Improving Rural Basic Infrastructure and Improving Urban Public Transport. See http://www.moha.gov.my/index.php/en/maklumat-korporat/maklumat-bahagian/bahagian-keberhasilan-utama-negara

workplace training, began in 2005 (Pang 2010: 2).[49] This shows a deepening of private sector "buy-in" to WfD development, driven partly by external circumstances such as the Asian Economic Crisis and the more recent global financial crisis.

256. Strategic commitments were translated into action in 2000 with the passage of the Private Higher Education Act and the launch of the LAN, both directed at regulating the private sector as an education provider.

257. The Malaysian Qualifications Framework[50] was approved in 2005 and the Malaysian Qualifications Agency to oversee this Framework was established in 2007 (Box 1). The regulatory framework for WfD was strengthened with the passage of the Skills Development Act in 2006, and the establishment of the Department of Skills Development that same year. Budgetary allocations were increased between the Eighth and Ninth Plans. Lastly, an organizational framework was built around the Cabinet Committee on Human Capital Development formed in 2009.

Box 2: The Malaysian Qualifications Agency (MQA)

The Malaysian Qualifications Agency (MQA) was established on November 1, 2007 from the merger of the LAN (National Accreditation Board) and the Quality Assurance Division, Ministry of Higher Education (QAD). The legislation governing this agency is the Malaysian Qualifications Agency Act 2007. Unlike the LAN, which had oversight over private sector tertiary institutions only, the MQA is responsible for quality assurance of higher education for both the public and the private sectors.

On its website, the MQA cites as its main role "to implement the Malaysian Qualifications Framework (MQF) as a basis for quality assurance of higher education and as the reference point for the criteria and standards for national qualifications." Its specific functions are to:

- Develop standards and credits and all other relevant instruments as national references for the conferment of awards with the cooperation of stakeholders;
- Quality assure higher education institutions and programs;
- Accredit courses that fulfill the set criteria and standards;
- Facilitate the recognition and articulation of qualifications; and
- Maintain the Malaysian Qualifications Register (MQR)

Source: http://www.mqa.gov.my/.

258. These positives notwithstanding, two challenges remain. First, the emphasis on initiatives has not been accompanied by attention to monitoring performance or measuring impact. These implementation challenges will be made amply clear in the analysis of other Policy Goals. And second, the pervasive presence of foreign workers in the Malaysian workforce has produced resistance to worker training on the grounds that the benefits of such training would be lost when these workers leave (Suganthi Suparmaniam 2011).

[49] A good summary of Malaysia's TVET system is contained in UNESCO's TVETipedia website: http://www.unevoc.unesco.org/tvetipedia.0.html?tx_drwiki_pi1[keyword]=Malaysia#National_Dual_Training_System_.28NDTS.29.

[50] This Framework is a unified system of qualifications designed and applied to all educational and training institutions, both academic and vocational training, in both the public and private sectors. For details, see Keating (2010). The UNESCO website mentioned in the previous footnote has a useful summary.

Policy Goal 2: Fostering a Demand-driven Approach to WfD

259. Strategies for WfD development should engage employers (and workers) in shaping the WfD agenda and provide incentives for them to support skills development. Policy Goal 2 assesses the system's ability to: (i) establish clearly which skills are in demand and system constraints; and (ii) engage employers in setting WfD priorities and enhancing skills-upgrading for workers.

260. Malaysia's 3.0 score (which remained unchanged from 2000) is the average of scores in the five related Topics: (i) overall assessment of economic prospects and skill implications (3.0), (ii) identification of critical skills constraints in priority economic areas (3.0), (iii) recognition of the roles of employers and industry (3.0), (iv) provision of skills-upgrading incentives for employers (4.0), and (v) monitoring of incentive programs (2.0). The highest score was for (iv), provision of skills upgrading incentives, due to the establishment of the Human Resource Development Fund (HRDF), a levy on companies that can only be reclaimed through staff training (see Box 2). Employers participate in curriculum development, internships, and industrial training. However, although the HRDF is in place there has been limited monitoring of its performance.[51]

261. Before the year 2000, some assessments of economic prospects and their implications for skills were undertaken by German and Australian consultants (Blumenstein *et al*. 1999, Pang 2010). Incentives for skills upgrading were in place through the HRDF, established in 1993. The government itself provided training for industry instructors and workers through its training institutes. In addition to that, the government provided microfinance assistance to the informal sector through Amanah Ikhtiar Malaysia (AIM), based on the Grameen Bank model. The impact of AIM and other such programs was subject to ad hoc evaluations, but results have not been made public.

262. Since then, skills assessments were undertaken for the Ninth Malaysia Plan, and also by the Boston Consulting Group (BCG), the World Bank, the Ministry of Education through tracer studies in 2002 and 2006, and the Malaysian Employers Federation in a telephone survey in 2006 (BCG 2009, World Bank 2005, 2009, ADB 2007: 12-13). Skill constraints were also identified in the government's Economic Transformation Program launched in 2010, which are being targeted through upgraded curricula, rebranding of TVET in secondary schools, and the reconversion of technical schools into vocational schools.

263. While some WfD initiatives are demand-led, policymaking remains a top-down process and the private sector's engagement with broader WfD (as opposed to worker trainings) remained limited throughout the decade under review. The private sector voiced a perceived lack of incentives to participate and a diluted presence in light of the numerous public agencies involved in WfD.[52] On the other hand, employers that favor a low labor-cost model may not be overwhelmingly enthusiastic about worker training. There is still substantial reliance on cheap and unskilled labor in the economy (see Malaysian Employers Federation 2010). Finally, there is still greater need for monitoring, which saw little or no progress between 2000 and 2010.

[51] An evaluation of the HRDF was undertaken by Tan (2005) that contained data covering the 1990s, but there is no evidence of any other evaluation undertaken.
[52] These views were expressed by private sector participants at the SABER-WfD Workshop.

Policy Goal 3: Strengthening Critical Coordination

264. Coordination is critical to ensuring that the efforts of multiple stakeholders are aligned with the country's WfD strategy. As such, this Policy Goal requires strong leadership to overcome barriers to cross-sector and/or cross-ministerial cooperation. Policy Goal 3 examines the extent to which policies and institutional arrangements are in place to formalize roles and responsibilities for coordinated action on strategic priorities.

265. Several features of Malaysia's WfD context render coordination critical. As the dominant player in WfD, the government's coordination task commences internally. Several ministries have responsibility over WfD, each one comprising institutes that run a variety of programs at different levels (Figure 132) (See Annex 8, for the list of institutes). Coordination also extends to the private sector, whose WfD programs have increased with the bourgeoning of private institutions of higher education.

Figure 132: Federal, State and Private Sector Institutions Providing TVET by Skill Level, 2012

Ministry or Agency [a/]	No. of Institutions	Total Enrollment	Under the Malaysian Skills Certificate (SKM) System					Bachelor of Eng Tech
			Certificates			Diplomas		
			1	2	3	4	5	
MOE	88	25,000	Technical and Vocational Schools[b/]					
MOHE	71	17,000	Community colleges					
	28	88,000	Polytechnics					
	4	30,000[c/]	MTUN (UniMAP, UMP, UTeM, UTHM)[d/]					
MOHR	22	10,800	Industrial Training Institutes (ITIs)					
	1	3,200				Japan-Malaysia Technical Institute (JMTI)		
	4					Advanced Technical Training Centre (ADTEC)		
	1	538[e/]			Centre for Instructor and Advanced Skills Training (CIAST)			
MRRD	1	2,000				German-Malaysia Institute (GMI)		
	12	10,000	MARA Vocational Institute (IKM)[f/]					
	9	2,700	MARA Higher Skills College (KKTM)[f/]					
	202	19,000	Local Youth Awareness Movement (GiatMara)[g/]					
	1	15,300				Universiti Kuala Lumpur[h/]		Universiti Kuala Lumpur[h/]
MYS	15	8,200	National Youth Skills Training Institute (IKBN) [f/]					
	1				National Youth Higher Skills Training Institute (IKTBN) [f/]			
MOA	7	700	Ministry of Agriculture Institutes [h/]					
MOD	5	805	Institutes of the Armed Forces Ex-Servicemen Affairs Corporation (Perhebat)					
MOW	6	37,000	Construction Industry Development Board (CIDB)					
States	31	20,000	State Institutes					
Private	500-600	60,000	Accredited Centers					

Source: CIDB (2011), Department of Skills Development (2013b), GiatMARA (2008), Mohd Gazali Abas (2012), MOHE (2010); Pang (2011).

a/ Full names of the ministries or agencies are shown in the list of abbreviations at the end of the report.

b/ Students sit for the Sijil Pelajaran Malaysia Vokasional (SPMV, Malaysian Certificate of Vocational Education) and the end of their study and some programs lead to the SKM.

c/ Of whom 3,500 were at the diploma level, 24,600 at the bachelor's level and the rest at the postgraduate level.

d/ The acronyms refer, respectively, to Universiti Malaysia Perlis (UniMAP), Universiti Malaysia Pahang (UMP), Universiti Teknikal Malaysia Melaka (UTeM) and Universiti Tun Hussein Onn Malaysia (UTHM).

e/ Enrollment only in courses leading to Vocational Training Officer Certificate (VTO), SKM level 3 and VTO, Vocational Instructor Advanced Diploma (DLPV).

f/ Acronyms stand for the Bahasa Malaysia equivalent of the terms in English; see list of abbreviations for the full explanation.

g/ GiatMARA (Gerakan Insaf Anak Tempatan), established in 1986 as a non-profit, grassroots training institution under MARA, provides skills training and lifelong learning to school dropouts, retrenched workers and poor students from the *Bumiputera* ethnic community.

h/ Includes the British Malaysian Institute (BMI), Malaysia France Institute (MFI), Malaysian Spanish Institute (MSI), Malaysian Institute of Aviation Technology (MIAT).

266. In 2010 Malaysia scored 2.7 in this particular Policy Goal. Its components received the following scores (i) role of government and ministries (2.0), (ii) role of non-government WfD stakeholders (2.0), and (iii) coordination for the implementation of strategic WfD measures (4.0). Low scores in the first two areas reflect the fact that since 2000, there was little coordination among the multiplicity of ministries that oversaw an array of training institutions involved in WfD. The key ministries involved are the Ministries of Education (MOE), Higher Education (MOHE, in 2013 it became part of MOE again) (which took over some functions in TVET), Human Resources (MOHR), Rural and Regional Development (MRRD), which run the MARA Institutes (which provides loans, entrepreneurship courses, vocational training, consultancy services and assistance in marketing to *Bumiputera* (indigenous peoples) entrepreneurs), and Youth and Sports (MYS), which hosts its own training institutes (National Youth Skill Training Institutes – IKBN), together with the Economic Planning Unit (EPU) of the Prime Minister's Department. Other ministries as well as states are also involved in public WfD initiatives (see Table 1 in Annex 8).

267. The result has been substantial overlap in mandates and responsibilities. For instance, MOHE is responsible for community colleges and polytechnics, while MYS and MRRD also oversee post-secondary public training institutions. Target audiences for each ministry differ, however; for example, TVET under MOE's secondary schools target students who are still in the formal education system, while those in polytechnics and community colleges would fall under MOHE (which as of 2013 is part of MOE once again).

268. Progress towards coordination of TVET appears in fact to have been scaled back recently. A National Advisory Council on Education and Training (NACET) was established in 2007 under the Ninth Malaysia Plan. Chaired by the Deputy Prime Minister with the Economic Planning Unit of the Prime Minister's Department as its secretariat, NACET's role was to coordinate education and training as the "organization with the highest authority to create policies in education and training" (BCG, 2009). The Mid-term Review of the Ninth Malaysia Plan (Malaysia 2008) added that NACET would formulate a comprehensive plan for lifelong learning programs including distance-learning, part-time courses, and skills upgrading, to be implemented by various ministries and private training providers. However, NACET had met only twice since its establishment as of 2009. In 2009, the Cabinet Committee on Human Capital Development (JKPMI) was established, apparently overtaking NACET's coordination role. Although JKPMI is also chaired by the Deputy Prime Minister, with representation from various ministries, it has no private sector representation.

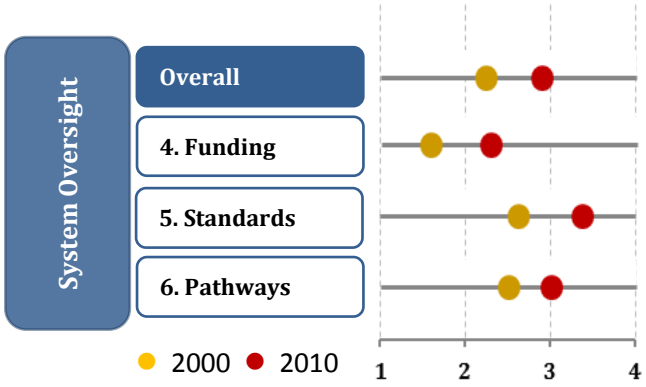
269. Most of the 2.7 score for this Policy Goal is attributable to Topic 3, which has achieved **Advanced** status (score 4.0) for the implementation of WfD measures. This score rewards the expanded coverage of the MQF under the MQA, as well as enforcement to discourage non-compliance. From 2008 to 2012, an average of 20 private tertiary education institutions were brought to court by the ministry each year for misconduct, and in 2012, 33 institutes were being considered for closure for the same reason.

8.4.2 Dimension 2: System Oversight

270. One of the main objectives of WfD institutions is to minimize systemic impediments to skills acquisition and mismatches in skills supply and demand. In the System Oversight dimension, Malaysia obtained an overall score of 2.6, halfway between **Emerging** and **Established**, by applying quality standards for its TVET programs and offering an increasingly diversified set of pathways for skills acquisition. This score is the average of the three Policy Goals corresponding to this area: (i) ensuring efficiency and equity in funding (1.7); (ii) assuring relevant and reliable standards (3.4); and (iii) diversifying pathways for skills acquisition (2.8) (Figure 133).

271. Together, these three factors help ensure access to uniform and good quality TVET for a large segment of the population, and improvement in the overall score (from 2.2 to 2.6) is also seen in each one of the Policy Goals. Performance for each goal, however, remains uneven. Some of the most salient issues in this area are not the lack of funding for programs, but weaknesses in monitoring and oversight that hinder cost effectiveness and equity of access. The area with greatest limitations and least improvement was funding efficiency and equity, which is a direct result of limited performance monitoring.

Figure 133: SABER-WfD Ratings of the System Oversight Dimension



Source: World Bank 2013

272. System Oversight presents a mixed bag of progress compared to other countries. In Korea, this dimension is its second best performing at an Advanced level. Its system performs under sophisticated and well established standards for accreditation and testing, which in turn render it credible to employers (although this is its weakest Policy Goal). All providers, public and private, receive equal treatment. Employers likewise participate in setting overall WfD funding priorities and program and curriculum design. As in Malaysia, a levy system provides dedicated funds for employers to train their employees.

273. In Singapore, on the other hand, System Oversight represents the weakest dimension (as in Malaysia), but still at the Advanced level. Its weakest policy Topic is diversity of pathways for skills development. On the other hand, there has been steady improvement of

accreditation systems and standards for providers, in addition to performance measurements of government efficiency.

274. Within this dimension, Standards are the weakest Policy Goal for Chile (Emerging, compared to Malaysia's Established), which has gradually established quality assurance mechanisms for WfD. Its overall Oversight score is Established, owing largely to the emergence of funding for WfD from the private and public sectors (where Malaysia's greatest weakness lies), and the diversity of pathways for WfD for many segments of the population. Like Malaysia and Singapore, this is the weakest dimension for Chile.

Policy Goal 4: Ensuring Efficiency and Equity in Funding

275. To ensure effective and efficient use of resources one must examine the extent to which policies and institutional arrangements are in place to: (i) ensure stable funding for effective programs in initial, continuing and targeted TVET; (ii) monitor and assess equity in funding; and (iii) foster partnerships with employers for funding WfD.

276. Malaysia has no shortage of funding of WfD, most of which is public or from levies collected from private sector firms. Specifically, funding for IVET and CVET[53] stem from fiscal sources, through taxation and fiscal debt for public sector training provision, and also from a dedicated training fund paid into by companies, the HRDF, for training of private sector employees (see Box 2).[54] Most funding is public, allocated under Malaysia's five-year development plans, and disbursed through the federal government's annual budget. In practice, however, the Government's emphasis on tertiary education may result in less funds allocated to TVET—scholarships awarded by the government and government-linked companies have been mainly for tertiary education.

Box 3: The Human Resource Development Fund

The Human Resource Development Fund (HRDF) was established in 1993 to promote training, retraining, and development of Malaysia's workforce to meet the demands of a knowledge-based high-income economy in line with Vision 2020. Since 2001, the HRDF has been administered by Pembangunan *Sumber Manusia Berhad* (PSMB), an Agency under the Ministry of Human Resources.

Its funding is sustained by a mandatory levy of one percent of the monthly wage of workers for several categories of enterprises above a certain size, defined in terms of the number of employees, depending on the economic sector, with enterprises below that minimum size having the option to contribute. For instance, for manufacturing, enterprises with 50 workers and above are obliged to contribute. Employers can seek reimbursement for a part of the costs they incur in providing training for their workers. Eligibility for reimbursement depends on the type of skills imparted (e.g. up-skilling, reskilling, cross-skilling) and on whether the training programs are recognized by PSMB.

In its 2010 Annual Report, PSMB provided the following data.

[53] At the beginning of the decade, funding for retraining had been minimal, even for workers retrenched in the aftermath of the 1997-98 Asian Financial Crisis. Worker retraining did not receive public fund allocations, and the number of workers benefiting from HRDF was a mere 572 in 1998 and 426 in 1999 (Jomo and Lee 2010).

[54] The HRDF consists of a mandatory levy on companies employing 50 workers or over. However, under the provisions of the Human Resources Development Act 2001, the Minister of Human Resources is empowered to exempt fully or partially any employer from payment of the mandatory levy (*Pembangunan Sumber Manusia Berhad Act 2001*, incorporating all amendments up to 1 January 2006, Act 612, Laws of Malaysia, Part III, Section 19).

	2006	2007	2008	2009	2010
Levy collected (RM million)	289	312	340	237	221
Training grants disbursed (RM million)	220	260	288	301	270
% of collection disbursed	76.1	83.3	84.7	127.0	122.2

Although the Fund operates on the principle of cost sharing, disbursements in 2009 and 2010 have exceeded collections by a wide margin. With 110 percent of allowable costs eligible for reimbursement from January 1, 2013, the Fund is in deficit and operates more like a subsidy during this period. However, given the pro-cyclical nature of such schemes, this is expected to be reversed in the future.

Source: HRDF: http://www.hrdf.com.my/wps/portal/PSMB/MainEN/corporate-profile/about-psmb/

277. There were improvements between 2000 and 2010 in recurrent funding for CVET and for active labor market programs (albeit from a very low base), and in public-private collaboration. However, there is much room for improvement on both efficiency and equity grounds. For example, recurrent funding for IVET and CVET is based primarily on past expenditure and enrolments, rather than performance (see EPU 2004, Nor Azlina 2013, Schiavo-Campo and McFerson 2008, Siddiquee 2013, Mohamed Aslam and Tan 2012).

278. By 2010, however, progress had been made in targeting allocations for recurrent funding of active labor market programs. In 2011, greater focus on on-the-job training for SMEs was already reflected in two programs. The first was the Graduate Employability program, introduced in 2009, which was a response to anxieties over the poor quality of university graduates. The program was made available to all public higher learning institutions including community colleges. The second was mandatory industrial training for students, for which industry partners provided a token allowance with the possibility of hiring trainees for permanent employment. Given their relatively recent implementation, the impact of these programs has yet to be reviewed.

279. Over the same decade, HRDF also made efforts to raise awareness and participation among SMEs, and the utilization rate among SMEs rose from 34 percent in 1999 to 76 percent in 2010. Another incentive was provided by the federal government's promise to match grant allocations one-to-one. The scheme, however, remains small at only RM10 million in 2011. The Tenth Malaysia Plan (2011-2015) aims to expand the coverage of these matching grants to HRDF and SME Corporation Malaysia, and provide financial assistance in the form of loans for employees to undergo additional training.[55]

280. Between 2002 and 2006, the federal government sponsored Graduate Training Schemes (Lim 2009). And in 2009, job-matching and training programs for unemployed graduates of tertiary institutions were managed though the Graduate Employability Management Scheme (GEMS) by the Putrajaya Committee on Government-Linked-Company High Performance and Khazanah (Malaysia 2010). This program enlisted assistance from government linked companies that generated earnings from commercial activities.

281. In terms of partnerships between training providers and employers, the government has formal arrangements since 2000 to link training providers with employers. By 2010,

[55] SME Corporation Malaysia was established as a specialized agency in 1996 to facilitate the development of capable and resilient SMEs that are able to compete in the global maret (http://www.smecorp.gov.my/vn2/node/40).

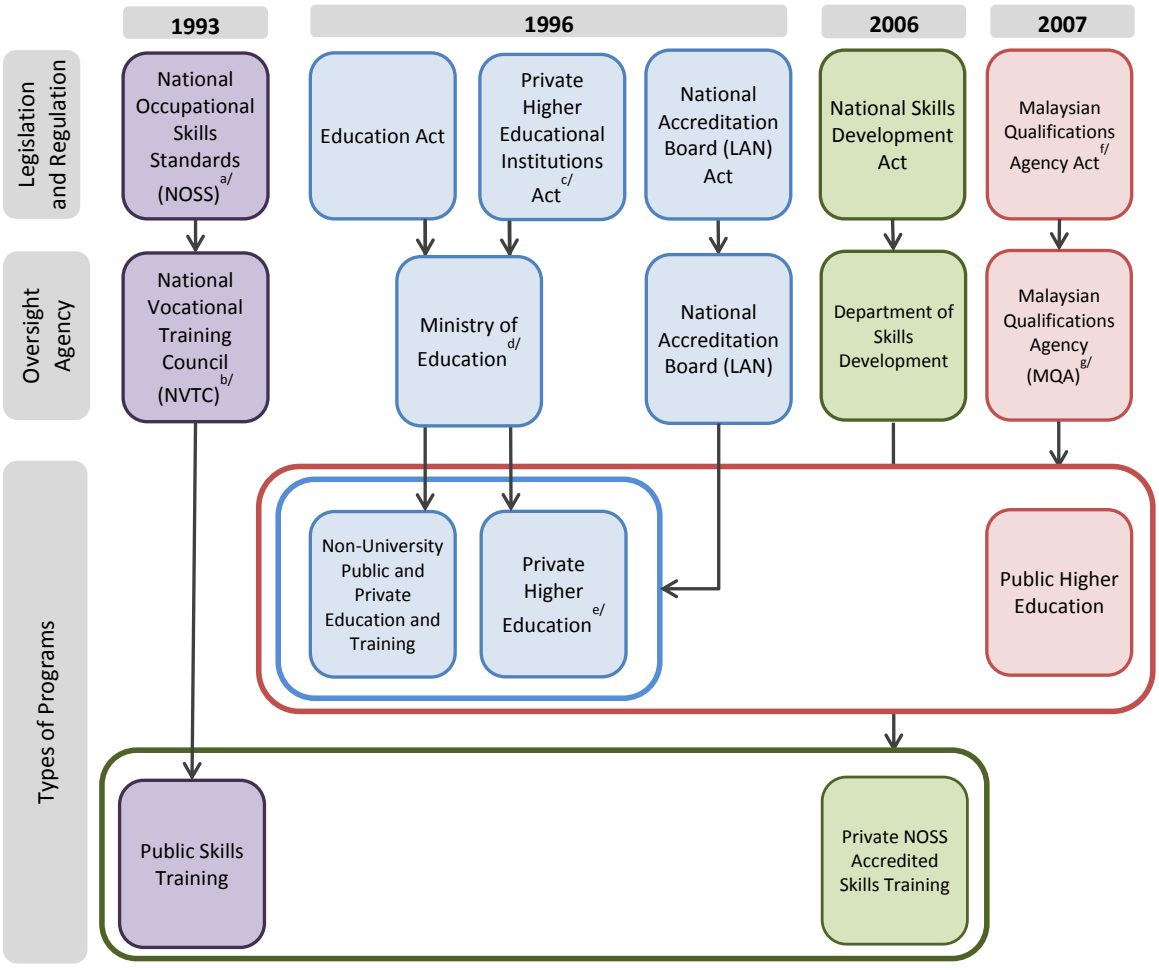
employers' public-private collaborations extended to financial and equipment contributions, technical knowledge and personnel, and training facilities.[56] These advances notwithstanding, public-private collaboration remained relatively shallow.

Policy Goal 5: Assuring Relevant and Reliable Standards

282. A wide range of training providers comprise the WfD system. An effective system of standards and accreditation ensures quality in the provision of training, and relevancy and quality of skills taught. As such, Policy Goal 5 assesses the status of policies and institutions to: (i) set reliable competency standards; (ii) assure the credibility of skills testing and certification; and (iii) develop and enforce accreditation standards for maintaining the quality of training provision.

283. The oversight structure of TVET in Malaysia is shown in Figure 134. The country has made considerable progress in several elements of Policy Goal 5, from the establishment of competency standards to skills testing, to ensuring the application of relevant and reliable standards. The considerable change from a score of 2.6 in 2000 to 3.4 in 2010 (between Established and Advanced) reflects this progress.

Figure 134: Oversight Structure of Malaysian TVET, 2010



Source: Adapted illustration from various sources

[56] Examples were reported to be Proton, the Faber Group, Malaysia Airlines and Mesiniaga.

a/ NOSS replaced the National Trade Standards which was implemented in 1971 with the National Industrial Trade Testing and Certification Board (NITTCB) as the ooversight agency.
b/ The NVTC replaced the NITTCB in 1989 and oversaw the implementation of the NOSS until 2006 when it was reorganized as the Department of Skills Development.
c/ The Private Higher Education Institutions Act provided for the establishment of private universities and university colleges.
d/ From 2004 the Ministry of Higher Education had oversight responsibility for the private universities and university colleges until it merged with the Ministry of Education in 2013.

e/ Tertiary (post-secondary) private institutions including private universities and university colleges.
f/ This Act creates the MQF, which incorporates the NOSS. Under this act there are two oversight agencies. The Dept Skills Development oversees the NOSS. The MQA oversees non-NOSS programs.

g/ The MQA's Qualifications Framework covers all educational and training courses and programs.

284. The establishment of competency standards and national qualification frameworks received the highest score and also showed the greatest improvement (from 2.5 to 4.0). In 2000, Malaysia did not have a national qualification framework, and the few standards that were in place were fragmented. At the tertiary level, LAN only covered private sector institutions. The National Skills Development Act 2006 and Malaysian Qualifications Agency (MQA) Act 2007 established the MQF, with more resources and authority than its predecessor, and subsuming the National Occupational Skills Standard (NOSS). In addition, the Department of Skills Development (DSD) under MOHR has taken responsibility for NOSS accreditation.

285. These advancements were accompanied by broader coverage of occupations and range of occupational skills. The coverage of NOSS reached 1,585 by 2010, compared to less than half that in 2000, and the range of skill levels also deepened. All NOSS-based trainings had to be accredited by the National Vocational Training Council (NVTC) and LAN in 2000, and by the DSD in the MOHR and the MQA in 2010. The DSD also conducted audits of testing centers and issued all certifications (with the exceptions below) in 2010. Malaysia's score has therefore improved, from 2.7 to 3.3 between 2000 and 2010.

286. Although accreditation standards had been established in 2000, they are now being enforced by requiring accreditation of all publicly funded programs. Mandatory rules were combined with incentives, mainly in the form of recognition of training provided. In all these areas, policy-making in 2010 was much more participatory than in 2000, with government, non-state entities like employers and industry associations, and training providers all involved. This broad-based participation is largely due to the provisions in the National Skills Development Act 2006 and the Malaysian Qualifications Agency Act 2007. The 2006 Act also established the National Skills Development Council, which is in charge of creating policy on competency standards.

287. Given that several ministries have responsibility over WfD, the establishment, regulation and enforcement of a common set of standards and testing help to effectively unify the substance of training. A stronger accreditation process, from establishment to enforcement of standards, and wider coverage, also helps to offset somewhat the institutional coordination challenges described in Policy Goal 3.

Policy Goal 6: Diversifying Pathways for Skills Acquisition

288. In dynamic economic environments skills requirements fluctuate, and workers need to keep their skills up-to-date throughout their working lives. Education and training should promote lifelong learning by offering clear and flexible pathways for transfers across courses, progression to higher levels of training, and access to programs in other fields.

Policy Goal 6 therefore evaluates the extent to which policies and institutions are in place to: (i) enable progression through multiple learning pathways, including for students in TVET streams; (ii) facilitate the recognition of prior learning; and (iii) provide targeted support services, particularly among the disadvantaged.

289. Malaysia's achievement in Policy Goal 6 was at the **Established** level (score 3.0) in 2010, up from 2.5 in 2000. The 2010 score represents the average of scores of: (i) access to learning pathways (3.0), (ii) strengthening public perception of TVET pathways (3.0), (iii) articulation of skills certification (3.0), (iv) recognition of prior learning (3.0), (v) support for further occupational and career development (3.0), and (vi) training-related provision of services for the disadvantaged (3.0). These represent increases for government initiatives to improve the public's perception of TVET (2.0 to 3.0), recognition of prior learning (2.0 to 3.0), and support for further occupational and career development (2.0 to 3.0). The scores for the remaining areas – access to learning pathways and services for the disadvantaged – remained at the Established level.

290. Although enrolment in higher education institutions has grown over the decade (Table 17), access to learning pathways has remained unchanged. At the post-secondary level, TVET is offered in public sector polytechnics, community colleges, and, in 2010, specialized universities. TVET students have the option to stay in that stream or rejoin the academic stream. In 2007, though, community college rebranding led to the introduction of work-based diploma programs that allowed graduates to pursue undergraduate studies. MARA also provided an academic track for its graduates with certificate holders proceeding to the diploma level and then to MARA's University in Kuala Lumpur or to public universities. Better articulation also came in the form of more widespread skills certification.

Table 17: Enrollment in Higher Education Institutions under MOHE, 2001 – 2010

Year	Public Tertiary Inst.	Private Tertiary Inst.	Polytechnics	Community Colleges	TAR College	Total Enrollment
2001	304,628	270,904	51,839	1,108		628,479
2002	281,839	294,600	52,898	3.207	31,858	664,402
2003	294,359	314,344	53,492	6,424	29,537	698,156
2004	293,978	322,891	64,382	8,945	26,098	716,294
2005	307,121	258,825	73,834	9,873	24,846	674,499
2006	331,025	323,787	82,046	11,273	26,150	774,280
2007	382,997	365,800	84,250	14,438	25,753	873,238
2008	419,334	399,897	85,280	17,082	26,235	947,828
2009	437,420	484,377	86,471	17,279	25,179	1,050,726
2010	462,780	541,629	87,751	18,200	23,774	1,134,134

Source: http://www.mohe.gov.my/web_statistik/indikator_pengajian_tinggi_2009-2010.pdf

291. Efforts to strengthen public perception of TVET have been made by improving the quality of programs, and allowing TVET graduates to progress to tertiary education. School counselors were tasked with the promotion of student awareness of technical occupations. A graduate tracer study by MOHE tracked the employability of graduates from polytechnics and community colleges (MOHE 2011). With respect to facilitating student progress to tertiary education, the establishment of the Malaysian Technical University Network (MTUN), comprising Malaysia's four technical universities, would allow articulation into diploma/degree programs for skills training graduates.

292. Articulation of skills certification works through government recognition of certificates issued upon completion of TVET programs. In 2000 the system recognized: a) NOSS under the MOHR, b) the public sector polytechnics under the MOE, and c) LAN under the MOE covering private higher education. SKM level 3 graduates could gain admission to other certificate and diploma programs at polytechnics and community colleges. By 2010 the MQF expanded coverage to private higher education and allowed certificate holders at the diploma level to articulate to university studies.

293. There has been greater recognition of prior achievement (RPA) in recent years. By 2010 RPA had been integrated into the national qualifications framework, with MQA publishing guidelines on what constitutes RPA. Lifelong learning (LLL) courses for the needy are now also provided in community colleges.

294. Support for further occupational and career development was strengthened in several ways. All secondary schools in the country have at least one full-time guidance counselor. The government also established (in 1997) the National Higher Education Fund Board under MOE to provide educational loans for those wishing to attend polytechnics and other institutions of higher education. The National Dual Training System was established in 2004. And in 2009, the Manpower Department established JobsMalaysia Centers and Points in 11 major urban centers to provide community-based career counseling and job matching services (MOHR 2013). MARA also provides free tuition for skills training and upgrading at its training institutes (MARA 2013).

295. The Department of Social Welfare, Ministry of National Unity and Community Development (now Ministry of Women, Family and Community Development) (MWFCD) has been offering skills training to people with disabilities in its Sheltered Workshops since 1979. Students with disabilities also have reserved places and/or receive monthly allowances at public sector training institutes (Kamarulzaman Kamaruddin 2007). Under the Ninth Malaysia Plan (2006-2010), MWFCD established Community-Based Rehabilitation Centers that provide comprehensive services to people with disabilities. Services include vocational training and job placement.

296. In spite of the numerous initiatives in place, participants at the SABER-WfD workshop noted issues in implementation, including differentiation of treatment by institutions.

8.4.3 Dimension 3: Service Delivery

297. Malaysia scored slightly higher in **Service Delivery** (score 2.7 in 2010) than in System Oversight. The most important development in service delivery is the rapid expansion of private sector provision, including significant growth of private post-secondary education. Throughout the years, the government has come to recognize the need for regulation to ensure minimum standards of quality for greater program relevance and performance accountability. Malaysia's 2.7 score (a level between **Emerging** and **Established**) is the

average of the ratings for the underlying Topics: (i) enabling diversity and excellence in training provision (2.5); (ii) fostering relevance in public training programs (2.8); and (iii) enhancing evidence-based accountability for results (2.9). The explanation for these ratings and their implications follow in this section (Figure 135).

298. Given the initial attention devoted to public sector institutions (as the primary providers), it is not surprising that Malaysia scored at the Emerging level in 2000. Among public sector providers, a top-down approach may be one cause for mismatches between the supply of training and the demand for it. This was observed in Policy Goal 8, although improvements did occur over the past decade from a score of 2.0 to 2.8. Given this mismatch, plus limited attention to impact evaluations, Policy Goal 9, enhancing accountability for results, obtained scores similar to policy goals 7 and 8.

Figure 135: SABER-WfD Ratings of the Service Delivery Dimension

Source: World Bank 2013

299. Malaysia scores slightly below other countries in this dimension. Korea is at the Established level, with strong formal links between TVET and industry, of which the latter plays an important consultative role on WfD policy, programs, curricular design, etc. All providers collect and report data by law, which is analyzed to improve resource allocations, determine best practices, etc. From a system that previously focused strongly on skills analyses to manage inputs and performance, Korea is now increasing its assessments of providers and overall system performance. Singapore has most of these features at an Advanced level, and has made substantial improvement in measuring outcomes, thus enhancing accountability. It has also increased promotion of diversity and quality of its training providers. Chile has a diverse system in place, as well, but is lacking in other areas like quality and standards for trainers and outcome-oriented monitoring mechanisms.

Policy Goal 7: Promoting Diversity and Excellence in Training Provision

300. Policy Goal 7 benchmarks the system according to the extent to which policies and institutional arrangements are in place to: (i) encourage and regulate non-state provision of training, and (ii) foster excellence in public training provision by combining incentives and autonomy in the management of public institutions. The increase of private providers, and thus diversity of training provision, resulted from rising demand for tertiary education which exceeded what public universities could supply. Private post-secondary education provision burgeoned to cater to this unmet demand (Table 18). The government's response to growth of private providers was the passage of the Private Higher Educational Institutions Act in 1996. Under this Act, non-government institutions such as tuition centers, training institutes, language centers (like the British Council), and professional organizations (e.g. the Malaysian Institute of Management), were required to register as

private higher education institutions (Tan, 2002). The result was a more than two-fold increase in the number of private higher education institutions from 280 to 611 between 1995 and 1999. These primarily for-profit private institutions were also to play an increasing role in training provision.

Table 18: Indicators Showing the Expansion of Higher Education in Malaysia, 1967-2007

Indicators	1967	2002	2007
No. of public universities	1	18	20
No. of private universities and university colleges	0	12	33[a]
No. of foreign branch campuses	0	4	4
No. of private colleges and higher education institutions	2	518	488[b]
No. of polytechnics	0	13	24
No. of community colleges	0	17	37
No. of students (postgraduate)	4,560 (398)	262,626 (31,501)	873,238 (45,888)
No. of Malaysian students studying abroad	n.a.	42,780	54,915

Sources: Hill *et al.* (2013) Table 1. For 1967 data – Ministry of Education (MOE) (1974); for all other data – Ministry of Higher Education (MOHE) at www.mohe.gov.my [a] Excludes branch campuses [b] Includes branch campuses

301. There is also diversity among private providers, as not all of them are for-profit. NGOs such as the Monfort Boys Town also offered vocational courses. State and semi-state owned institutions like the Sekolah Agama Darul Ehsan Islam (a religious polytechnic funded by the Selangor State Government) and Yayasan Pelajaran MARA (MARA Education Trust) are also considered private education institutions (Tan, 2002). To the extent that foreign institutions entered into partnerships with Malaysian private institutions, they also played an important role.[57]

302. Several regulations prohibited private colleges from becoming universities. Recognition of the private sector's role only came with the Private Higher Education Institutions Act in 1996. Private providers continue to face constraints in their operations, however. For example, Malaysia's TVET sector was opened to foreign providers only in 2012. Before that, there were only a few bi-national TVET providers such as the German-Malaysian Institute and the French-Malaysian Institute (Custer 2012).

303. The same is true of incentives for private sector training provision, for which the government provides almost no direct incentives. The main incentive for private training providers since 2000 has been through NOSS adoption benefits, in terms of accredited content and standards. NOSS accredited programs issue certificates bearing the recognized Malaysian Skills Certificate stamp. For private trainers, the primary financial incentive consists of eligibility to claim reimbursement from levies made to the HRDF, but is only applicable to HRDF levies, and not training programs. Priority programs were able to obtain higher reimbursement rates (Mohd Gazali Abas 2012). Registration with the HRDF also afforded training providers eligibility for selection by employers seeking training for their employees. Financial assistance was also available through the Small and Medium Industries Development Corporation (SMIDEC) Skills Upgrading Program.

[57] Foreign for-profit institutions include the branch campuses of foreign universities and institutes set up through inter-government cooperation (e.g., the German-Malaysian and British Malaysian institutes).

304. In addition, the Ministry of Youth and Sports through IKBN provides and funds external training since 2002. This is mainly in the area of hospitality management with private colleges such as Taylors' College and Kolej Damansara Utama among the private training providers. As non-financial incentives, these providers also gained access to the latest equipment and were also authorized to issue government approved certificates.

305. While profit motivations incentivize private providers to meet certain targets, public institutions work differently. Before the establishment of MOHE, technical and vocational schools under the MOE were expected to achieve certain targets, although many of the targets (enrollment, funding) were controlled at the central level. Three main guiding principles included: (i) accessibility; (ii) equity; and (iii) quality. Secondary education institutions were similarly given targets for enrolment, graduation and job placement rates. After the MOHE was established, a new objective was for community colleges to contribute to the skilled manpower needs of the country. For instance, it was decided that 120,000 trained graduates from these colleges should complete the National Modular Certificate by 2015. Likewise, it was expected that about 80 percent of IKBN and MARA graduates would enter the industrial sector. It is unclear whether these requirements were met by incentive or reward structures, if and when targets were met.

306. There are few links between autonomy and accountability among public institutions given a top-down approach and continued focus on inputs rather than outputs. Also within public institutions, the degree of autonomy varies between ministries. The MOE's (and later MOHE's) public secondary training institutions had little autonomy, with major decisions—admissions, purchase of materials, staff hiring or firing, and remuneration—all centrally determined, nor were they allowed to generate or retain revenues. Similarly, MARA's individual Vocational Institutes (IKMs) and MYS' IKBN centers also enjoy little to no autonomy in their operations. All decisions are centrally determined by the Skills and Technical Division (*Bahagian Kemahiran dan Teknikal*) and Management Standardisation Unit (*Unit Penyelarasan Pengurusan),* respectively. Under MOHR, some degree of autonomy was introduced in 2007, with some institutions allowed to offer new courses and engage with local industry. Income generation was also allowed. By 2010, the Department of Polytechnic Education of MOHE reported that 17 colleges had availed themselves of this opportunity and established trust funds.

Policy Goal 8: Fostering Relevance in Public Training Programs

307. Public training institutions (private ones, as well) need reliable information on current and emerging skill demands in order to keep their program offerings relevant to market conditions (as discussed in great detail in earlier chapters, and relating directly to Pillar 3 of the knowledge economy). Partners such as employers, industry associations, and research institutions, can provide information about skills competencies and expertise, and advice on curriculum design and technical specifications for training facilities and equipment. They can also help create opportunities for workplace training for students and continuing professional development for instructors and administrators.

308. Malaysia is close to an **Established** level of development (score 2.8 in 2010) for this Policy Goal. This score is the average of scores for: (i) links between training institutions and industry (2.8), (ii) an industry role in curriculum design (4.0) and (iii) the design of facility standards (2.0), (iv) links between training and research institutions (2.6), (v) recruitment and in-service training of heads of public training institutions (3.0) and (vi) instructors of these institutions (2.4).

309. Links with industry with respect to curriculum design have become established. Industry experts play a role in curriculum design in public training institutions under MOHE, with the Community College Department in particular benefiting from formal inputs from industry experts as and when needed. Since 2006, MARA has designed its curricula based on inputs from industry experts and academicians. MARA also provides industries without the latest equipment with access to its training centers to train on new machines and equipment. Industry experts also had opportunities to provide curriculum feedback through the MARA Council in which they were represented. Similarly, IKBN's links with industry-based institutes have helped shape curricula while collaborations with local institutions like Tun Hussein Onn University also enabled research on vocational and technical training that could improve teaching substance and methods.

310. Industry had no role in the specification of facility standards, however. They also do not have clear links to feedback as time passes, and outside the formal curricula update process. To the extent that industry experts were involved, it was only during workshops or when they were invited to facilitate courses. Some progress was reported by MARA, however.[58] Like MARA, MYS's IKBN obtained industry feedback from students' on-the-job training, which were compiled and presented to the IKBN's Technical Advisory Committee.

311. There are now a few links between training and research institutions. In 2000, the only link was through inclusion of research institutions at the central level to provide inputs at formal meetings. By 2010, one university (the Faculty of Technical Education, Universiti Tun Hussein Onn) played the lead role in training vocational school teachers for a new NOSS-based curriculum under the TVE transformation program. This collaboration led to new training programs incorporating NOSS. In 2012, community colleges were reportedly undertaking research, but it was unclear if this was in collaboration with research institutions. By 2010 IKBN had also established links with local universities to offer the latter's programs or to create learning pathways.[59] MOHR's links with research institutions began around 2007, when some ITIs and ADTECs signed memoranda of understanding with several universities to share facilities and instructor training.

312. In terms of leadership of training institutions, as well as recruitment of instructors, minimum qualifications were stressed. Most of those recruited were civil servants under a hierarchical structure where positions are filled internally. Filling leadership positions through internal promotion, while providing incentives for ministry and training center staff, has the downside of excluding candidates with industry experience. This system also limits the amount of practical knowledge and new technology that is brought into the system of learning on a regular basis. In-service training both for heads of institutions and instructors has received greater emphasis over the years to better meet industry needs.

Policy Goal 9: Enhancing Accountability for Results

313. Adequate information and information flows are particularly important in the Malaysian context, where the multiplicity of players and oversight bodies makes it complex for parents

[58] One example was the Welding Institute and the Fiber Optic Association providing input to the professional courses provided by them. MARA's Technical Advisory Committee which comprises industry players like Petronas and Toyota also provided inputs to MARA courses.

[59] IKBN has established links with Universiti Teknologi Malaysia to offer the latter's Diploma in Technology. IKBN Termerloh signed MOUs with Universiti Tun Hussein Onn to look into training and advice for IKBN courses. It introduced new courses (certificates/diplomas) in automotive technology, casting technology and processing that, on completion, led to the bachelor's degree in technology at the university.

and students to make informed decisions. Also, a lack of information helps to entrench misconceptions of the status and role of TVET in relation to academic education. Malaysia is almost at an **Established** level (2.9) for this Policy Goal. This score is the average of scores for: (i) the availability of administrative data from training providers (3.0) and/or (ii) through surveys and other data collection means (3.4), and (iii) the use of such data to monitor and improve program and system performance (2.2). It is in the first (2.3 to 3.0) and second areas (1.5 to 3.4) that Malaysia has shown the most improvement over the decade. The poor assessment of the third component – use of data for monitoring – kept Malaysia from achieving an Established level for this Policy Goal.

314. Improvements in the coverage and dissemination of administrative data are best illustrated through developments at the MOE. Secondary institutions collected data on enrolment and administration, graduation rates, and job placement, which were compiled in annual reports for internal use (in 2000) but subsequently also for public dissemination (2010). Post-secondary training institutions provided similar data in 2010. Non-state post-secondary institutions were also required to report data, and most did, but this required visits from MOE officials to obtain them. Reporting requirements for MOHE were initially similar to those of MOE, but were also progressively enhanced. MOHE also monitored data collection by non-state institutions, although only partial compliance was achieved.

315. Other public training providers also generate and disseminate substantial administrative data. For MARA, all training centers (the MARA Technical College – KKTM and the MARA Vocational Institute – IKM) were required to submit data on course enrollment and passing/failure rates to MARA headquarters. This included administrative statistics, graduate and job placement information, graduates' earnings, and client feedback. Annual reports were produced for internal use and also publicly disseminated. Individual colleges also maintained their own databases. The MOHR's training institutions saw enhancement of administrative data collected between 2000 and 2010. While only basic data to evaluate progress and review policy were collected in 2000, tracer studies of graduates conducted since 2004 also yielded information on employment and job outcomes. Since 2005, student evaluations conducted twice a year were used to evaluate courses, equipment, and instructors (in compliance with ISO 9001 requirements). As for the HRDF, evaluation by employers after every training program was required in 2010. Effectiveness studies were conducted by HRDF's Research and Development Unit—annually for approved programs, and once every three years for HRDF as a whole.

316. The MYS's institutions, however, generated much less administrative data. Even as of 2010, there was no systematic requirement for every IKBN to submit reports. Performance reports were required only for the publication of annual reports for internal use only. Among non-state training providers, the NVTC maintained records of the Malaysian Skills Certificates awarded, and in the process, also kept track of enrolment. While most training providers complied with reporting requirements, there was no central database to collect the information. Much less emphasis has been placed on other means of data collection. The MOE conducted surveys on specific issues, including impact evaluation of specific activities, but only on an ad hoc basis. As of 2010, both IKBN and MARA headquarters conducted tracer studies of graduates to assess the employability of graduates. However, beyond graduate employability, there was no evidence that impact evaluation of programs was ever undertaken.

317. Notwithstanding the absence of impact evaluation, and an overall lack of rigorous impact evaluation culture in the education sector in Malaysia, ministries do use data to monitor program and system performance, and increasingly so by 2010. The greatest improvement

was in dissemination of information, which was made available online by 2010. The MOHE has followed in the MOE's footsteps, using data collected along with performance evaluations to construct a rating system for community colleges in 2013. Feedback to community colleges was provided regularly, and good practices and lessons were shared through meetings of heads of institutions, seminars, and online. The MOHR had also seen major advances in the use of data. While the Manpower Department relied on data to monitor center performance throughout the decade, by 2010, an additional initiative by the state-operated Center for Instructor and Advanced Skill Training (CIAST)[60], was a tracer study of graduates, including information on employment and earnings. CIAST's and other reports were available online.

8.5 Key Lessons from the Institutional Analysis

318. The results of this exercise suggest a WfD system that combines both strengths and weaknesses. There has been overall, sometimes significant, improvement across all three dimensions and many policy goals. The leadership's prioritization of human resource development is reflected in announcements and policy documents during the period from 2000 to 2010. As a result of significant progress on Strategy, Oversight, and Delivery**,** the country has an established system with institutionalized arrangements for funding, standards, and provision through a large network of public institutions and a vibrant private sector.

Strengths:

- More comprehensive coverage of skills standards and assessment (MQA vs. NOSS)
- More rational funding for Continuing Vocational Education Training (CVET) aligned with industry needs
- Shift in focus of program evaluation, from inputs (based on costs) to outputs (based on number of people trained)
- Increased access to wider range of training options, through diversification and articulation of learning pathways (e.g. recognition of prior learning)

Weaknesses:

- Inadequate attention to program implementation and monitoring (e.g., funding not linked to explicit targets)
- Weak institutional memory in agencies leading WfD, resulting in limited learning from past experience
- Insufficient leveraging of public-private partnerships to build a holistic WfD system
- Fragmentation of responsibility for WfD policy development and implementation across multiple agencies with limited coordination
- Limited role of workers in the design of training programs, compared to the more significant role of industries
- System is burdened by the need to provide remediation to trainees with weak basic skills

319. Together with adequate funding, these improvements have elevated public sector WfD programs from being a minor player in education and training with limited coverage to a major player with nationwide reach, and accessible through a widening set of learning pathways. Public provision has been augmented by rapid expansion of private provision.

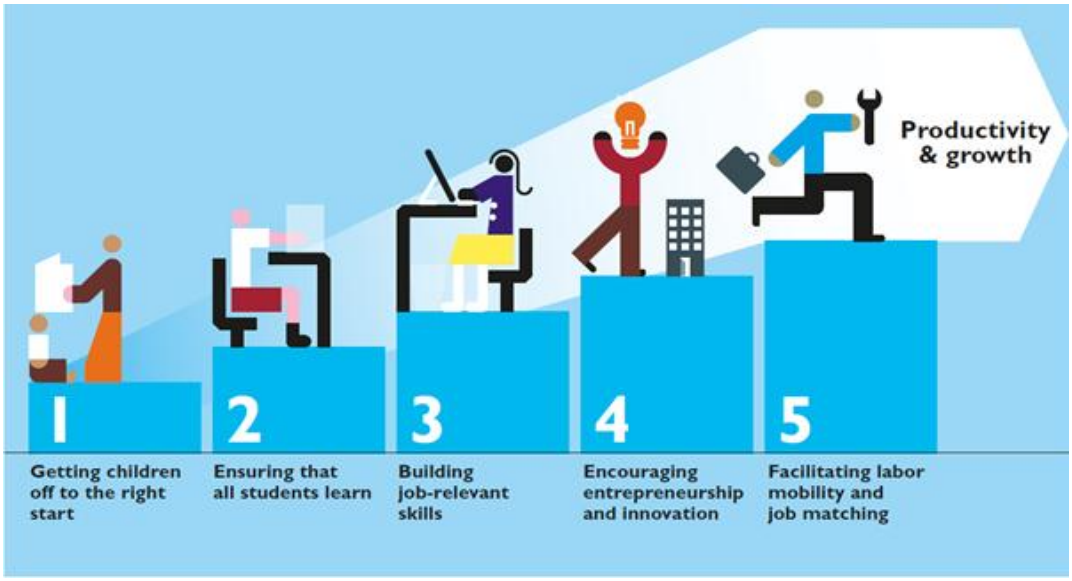
[60] CIAST is under the Manpower Department, MOHR, and has been operational since 1984. Its establishment was sponsored by the Government of Japan. Details of its operations can be found in its website at www.ciast.gov.my.

Chapter 9: Policy Recommendations

320. Skills developed in early childhood (cognitive and non-cognitive alike), and fine-tuned through subsequent years of formal education/training, are essential to achieving Malaysia's knowledge economy country model. Indeed, a key message from this report is that *people* need to have a solid foundation in cognitive, social and behavioral, and technical skills in order to be skilled and adaptable *workers.*

321. But as shown in Figure 136, the acquisition of foundational skills takes place from early childhood education, primary and lower secondary education (Steps 1 and 2)[61], and continues to be strengthened throughout the working life of an individual (Steps 3 and 4). And as shown in Step 5, there are institutional factors that facilitate (or hinder) how skilled and adaptable workers are. These are factors such as having clear feedback mechanisms between the education-training institutions and the labor market, or having a labor environment that enables worker mobility and eases access to information so that people and institutions can make informed decisions (Step 5).

Figure 136: Skills Needed for Productivity and Growth Follow an Interconnected Sequence



Source: World Bank. 2010. Stepping Up Skills for More Jobs and Higher Productivity

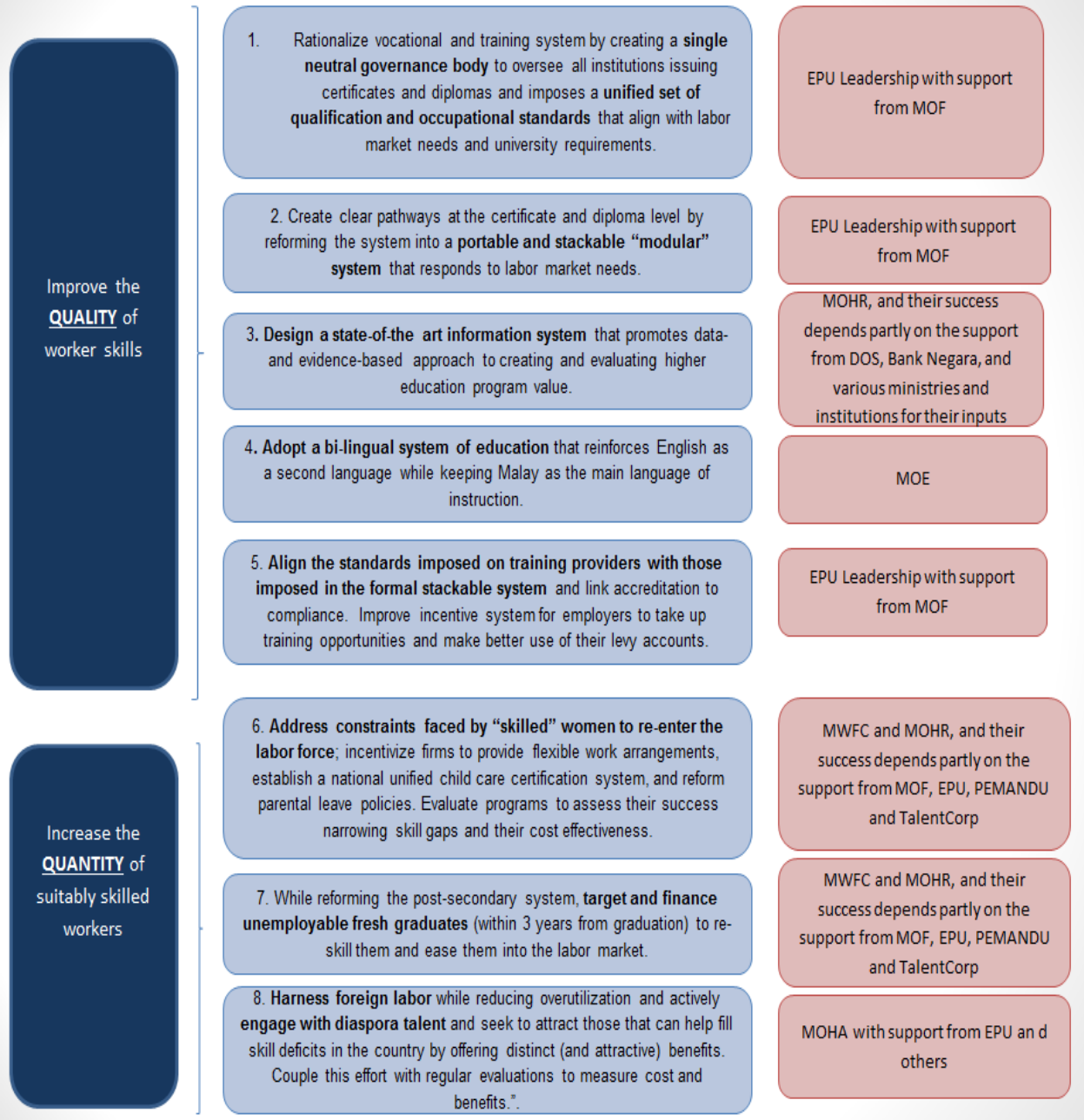
322. This chapter lists eight Priorities, with a set of corresponding actions that the government of Malaysia can consider to get closer to meeting its goal of becoming a knowledge-based economy, with workers that are skilled and adaptable to an evolving labor market.

323. All Priorities (Figure 137) are meant to address two overarching objectives: first, improve the quality of worker skills; and second, increase the quantity of suitably skilled workers. It is important to note that some Priorities (and their respective action plan) are more likely to succeed when implemented together; for instance: Priorities 2 and 5 are

[61] It should be notes that many of the key issues in primary and secondary education are acknowledged in the newly released Education Blueprint; going forward, it will be important for the government to follow through with the implementation of many of the proposed reforms.

partly dependent on Priority 1. Fortunately, most of them can be done in parallel by various ministries and institutions. Priority 4 is directly under the domain of the Ministry of Education. Priorities 6 and 7 involve various ministries and institutions, such as Ministry of Women, Family and Community, and Ministry of Human Resources, and their success depends partly on the support from Ministry of Finance, Economic Planning Unit, PEMANDU and Talent Corp. Priority 3 falls largely under the Ministry of Human Resources but depends on the support of Department of Statistics, Bank Negara, and various ministries and institutions for their inputs. Priority 8 falls largely under Ministry of Home Affairs with support from EPU and others.

Figure 137: Summary of Priorities Identified



OBJECTIVE 1: IMPROVE THE QUALITY OF WORKER SKILLS

324. University and vocational education and on-the-job training are the main avenues for acquiring most of the technical skills that Malaysian workers need to perform in their chosen occupations. As clearly described throughout the report, despite great improvements in the level of education of the Malaysian workforce and core foundational skills such as literacy and numeracy, a large segment of the workforce does not have the job-related or technical skills necessary to meet the country's aspirational goals. In fact, the bulk of Malaysian workers are "stuck" in occupations that entail using routine cognitive skills rather than non-routine cognitive analytical or interpersonal skills, which are typical of a knowledge economy. Going forward, it will be critical to make substantial improvements, beyond educational levels, in the quality of the skills of the workforce so as to positively affect their productivity levels. As shown in the report, much can be gained from a one percent improvement in the productivity of the skilled workforce.

325. Inadequate quality of education and skills stem from having a workforce development system that is not responsive to the dynamism of the economy and fast changing labor demands, and from deep rooted institutional failures. Fortunately, both of these issues can be dealt with by identifying a set of priorities and designing a strategy to tackle them.

326. The priorities listed here address weaknesses or market failures identified in the current workforce development system. If addressed, the ability of the workforce development system to improve skill quality will likely succeed. The specific market failures in need of addressing are as follows: 1) fragmentation in the workforce development system; 2) heterogeneity in the quality of training and education at all certificate and diploma levels and mis-alignment of training with market demands, both of which distort economic returns to education for post-secondary graduates; 3) limited information systems that can make the workforce system more responsive and synergistic; 4) deficient quality in the delivery of basic educational services (namely as it related to English language, math and science); and 5) sub-optimal utilization of job-related skill training opportunities.

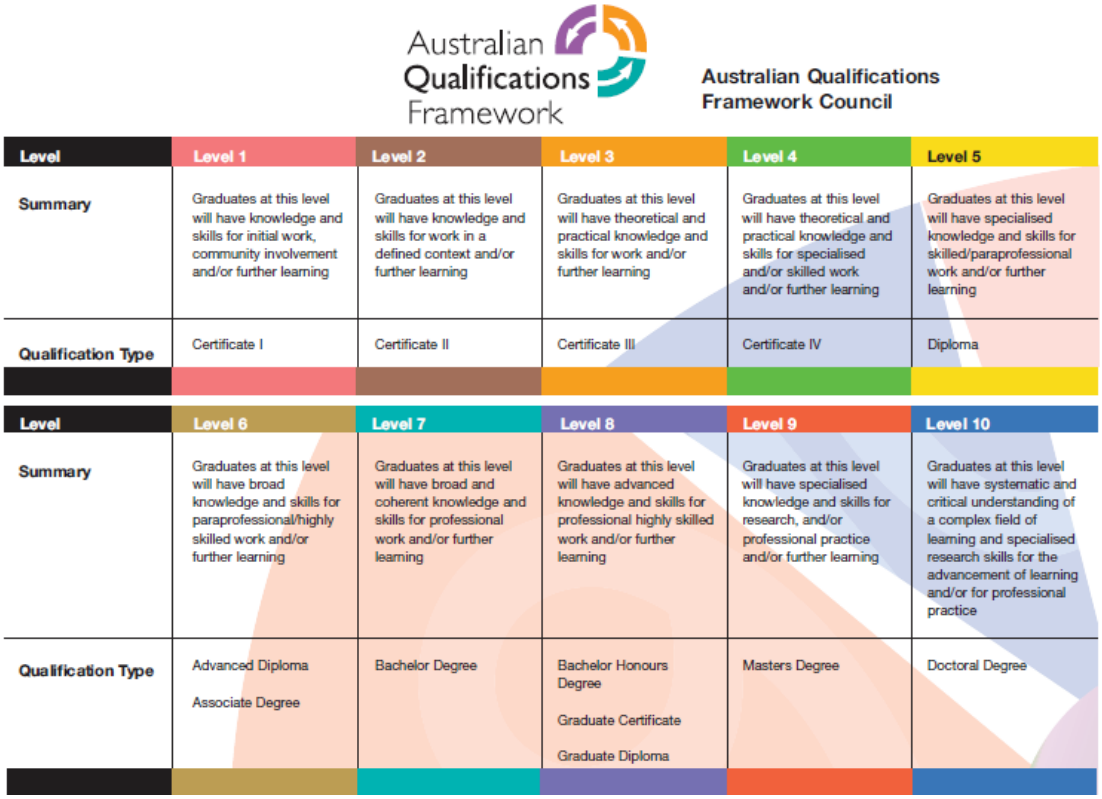
Priority 1: Rationalize the vocational and training institutional system to minimize fragmentation by creating a single neutral governance body to oversee all the institutions issuing certificates and diplomas. Also, the system should manage a unified set of qualification and occupational standards that align with labor market needs and university requirements.

327. *Action 1: Create a single neutral governance body to oversee all institutions issuing a certificate, diploma, and advanced diploma.* A unified governance structure will limit the proliferation of institutions and providers, and ensure that the requirements at the certificate and diploma levels are aligned directly with those at the University level, governed under the Malaysia Qualification Standard (this links to Action 2).

328. The Australian Qualifications Framework, regulated under a Framework Council composed of national ministers responsible for tertiary education, training and employment, includes all levels of post-secondary and training education; from certificate I to Doctoral degrees (Figure 138). Given Malaysia's complex WfD system, unification across all levels may not be feasible; however, to address the current fragmentation, it is imperative to establish a unified system to govern the non-university post-secondary level, encompassing levels 1 to level 6. The objective of the unified governance body should be to ensure that the system is organized and coordinated (between internal actors and with external stakeholders such as employers), provide credential consistency, and manage

differences between disparate sector-based institutional interests so that the system is well connected with the changing needs of the labor market and the university level of education.

Figure 138: Overview of the Australian Qualifications Framework



Source: Malaysia Qualifications Framework Website

329. The new governance body should also harmonize the accreditation process across ministries and private skill providers. Such a governance body would also be able to eliminate overlapping courses (or varying quality) offered across institutions so as to ensure quality, reduce confusion, and improve efficiency. Funding and re-accreditation of institutions should be tied to proper compliance with rules set and performance standards (such as the Star Rating system) set by the governance body. One of the core tasks of the unified governance body should be to monitor labor market demands, in terms of skill content and fields of study, and feedback the information through revisions in the qualification and occupational standards. Another task should be to reward private-public partnerships that result in better student placement and encourage private sector to take a more active role in curricula modification.

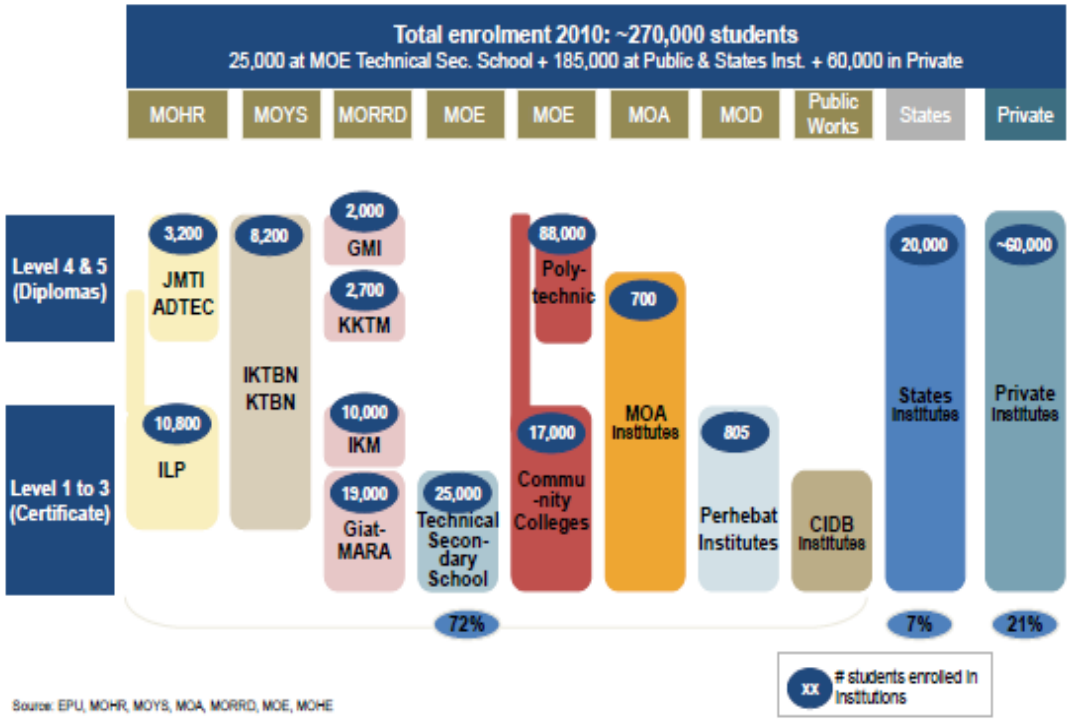
330. Action 2: *Review the quality and occupational standards for post-secondary (non-university) levels to be more broadly applicable across the entire post-secondary system (except university), and how they are governed (under unified system of governance) to harmonize standards across system.* The new governance body should establish a unified set of quality standards that not only address the proliferation of qualifications issued by various providers, but also control the diversity in quality by improving the quality assurance under one national standard and one national regulating body. The new qualification system can very much depart from the current National Occupation Skill Standard (NOSS) and make it more broadly applicable and enforceable; something that has

been a challenge to date given that it is mainly geared to TVET education under the MOHR (and some private sector providers).

331. As previously stated, the current Malaysian workforce development (WfD) system (namely the certificate and diploma levels) is characterized by fragmentation and duplication of efforts which limits the overall effectiveness of the system to deliver quality services and content. Figure 139 shows how diverse the system is in terms of number of students, and responsible parties (often with distinct qualifications standards being imposed) exist currently. A diverse supply of providers and competition among them is highly encouraged, especially in a country with a growing labor force and changing economic demands. But, Malaysia's diverse system does not currently have (or impose) a unified set of minimum standards that the labor market can validate, recognize and reward accordingly. The variability in the quality of education and training provided by all these institutions, even for the same field and level of study, make it difficult for employers to reward non-university post-secondary students in a manner that reflects the number of years of education and resources invested. Therefore, harmonization should lead to clarity of the occupational standards and make them easier to enforce across institutions in Malaysia.

332. Standards should be fed through the system at the institutional level, monitored through a rating system and enforced by the unified governance body to ensure homogeneity of quality across the system. Standards should be reviewed by the governance body with regularity, using a variety of labor market indicators to ensure fit with labor market needs.

Figure 139: Current "Complex" System of Technical Vocational Education and Training



Source: Ministry of Human Resources, 2012

333. The new unified standards should feed curricula re-design at the institutional level to ensure that standards are implemented and adopted throughout the system. The process of

redesigning curricula should be highly structured so that standards are adequately applied and reflected in the fields of study and courses offered and that they remain relevant to labor market needs. Incentives of higher learning institutions will need to change by attaching funding and accreditation to innovation, excellence, and (private and public) competition for students.

334. The new governance entity can also prioritize critical fields of study that are directly aligned with labor market needs; for instance, skills needed for NKEA sectors and other core areas of the economy[62] (Box 4). The role of the "neutral body" should include to continuously monitor the ability and capacity of institutions to meet skills demands and to evaluate existing programs to assess their fit into the new system and to ascertain whether to enhance, maintain, or consider sun-setting the program. Employer requirements and industry certifications need to be examined and taken into account in the selection of programs within the priority fields of study.

Box 4: City Colleges of Chicago "Reinvention Campaign"

The City College of Chicago (CCC) is one of the largest community college systems[63] in the United States, with more than 115,000 students in 2012[64]. A review of the City Colleges programming undertaken in 2010 found several worrisome trends. Most relevant to Malaysia's skills challenges, the review found that programming was not related to employer needs, with courses either misaligned with or insufficient for the current skills demands of employers.[65] In particular, a mismatch was identified between fields in which well-paying jobs were growing and enrollment in and completion of CCC was low. After the review, the City launched a reinvention initiative, which meant embarking on an ambitious campaign to reform how the system educates its students. One of the four "core goals" of the Reinvention was to ensure that more students receive credentials of "economic value," a goal specifically designed to address the problems of skills mismatches.

The CCC's review of the manufacturing sector provides an example of how the process works. CCC's review of its manufacturing programs found duplication and instruction scattered among colleges, among other problems. However, CCC also found that the manufacturing sector is important in Chicago, representing the 7th largest source of employment in the county surrounding Chicago with several manufacturing segments growing strongly. Review of the labor market (mainly using data) revealed five career steps in the local manufacturing sector, from low-skilled employment (materials handler) to high-skilled employment (manager). Interviews with industry employers and experts revealed that entry-level students are viewed as underprepared and that there seems to be demand for a more highly specialized "core" curriculum for entry-level employees. Development of programming to fit these needs was then pursued in partnership with employers such as Caterpillar and Kraft.

Another key economic area in Chicago, as determined using data on employment opportunities and wages, is the insurance market. To meet the demands from the insurance sector, City Colleges partnered with organizations in the insurance industry, gathered job descriptions of entry-level positions, developed common skills requirements from these descriptions, had its insurance

[62] In the case of Chicago, they used four criteria to determine whether programs are "relevant" to the labor market. These are: whether 50 job openings are available to graduates, whether a wage sufficient to support a family can be earned by graduates, whether a program fits into a relevant educational pathway, and whether the program serves a "compelling local need."

[63] In the United States, community colleges generally refer to public institutions that offer two-year degrees and courses in preparation for bachelor's degrees, continuing and adult education, and other instruction.

[64] http://www.ccc.edu/menu/Documents/CCC%20FY%202012%20Statistical%20Digest.pdf

[65] Reinvention: Chapter 2: Foundation for Success

partners review them, and, finally, worked with faculty to locate both gaps in the current curricula as well as areas in the existing curricula that are relevant to the skills requirements identified.[66]

College to Careers is more expansive than this review process alone. The initiative's partnerships have three primary goals: the creation of curricula and the design of training facilities; the delivery of curricula through the use of "teacher-practitioners"; and the creation of a pipeline to internships, interviews, and training facilities. Importantly, the partnerships are structured such that feedback between employers and skills providers (i.e. CCC institutions) is ongoing. Current partners include private sector employers such as the global shipper UPS, health care providers such as Rush University Health Center, and public agencies such as the Chicago Transit Authority. As a result of College to Careers, occupational programming in the six areas of focus has been redesigned, six of CCC's seven campuses have been devoted to one of the six growth industries, and two state-of-the-art facilities have been constructed for health science and logistics training.

Source: Author's summary from various Reinvention documents provided by the City of Chicago.

Priority 2: Create clear pathways at the certificate and diploma level by reforming the system to a portable and stackable modular system where career credentials responds to the labor market.

335. Action 1: *Reform the pathways between post-secondary systems by reforming the diploma and certificate levels into a portable and stackable career credentials.* By designing a system of portable, stackable credentials embedded in transparent, more easily navigable career pathways, students (and parents) are likely to be more confident of the value of TVET and community college education. As stated by a recent study (Austin, Mellow, Rosin and Seltzer, 2012) "These credentials would provide employers with a reliable method for hiring and maintaining a skilled workforce and give workers a clear pathway for building a sustainable career with the opportunity for advancement. (A credential refers to a variety of different work qualifications—including diplomas, certificates, certification, degrees, and licenses.) The policy paper outlines how other nations, including Germany and Canada, have been successful in creating skilled workers with similar measures".

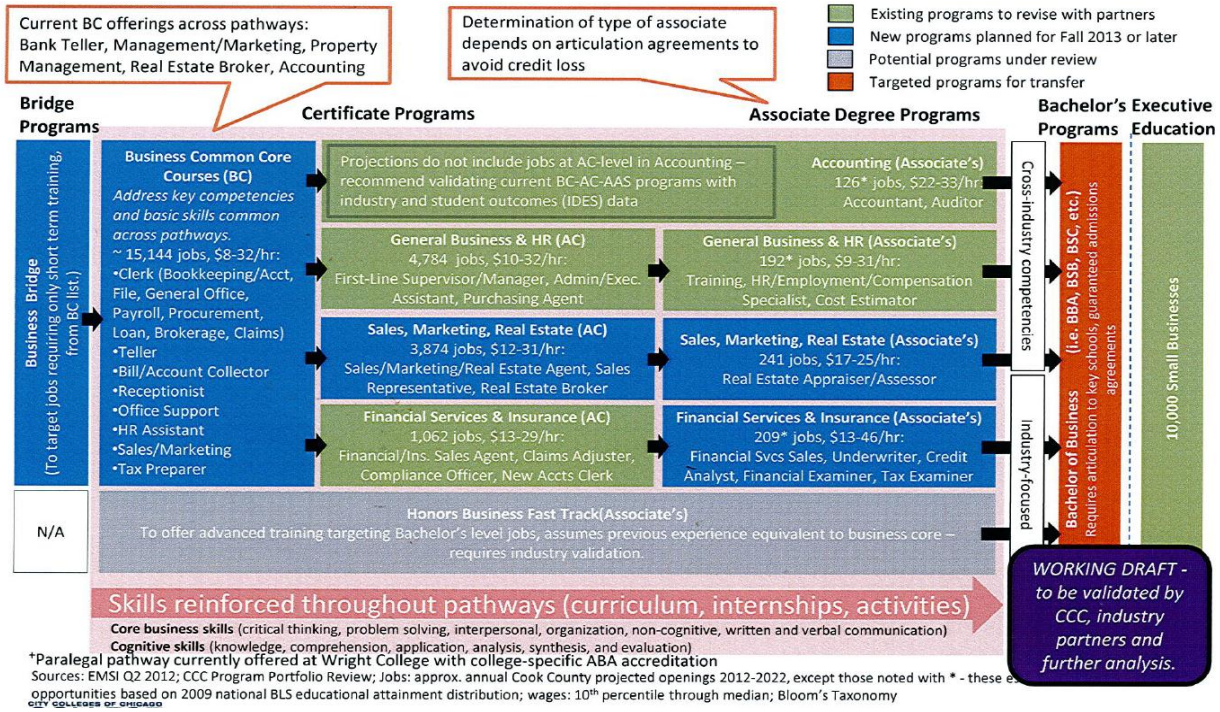
336. More specifically, reformat certificate and diploma levels (levels 1 through 6) into a stackable occupational programming approach that offers self-contained modules that stack up across levels (from 1 through 5) but also transfer easily to universities, if the student takes the academic route. Such a system requires ex-ante articulation agreements with four year universities be in place to ensure a smooth transition. There is some precedent for such as system at the community college in Malaysia but the modular system has not been widely implemented or evaluated for effectiveness, and it is unclear whether it is meant to be stackable.

337. By changing the current system into stackable modular approach students across all fields of study can have a clear career or academic progression path. **Portability** of credentials is critical; but to ensure they are recognized across the system each module must be verified and accredited under a unified qualification standard. **Stackability** can also be an effective model to meet the demands of students in need of basic skills and those seeking more advanced skills and lifelong learning. Stackable credentials allow students to earn shorter term credentials with clear labor market value that builds on into more advanced credentials that easily translate into higher wages. These stackable degrees or certificates ease the entrance into the workforce, and function as a "gateway" for attainment

[66] Reinvention: City Colleges of Chicago's College to Careers. Presentation to the World Bank. April 23, 2013.

of more advanced skills. Students know what skill and credential they will have at every stage and what their earning potential is for every level (Figure 139). Another advantage is that by offering short term stackable modules students are motivated to continue acquiring more skills over their lifetime.

Figure 139: Example of s Stackable System



Source: Example of information provided by the Chicago Community College system, 2013

338. The objective should be to avoid awarding degrees that are not relevant to the labor market and to guarantee that career development is always possible. Thus, foundational adult education can lead to basic certification, which makes lower-skilled jobs available. But in the stackable model, this basic certification also permits admission into advanced certificate and associate degree programs (and these into bachelor's programs), which open up opportunities for higher-skilled and higher-paying jobs. An exit from occupational programming is possible at any of these levels, but transition to (or reentry into) a higher certification is possible, as well. A stackable model is complemented by partnerships with four-year colleges to ensure that credits obtained in the vocational/college system will be accepted at universities. This helps avoid the problem of students taking courses which they must repeat upon entry into a four-year institution. Lastly, there must be emphasis on multiple entry points to skills development, providing "bridge programs" for students (including adults) in need of foundational education and offering courses for credit to high school students.

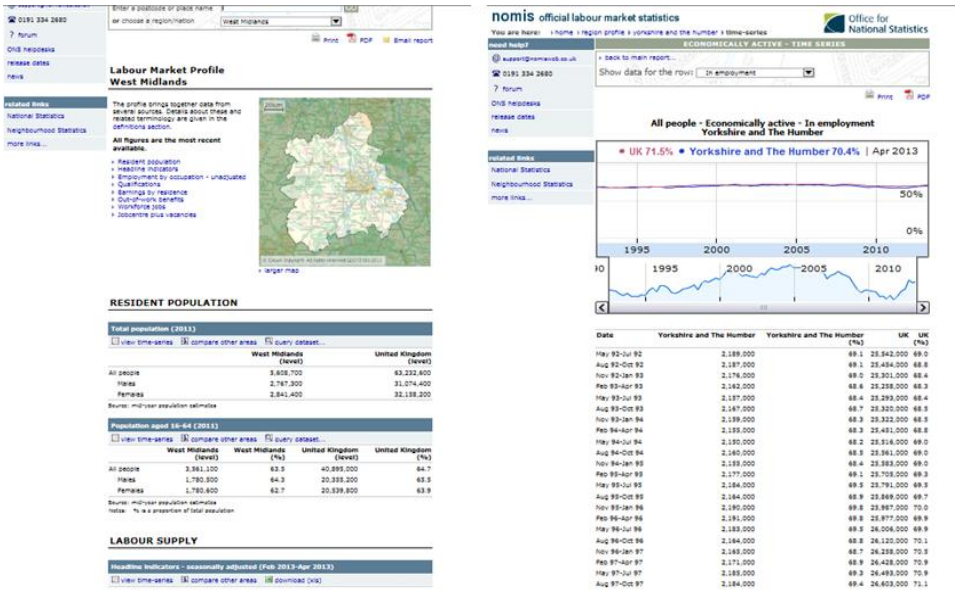
Priority 3: Design a state-of-the art information system for all key stakeholders to use and to have a data- and evidence-based approach to creating and evaluating higher education program value.

339. Action 1: *Create an accessible and regularly updated labor market information system or "Workforce Dashboard" (WD) that allows stakeholders to make informed choices.* A WD can be critical for institutions to rationalize programs, modify curricula and update programs regularly. It also allows students to make better decisions on career choices and employers to have a clearer picture of the skills of the workforce. The data-driven approach allows

program designers to consider both academic and labor market information, both which can be easily validated through engagement with stakeholders. Data and stakeholder input combined provide a powerful source for evidence based decision making in program rationalization.

340. Many developed countries have some version of a Workforce Dashboard. The Australian Labor Force Information Portal is one example; it is geared to give employers labor market information. The United States has various examples; at the national level, it has the Occupational Outlook Handbook, which is geared to job seekers wanting occupational information (e.g. types of skills required for a specific job, wage rates). The state of Maryland in the U.S. has its own Dashboard; it is geared to casual users wanting general labor market information at the state and county level. The U.K.'s National Statistics office has NOMIS, which is the official labor market statistic system (Figure 140). The U.K.'s Center for Economic and Social Inclusion has a parallel system that relies heavily on mapping the information. This one is a comprehensive system of employment related information.

Figure 140: NOMIS is the U.K.'s Dashboard



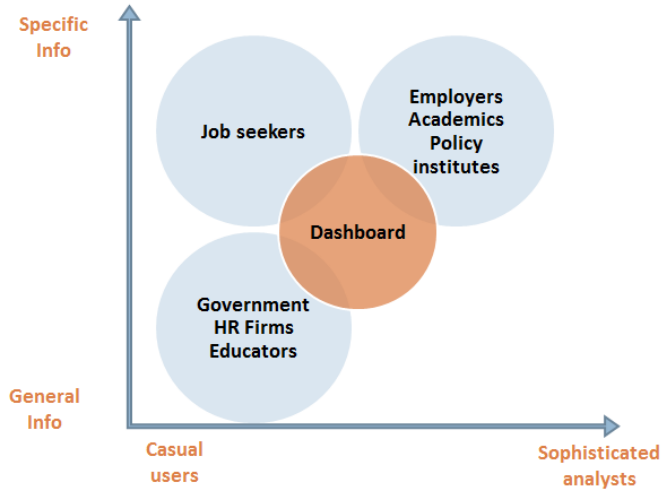
Source: U.K National Statistics Office

341. Typically WD are used to address some or all of the following objectives: 1) provide timely and accurate information about strengths and weaknesses in the labor market; 2) improve planning for future human capital needs; 3) identify skills gaps; 4) help firms understand the labor force and job seekers understand sectors and occupations of interest; and 5) promote research in labor markets using up-to-date and uniform information. Ideally, a WD should aim to address all of these objectives to remain useful and relevant to the users.

342. The approach varies depending on the context but generally successful Dashboards manage to keep a balance between flexibility in the presentation of the information so that the needs of all users are taken into account with richness in content so more sophisticated users find it useful (Figure 141). A landscape analysis of twelve workforce dashboards across the world reveals some workforce dashboard "better practices": 1) Provide something for everyone by making many indicators available; 2) include on-site

visualizations; 3) permit downloading for further analysis; 4) explain the data, define indicators, and explain what is being measured in plain terms; 5) cite sources and caution users when data is not representative. In terms of the maintenance of the Dashboard, better practice shows that for the tool to be effective it must be updated regularly and using reliable sources. Whenever possible, partner with the private sector to update and improve the site.

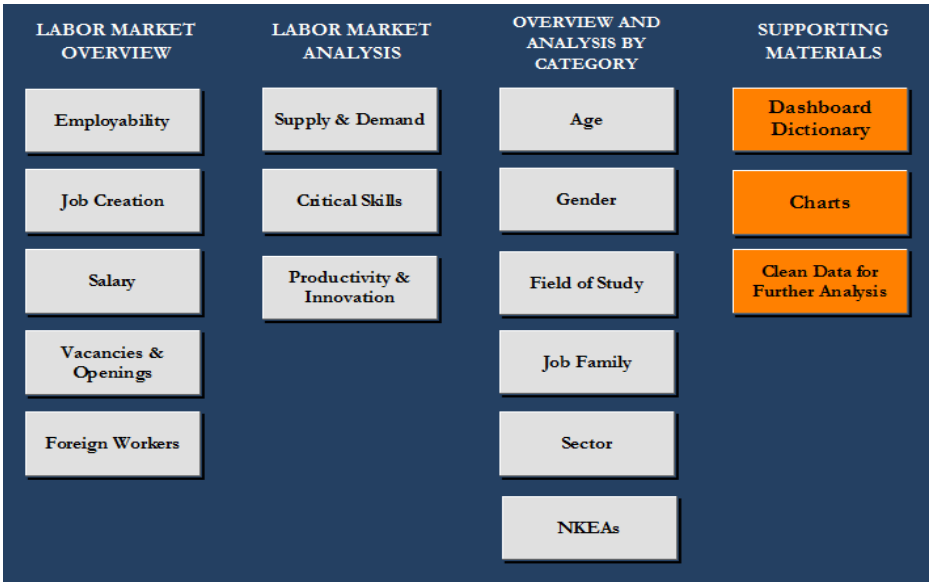
Figure 141: Trade-Offs to Consider When Designing a Workforce Dashboard

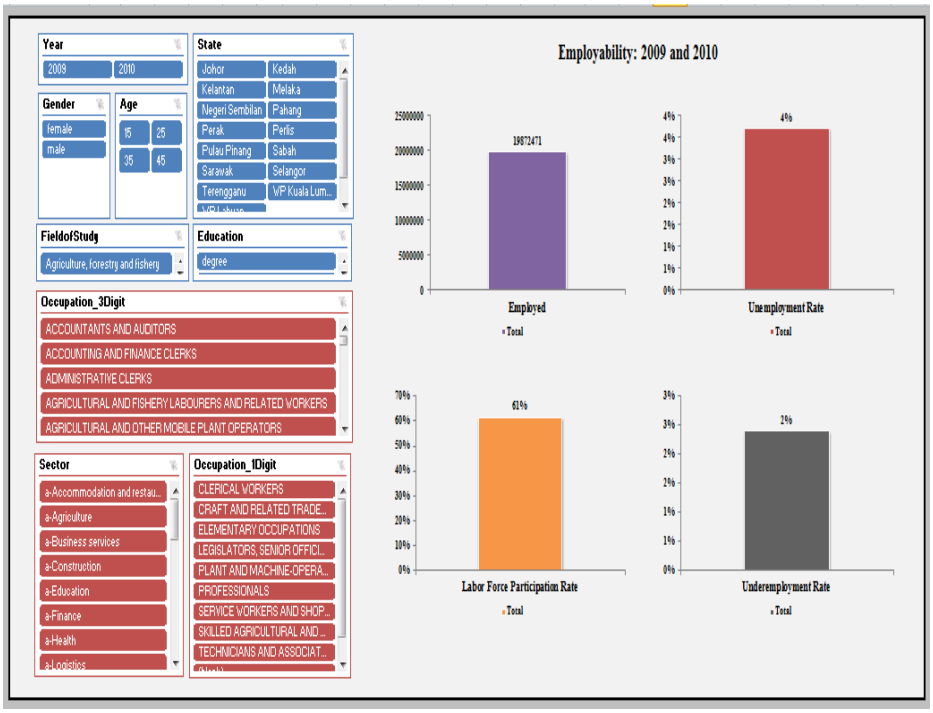


Source: Author's illustrations

343. Figure 142 shows an example of the information that a Workforce Dashboard in Malaysia should contain in order to make it useful to a multiple set of stakeholders. For instance, the categories listed under labor market overview aim to primarily inform stakeholders seeking employment or seeking workers. The categories listed under labor market analysis, such as critical skills, provide information for curricula re-design, future students, and employers. The information should be as precise as possible, for instance, by gender, age group and geographic location to increase accuracy in the decision making process.

Figure 142: Examples of a Workforce Dashboard Interface

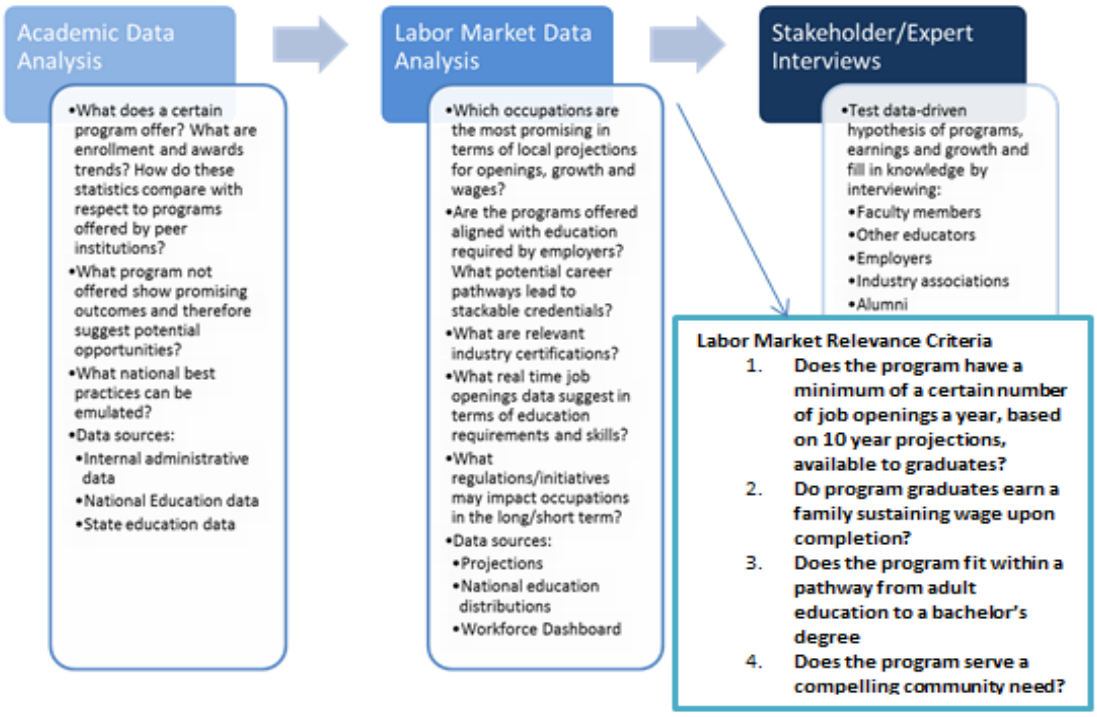




Source: World Bank's Mockup of the ILMIA-TalentCorp Workforce Dashboard

344. Regularly update the content of the information system, market it broadly, and use it to evaluate the effectiveness of programs and make necessary reforms. The system should not only contain information on labor markets, the skills in demand, and details on the supply, but should also serve as a platform for information on the quality of educational and training institutions (e.g. rankings) and a data source for evaluating program effectiveness. The system should yield enough information so that the user can take academic data (data from surveys such as the Labor Force and others) and contextualize it into the labor market needs and then be able to validate it with real employers and field experts (Figure 143).

Figure 143: How to Use the Workforce Dashboard to Rationalize Programs



Source: Adapted from the City of Chicago Reinvention Documentation.

345. Action 2: *Establish a partnership (and align incentives) with the Department of Statistics for all data related inputs.* Such partnership is critical given DOS' role in data collection; and it should be established at the institutional level to ensure sustainable access to the data, and DOS should be a key stakeholder of the WD.

346. Government should consider partnering with others in this effort. There are key functions that are better aligned with the comparative advantage of non-government agents. It makes economic sense to partner with private sector providers, academia, or others to undertake key functions such as up-keeping the technological platform, managing the content, marketing of the system, and evaluating program effectiveness, among others.

Priority 4: Adopt a bi-lingual system of education that reinforces English as a second language while keeping Malay as the main language of instruction.

347. The switch from English to Bahasa Malaysia as the language of instruction in 1970's yielded average positive results on wages, especially for ethnic Malays. It also positively impacted the quantity of people who sought further education and the quality of their learning. The 2003 language policy change (to impart math and science in English) had a negative impact on the mathematics achievement of 8th graders. In fact, relative to students in a comparable group of countries their performance deteriorated by 7.7 percent in mathematics and by 4.4 percent in science. One of the explanations is that most science and mathematics teachers are not proficient in English and are unable to impart high quality lessons in that language; in fact, a recent assessment of English language of teachers shows that only 28 percent scored in the proficient range, the rest require up-skilling or require full training (PEMANDU, 2012).

348. It is clear from the analysis that employers need workers, especially skilled workers, to possess English language skills while also mastering foundational (cognitive, technical and non-cognitive) skills. In fact, employers offer a premium for English language skills. Overall, data from employers shows that English language skills are critical to the career progression and economic success of workers. Thus, it is critical for the government to manage its language policy so as to avoid negatively affecting the quality of skills that students (and future workers) obtain while in the formal educational system. For instance, teaching core subjects in a non-mother tongue language in which students and teachers are not proficient can yield negative learning outcomes, and without proper preparation to update the foreign language skills of the teaching staff the problem can be exacerbated.

349. Action 1: *Adopt a bi-lingual (English-Malay) system of education, where English complements (rather than substitutes) Malay.* Given the importance of English language skills to the Malaysian Economy, it is critical to maintain the intensive teaching of English in public schools; however, until all teachers are not entirely proficient to teach all core subjects in English, it is recommended that Malaysia adopt a fully bi-lingual system. In the proposed approach, all core subjects should be imparted in Malay, the language mastered by most teachers, while also offering a complementary set of English language courses designed to help students develop and master English as a second language. All students should be able to pass examinations designed to measure aptitude, at various educational levels, to ensure proficiency in English upon graduation.

350. Action 2: *Invest adequate resources in the development of English language skill of teachers and administrators***.** Reinforce the system of externships abroad and various programs of language development for young teachers. The English skilling system should be continuous, throughout the career of educators.

Priority 5: Align the standards imposed on training providers with those imposed in the formal stackable system. Also, link accreditation to compliance. Improve incentive system for employers to take up training opportunities and make better use of their levy accounts.

351. Action 1: *Align the standards imposed on training providers, and like their accreditation, with the national occupational qualifications standards so that they are part of the stackable system.* Increase the incentives of workers to seek skills upgrading by linking their training to the educational system and offering them stackable credentials which are linked to the formal diploma and certificate and university system. Such an approach ensures that trainees (or students) receive credentials of economic value by allowing them to stack the credits, add them to their formal training and get them recognized by the formal education system.

352. Evidence shows that training programs must meet the expectations and needs of employers and trainees (employees) in order to be effective. Employers who invest in training need to see immediate results in order to continue investing. The same is true for workers; when they view their training as relevant to their jobs, they are more likely to seek training, even if self-financed. This is even more likely in a stackable system where trainees get credit for the training received.

353. Action 2: *Design incentives for distinct groups of employers to engage in training their workers.* Employer-provided training (on or off the job) is one way to tackle skills deficiencies and overall mismatches. Chapter 5 shows that training positively impacts worker productivity and firm performance in high flyer firms. But many firms do not see training as a cost effective option. A comprehensive plan needs to be put in place to provide

information to employers about the potential benefits of training, which include productivity gains and employee commitment, and shed light on which training schemes and types of skills provide the best returns on investment.

354. In this effort, enhance the role of HRDF and other levy account systems and leverage their overall "well established" system and course offerings to enhance employer provided training. Further analysis is needed to assess the effectiveness of distinct schemes currently provided by HRDF and other levy systems to introduce new ones, which have shown to be effective in other countries with similar contexts.

OBJECTIVE 2: INCREASE THE QUANTITY OF SUITABLY SKILLED WORKERS

355. A growing economy not only requires a better skilled workforce but it also requires a sufficient pool of willing workers of various skill levels. Even in a knowledge economy, key economic sectors and sub-sectors, such as agriculture, hotels and restaurants, wholesale and retail, necessitate a plentiful pool of workers to do routine manual tasks such as fruit picking, janitorial services, product assembly and distribution, among others.

356. The macro-economic modeling exercise (Chapter 7) projects that local employment demand (defined as employment of Malaysian citizens, both wage earners and self-employed) is expected to increase from around 10.5 million to 12.7 million. And the estimate rises substantially, from 11.9 million people to 15.3 million people, when foreign labor is included in the estimate of the expected total workforce in 2020. Such an increase in labor demand requires a proactive approach to enticing currently absent segments of the Malaysian working age population to return or remain in the labor market, and a strategic approach to manage foreign labor. To that end, the following three Priorities focus on actions, in the shorter term and the longer term, which address existing market failures that inhibit the full participation of the working age population and present obstacles to employing foreign labor.

357. The analysis in this report and a parallel report focused on assessing the role of migrant labor in Malaysia (World Bank 2013) identified various issues (market failures) that hinder the economic activity of segments of the working age population. Key issues are: 1) many unfilled jobs and long vacancy periods for key posts, especially among the most productive employers; 2) high inactivity rates among tertiary educated graduates, especially female; 3) high unemployment rates among tertiary educated youth; and 4) limited information on the role (and impact) of foreign workers (mainly in the low-skilled category) in the economy and over-dependence of foreign labor in some economic sub-sectors.

Priority 6: Address constraints faced by "skilled" women to re-enter the labor force, by incentivizing firms to provide flexible work arrangements, establishing a national unified child care certification system, and reforming parental leave policies. Evaluate these programs to assess their success narrowing skill gaps and their cost effectiveness.

358. One of the simulations explored in the modeling section focused on increasing the activity rate of tertiary educated people. Results show that activating inactive skilled graduates is growth enhancing. Thus, targeting tertiary educated women and enticing them to return to the labor market makes economic sense. But to purposely target them to return or remain in the labor market it is important to understand and address their specific constraints. Malaysia could experience a 23 percent increase in output per capita if women's labor force participation were the same as men, and if the share of women

entrepreneurs were the same as men's (Cuberes and Teignier, 2012). Key constraints faced by women in Malaysia which hinder their participation are: lack of affordable quality child-care, short-school hours, family related duties more generally, often exacerbated by cultural norms (World Bank, 2012).

359. Action 1: *Promote flexible work arrangements and establish a national unified system of child care quality certification to attract women back into the labor force. Rigorously evaluate the effectiveness of these initiatives to assess their success narrowing skills gaps.* Flexible work arrangements, improved child and elderly care, and retraining programs are three examples that have been shown to be effective in attracting women back into the labor force in other contexts. In the recent past the government of Malaysia introduced a double tax deduction incentive for training expenditures that were spent to re-employ women after a career break. The government also introduced incentive grants to establish childcare centers and establish child-minder training programs. Figure 144 outlines a sub-set of the recent initiatives or information provided to job seekers and employers. Unfortunately, there is little information on the take-up rate of some these incentive programs, on their effectiveness to attract women back to the labor force, and on their effectiveness to ease skills shortages. Thereby, as the government continues to experiment with such programs, and given their relative high costs, it will be critical to assess whether these initiatives yield the results expected, and whether they are cost effective in the longer term.

Figure 144: Sample of Efforts Currently Underway to Attract Women to the Labor Force

Source: world Bank, Malaysia Economic Monitor, 2012

360. Action 2: *Reform parental policies to reduce the burden on employers while not reducing the current (relatively low) benefit level.* Parental leave is an area of policy where Malaysia differs greatly from OECD countries in that it places the cost burden solely on the (woman's) employer and offers shorter leave periods, which makes women workers more costly to employers. Consider alternative modes of financing where the financial burden is shared in contributory funds, or fully removed from employers by embedding it into a social insurance scheme.

361. Generally, parental leave policies include maternity leave, paternity leave, and/or leave for both parents, and unpaid leave. Parental policy is meant to help parents employed prior to the birth (and in some case the adoption) of a child to remain home in order to recover from the birth and/or care for the child. In most cases parental leave policies mandate that

the job of the parent on leave is protected and in some cases there is some form of wage replacement during the leave period. The length of leave period for mothers mandated by law in Malaysia is 90 days for the public sector (with a maximum of 300 days over the length of service) and 60 days for the private sector. European countries have longer leave periods, and in many cases some form of wage replacement (e.g. flat amount, proportional to their previous wage) is provided. Some studies find that the OECD average of 10 months leave is the optimal amount because it is long enough to ensure parental bonding, improved health outcomes and maternal interest to remain attached to her job (Waldfogel, 2001). To avoid influencing women to leave the labor force many OECD countries have opted to offer a blend package which includes parental leave for the first months after child birth, and childcare options (economic support through subsidies or non-cost public options) thereafter.

362. In countries with higher female labor force participation, the financial burden of parental leave is removed away (fully or partially) from employers. Countries vary in how they impose financing parental leave, however, one common feature among twenty-one OECD countries recently reviewed is that the burden is shared between the worker, government and employer, or fully removed from employers. Examples are: contributory funds dedicated solely to family leave benefits; health and sickness funds; unemployment compensation funds; social insurance funds that pay for a broad set of contributory programs; or social insurance schemes where costs are distributed throughout society (Ray et. Al, 2009).

Priority 7: While reforming the post-secondary system, target and finance unemployable fresh graduates (within 3 years from graduation) to re-skill them and ease them into the labor market.

363. Graduate unemployment, especially among university graduates, is one of the greatest challenges facing the Malaysian government67. The causes for graduate unemployment are likely linked to the inefficiencies previously identified in the diploma and certificate issuing system. High unemployment rates among the youth poses a puzzle in a labor market where new jobs are commonplace and many vacancies remain unfilled for long periods of time.

364. A multi-dimensional approach is often required to address this problem; for instance, a combination of educational reforms (such as those prosed in the beginning section of this chapter), changes in labor market policies and institutions to facilitate hiring and firing workers and incentivize training and apprenticeships, partnerships with private sector, and a range of active labor market policies that ease the transition from higher education to the world of employment (Broecke, 2013). **But in the shorter term, the government can put in place short-mid-term remedies that address existing graduate unemployment, while making the necessary parallel reforms to the educational system and labor markets.**

365. The three actions proposed here relate to incentivizing employers to take on recent graduates through subsidizing employment (as part of re-training), providing graduates with resources to re-skill in fields better aligned with labor market needs, and improving the information infrastructure in employment related services. The first approach is currently being implemented in a small scale while the second one has not been tried in Malaysia yet. **Both should be thoroughly evaluated to determine their effectiveness**

[67] Compared to countries like Tunisia and Egypt, the fresh graduate unemployment rate in Malaysia is low.

before launching them full scale. Neither approach is inexpensive, so determining their cost-benefit after the initial trial basis is critical to their longer-term sustainability.

366. Action 1: *In the short term, expand the "Graduate Employability Management Scheme (GEMS) (or some of its features) to help unemployable graduates transition into the labor market*. Before expanding the program, undertake a thorough **evaluation to assess the effectiveness of the program its' cost-benefit, and to make necessary reforms.** The evaluation will also help determine the features of the program that are scalable and effective to address graduate un-employability in the short-to-mid-term. This program is currently only offered to graduates of 27 years of age or below, with difficulty finding employment. Age criteria can be revised to target a broader set of recent graduates in fields of study facing difficulty in the labor market and undergoing curricula reform.

367. Currently the GEMS program [68] consists of two parts, the first one focuses on classroom training and the second on the job training, at a firm. The main change would be to balance the type of classroom training that students receive so that it emphasizes those skills most desired by the type of career sought. For instance, training should combine interpersonal and behaviour skills training with technical skills. The on-the-job training part should emphasize developing job specific skills and furthering the work experience of the student in the desired career area. Employers could negotiate a reduced wage rate or a wage subsidy while the student is in training.

368. The design of these types of programs vary, depending on the resources allocated, the number of targeted graduates to be assisted, the types of employers that participate, and other important arrangements. In the case of Malaysia, the program could be targeted to higher education graduates looking for their first job and with certificates/diplomas/degrees in fields of study facing the most difficulty finding employment[69]. In Tunisia, employers entered into an agreement with the government and they were exempt from social security during the program period (and the following year is they hired the worker permanently). As in Tunisia, salaries may be paid directly to the worker to ease the administrative cost on the employer. Employers may top-up the salaries of workers, with a tax-free supplement, to reward them for good performance. The length of the program could be one year, and salaries should be set using local labor market indicators for entry-level jobs in the given industries (Marouani, 2010; and Broecke, 2013).

369. Action 2: *Another short term solution can be provided through Individual Training Accounts (ITA).* ITAs provide training vouchers to new graduates in any field, and recent (within 3 years) graduates whose degrees face particular recruitment difficulties. The objective of these training accounts is to provide tuition assistance to facilitate the transition of graduates (or young workers) into good paying jobs in key economic sectors by providing free tuition to public or private vocational institutions, colleges, universities or approved (by HRDF) training providers.

370. One of the main reasons why graduates face higher unemployment rates is that education is not a substitute for skills and experience. A higher education certificate/diploma or degree, in a context with an increasing amount of higher educated

[68] Employment subsidy programs and job tax credits have been tried in many OECD countries (and more recently in middle income countries). Even though their results are mixed[68], most assessments conclude that their effect is generally positive, albeit modest (OECD 2005; Kluve 2010; Immervoll and Scarpetta 2012; Neumark 2013; Neumark and Grijalva 2013).

[69] This report identifies the fields of study currently facing the most difficulty in the labor market; going forward, the workforce dashboard can be used to update the list.

people, is not a reliable signal for capabilities. Therefore, the ITA program allows people to obtain job-specific skills that are in high demand in their local labor market. These programs have been successfully tried in Korea and the United States, where they are set up not as an entitlement, instead, they are benefits provided to those who are assessed to have aptitude to success in their desired program.

371. In the United States, three distinct models were tried in order to determine which model yielded the best results. The first model customized the ITA benefit depending on the training proposed, and each recipient has to attend compulsory and very intensive counseling on job searching and related subjects. The counselor could reject the application in the first model. The second and third models had fixed amounts allocated for training, and the counselor had no ability to reject the proposed program of study. The difference between the models was that in model 2, the counseling was mandatory and intense, while in the third model the counseling was voluntary. All three models yielded positive results on employment; however, the first one was more successful in placing workers in better paid jobs, and with longer employment periods. Given that a thorough evaluation of all three models was undertaken (Perez-Johnson et. Al., 2011), Malaysia can easily learn which features make the most sense to its own context.

372. Action 3: *Improve employment search related services***.** The best way to promote quality is the promotion of competition among providers of information to the public. Thereby, ease the participation of private sector employment search related services, while at the same time enhancing the quality of related services provided by public entities, and considering private-public partnerships to enhance employment related services targeted to graduates.

Priority 8: Harness foreign labor while reducing overutilization and actively engage with diaspora talent and seek to attract those that can help fill skill deficits in the country by offering distinct (and attractive) benefits. Couple this effort with regular evaluations to measure cost and benefits.

373. Action 1: *Reform Levy system to better manage the utilization of foreign workers; move to an active rather than passive levy system.* The reform should focus on the pricing mechanism of foreign labor; it should be designed to actively discourage the over utilization of foreign labor in economic sectors with excess local labor supply while facilitating the entry of foreign labor in critical (quantity and quality) gap areas in the economy, which cannot be met in the short term with local labor supply.

374. Compare to caps on the number of visas issued, it is more efficient to implement different levy levels for each sector/occupation to finely manage and direct the inflow of immigrants. Levy levels should be set at lower levels in sectors and regions where domestic labor supply is limited and foreign workers are absolutely needed for the survival of the firms. Levy levels can be set in the form of tax-type fees that would be paid to the Government along with all the other taxes on a regular basis. Levies also provide more flexibility to the employers than caps by allowing them to plan ahead for their workforce needs more effectively and flexibly.

375. In Singapore and the Persian Gulf levies are increased as the ratio of the foreign workers on the payroll of the firms increases, which forces firms to adjust their overall workforce composition carefully. These adjustments, again, can be based on the sector, size and location of the firms and can change over time, based on the underlying macroeconomic and global conditions. It is, of course, extremely important to make sure that the bureaucratic burdens created by a differentiated system do not overwhelm the Government agencies and

firms while implementing such relatively complicated schemes. Implementing a multi-tiered system in Malaysia is potentially costly, especially for smaller firms that have already lower value-added and productivity levels. One option is to impose the multi-tiered regime where the levies are imposed on firms above a certain size.

376. Action 2: *Regularly evaluate the impact of foreign labor in specific sub-sectors to determine their economic contribution and to ensure that foreign labor remains necessary to fill labor gaps.* Migration programs should be fine-tuned towards the specific needs of the modern economy and respond swiftly as the underlying labor demand/supply conditions change. Naturally, these need to be determined in coordination with the employers of such workers, while paying close attention to labor market developments and making sure domestic workers are not disadvantaged. Labor markets in a dynamic economy continuously evolve, implying that new occupations are created while others become obsolete. The role of evidence-based analysis, for example a pro-active use of the WD, is fundamental to monitor the constantly changing labor market needs.

377. Action 3: *Actively engage with diaspora talent and seek to engage and/or attract them to fill skill deficits in the country by offering distinct (and attractive) benefits. Couple this effort with regular evaluations to measure cost and benefits.* The core message from this Action is to put in place mechanisms that allow the diaspora to be part of the country; in other words, making efforts and investments so that the diaspora skills are part of the stock of the country's skills. But again, to properly achieve this, a country must put in place concerted policies to keep their diaspora engaged. It is important to note that this does not mean necessarily to relocate all of the skilled diaspora back to Malaysia, this would be a futile effort and maybe even counterproductive; instead, the country should strive to keep diaspora engaged in order to benefit from their skills in one way or another, brain circulation as it is referred to in the migration literature.

378. Data from key destination countries such as Australia and the United States show that Malaysians (their spouses and their children) living abroad typically have high levels of education and are skilled in the fields of study (and professions) in demand in Malaysia (e.g. science, ICT). Many of them have achieved great success in their professions and are world experts in their fields; in fact, Malaysia has many examples. Evidence from around the world shows that diaspora who have achieved success abroad typically have the ability to form and lead networks of experts in their fields, serve as role models to aspiring experts, and can more easily (and credibly) facilitate reform in their home country. They also typically have an intrinsic motivation to help their home country and to embark in work that will lead to making improvements while also raising their own profile (MPI, 2013).

379. There are many ways in which diaspora can be engaged; three distinct activities are: 1) create (and/or strengthen) a designated institution that facilitates entry points for diaspora engagement, 2) facilitate the establishment of formal and informal networks of collaboration, and 3) actively seek (and incentivize) talent that fills existing skills gaps to relocate back home. All three are complementary and will likely reinforce each other.

380. The Malaysian government designed a Talent Roadmap less than 5 years ago, which focuses on leveraging the talents of all Malaysian citizens—living in the country or living abroad—and created the Talent Corporation to optimize all Malaysian talent everywhere, attract and facilitate global talent, and build networks of top talent. Even though the Talent Corp has embarked in various activities, their efforts are largely focused on engaging

diaspora to attract them back to Malaysia to help meet skill deficits at the higher end of the skill spectrum.

381. First, apart from direct connections between people, the creation (or strengthening) of a *designated institution that facilitates entry points* for diaspora engagements is critical; in the case of Malaysia, the Talent Corporation was established to engage diaspora and to facilitate their return by advocating for reforms to policies that may be hindering their return. For instance, the Talent Corp works with the Ministry of Home Affairs to reduce the time and burden to obtaining a visa for a foreign spouse of a returnee. Having a centralized institution that focuses on engaging diaspora is an excellent way in which to meet the goal of allowing the diaspora to be part of the country. But for this institution to continue to be relevant to Malaysia's growth agenda, it needs to work closely with partners in Malaysia and abroad. For instance, line ministries such as Ministry of Education and Health need to work with Talent Corp to help validate the credentials of the returnee so that he/she can integrate into the labor market quickly. Ministry of Home Affairs needs to continue reforming its rules for work permits and visas for diaspora and its family to reduce migratory burdens. Ministry of Trade can work with Talent Corporation to make sure barriers to investments by a Malaysian from abroad are minimized. On the side of private sector and academia, Talent Corp can facilitate the formation of networks and the identification of specific joint projects that keep the diaspora engaged and contributing to the Malaysian economy. For the institution to function properly it is also necessary to invest in information gathering, to ensure that it has an increasingly clear picture of where the Diaspora is located, what skills sets they have, and whether they are interested in staying engaged and/or relocating. Most recently, the Talent Corp engaged the World Bank to help them with them develop a Diaspora Heat Map and to evaluate its effectiveness.

382. Second, the establishment of *networks* has proven to be effective keeping diaspora engaged by India, Mexico, Taiwan, Scotland and Chile. But these countries have done it differently, with distinct levels of effort and success. The level of effort depends on how formalized and institutionalized the networks are; the most formal one rely heavily on the ability of the government to facilitate the engagement between diaspora and local institutions and partners (e.g. private sector, academia and others and promote the formation of specific joint (Malaysians and Malaysians abroad) projects that make improvements in the chosen area of work while strengthening cross boundary collaboration. Even though this level of formalization seems desirable, it carries the risk of stifling creativity by introducing too many rules, and being captured by special interest groups. Thus, it may be best for the government to ensure open channels for collaboration exists, by reviewing the regulatory environment and removing potential legal obstacles to the establishment of cross-boundary collaboration, while not participating directly. Table 19 shows three distinct levels of engagement and a recent publication by Kuznetsov (2013) provides specific examples for each of these countries.

Table 19: Types of Diaspora Networks

	Characterization of Better-Performing Segments	Examples
Stage 1: Informal Networks	Individual champions, usually high achievers, from the government, diaspora, and private sector.	Ireland in the 1970s, India in the 1970s and '80s. Most middle-income and many low-income countries today.
Stage 2: Some Institutionalization	The champions create institutional platforms to institutionalize interactions.	Taiwan's experience with early stage venture capital. Mexico's Red de Talentos. Diaspora initiatives promoted by private sector associations such as TiE in the United States.
Stage 3: Institutionalized Networks	A process of matching diaspora members and institutions in home countries to generate and support joint projects.	GlobalScot ChileGlobal

383. Third, effective diaspora engagement begins at home with identification of skills gaps. Occupations and economic sectors in which the demand for skills outpaces the supply of skills are prime targets to be filled by members of the diaspora: if these gaps are left unfilled, economic growth can suffer. Identifying skills gaps involves a range of different techniques. Close engagement with the business community is critical to determine where business leaders think job growth will be. In the same way, educators can share insights into the educational backgrounds of graduating and soon-to-graduate students. Economic modeling can use past and current trends to forecast which economic sectors and occupations will prosper and which will decline. The analysis of skills gaps permits targeted outreach to members of the diaspora who are in most demand and who are most important to sustained economic growth. This focused approach also allows for incentives to be tailored to the type of diaspora member being sought out: the incentives needed to draw a high-skilled worker in the Oil and Gas sector back to Malaysia are likely quite different from those that would lead a less-skilled worker to return.

384. To finalize, it is imperative for the government (Talent Corp and others engaged in diaspora related activities) to evaluate the effectiveness of its programs designed to attract the diaspora in order to ensure that the costs incurred merit the benefits to the economy.

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ANNEX: CHAPTER 2

Section 2.1 Background on the Educational System

Malaysia's education system consists of the three traditional education tiers: primary, secondary, and tertiary education. Each tier is categorized as follows for the purposes of this report. The primary tier lasts six years with a starting age of seven. Primary school graduates are given an Ujian Penilaian Sekolah Rendah (UPSR) aptitude test. The primary tier is followed by three years of lower secondary school, after which the Penilaian Menengah Rendah (PMR) test is taken, and two years of upper secondary school, after which the Sijil Pelarajan Malaysia (SPM) test is taken. Together, these comprise Forms 1 through 5. Basic education is provided free of charge from primary through upper secondary school, and there are special programs for disadvantaged groups.

The primary school curriculum emphasizes the basic skills of reading, writing, and arithmetic. Secondary education is structured to help students master basic skills and to begin developing vocational skills. As part of the vocational focus of the education system, the national curriculum for secondary education allows for choice among technical and commercial subjects and courses based on students' interests and potential. Postsecondary schooling bridges the gap between secondary and tertiary education. This sub-tier includes preparatory courses for college and can also be regarded as an extension of secondary school. Two tracks are available: one is form 6, which is offered by selected secondary schools and leads to the Sijil Tinggi Persekolahan Malaysia (STPM) college entrance examination. The other is a matriculation program mainly (but not strictly) for Bumiputera students.[70]

Tertiary education consists of a minimum of two years. Higher education in Malaysia involves a variety of institutions including universities for students seeking further academic training and polytechnics for students seeking practical vocational skills. Higher learning institutions can be both public and private. The latter includes campuses set up and branded by overseas universities. Students who attend vocational or technical schools receive a diploma (referred to interchangeably as Certificate or Diploma throughout this report). Those who attend universities receive a Bachelor's degree, which typically takes four years.

Section 2.2. Skill Content

The skill content analysis for the labor force in Malaysia is based on the characterization of jobs and occupations available in the Occupational Information Network (O*NET) database. O*NET is published by the US Department of Labor/Employment and Training Administration (USDOL/ETA). Specifically, Version 14 of the O*NET database was used in this analysis. A more detailed description of the methodology used in the analysis is available in Aedo, et al. (2013).

O*NET contains detailed information about hundreds of standardized and occupation-specific descriptors, including worker characteristics, worker requirements, and experience requirements (worker-oriented factors) and occupational requirements, workforce characteristics, and occupation-specific information (job-oriented factors). Peer evaluations are used to assign each occupation a score of 1 to 5 on each of these various requirements.

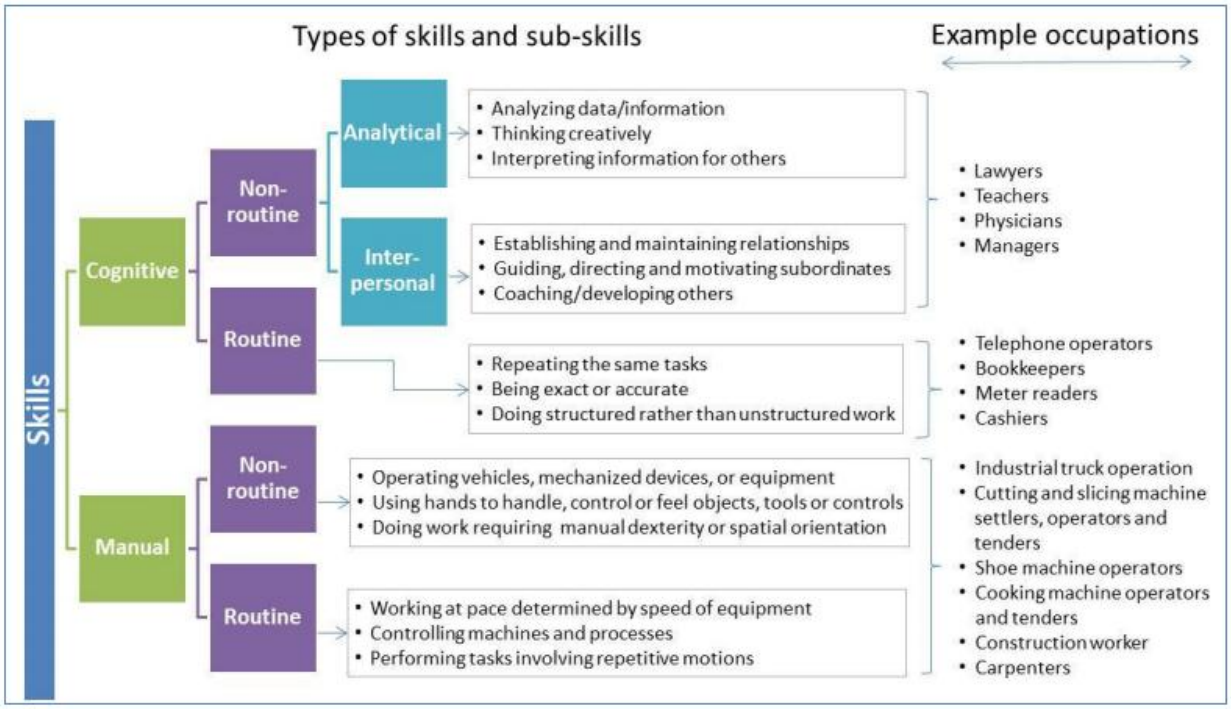
[70] PMR (*Penilaian Menengah Rendah*, Lower Secondary Assessment) is formerly known as Lower Certificate of Education. STPM (*Sijil Tinggi Persekolahan Malaysia* or Higher School Certificate) is formerly known as Higher School Certificate. (MOE, 2012)

The analysis extends Acemoglu and Autor (2010)'s work updating the results in Autor, Levy and Murnane (2003). Autor, Levy and Murnane (2003) identify 5 broad skill categories and 16 component categories (tasks). The broad skill categories are:

- Non Routine Analytical
- Non Routine Interpersonal
- Routine Cognitive
- Non Routine Manual
- Non Routine Manual

Details of the tasks pertaining to each skill category and examples of occupations associated to each one are presented in **Error! Reference source not found.**. Each broad skill category is a composite ndex of the scores associated to the respective tasks. The skill score is on a 1 to 5 scale.

Figure 1: Type of skills and sub-skills, and examples of occupations



Source: Based on descriptions in O*Net, Autor, Levy and Murnane (2003) and Acemoglu and Autor (2010)

A crosswalk table between the O*NET database and ISCO was created so that scores for each skill category in each occupation can be expressed in a different classification system. Hierarchical organization of the classification system allows for easy aggregation of occupations at different levels. For this report, the 3-digit ILO-ISCO-1988 occupational coding system is aggregated. Because the classification of occupations in the Malaysia Labor Force Survey (based on MASCO 1998) is compatible with ILO's ISCO-88, occupations are merged with the occupations skills scores table using a common occupation code. Eighty-seven percent of the observations in the pool sample matched without further problem. The remaining 13 percent (150k cases) was reviewed and recoded manually based on the title/description in MASCO and ISCO. Table 1 contains a crosswalk table for the occupations requiring recoding. Importantly, this method assumes that the O*NET skill intensities, which are formulated for the United States, are equivalent to the skill intensities of Malaysian occupations.

Table 1: Crosswalk for Unmatched MASCO and ISCO-88 Occupations

MASCO 3 1998 Table		ISCO 88 Table	
Code	Occupation	Code	Occupation
130	"GENERAL MANAGERS"	131	General managers
219	#N/A	#N/A	
239	"TEACHING PROFESSIONALS NOT ELSEWHERE CLASSIFIED"	235	Other teaching professionals
249	"BUSINESS PROFESSIONALS NOT ELSEWHERE CLASSIFIED'	241	Business professionals
250	"LEGAL PROFESSIONALS"	242	Legal professionals
291	"ARCHIVISTS, CURATORS AND LIBRARIANS"	243	Archivists, librarians and related information professionals
292	"SOCIAL SCIENCE AND RELATED PROFESSIONALS"	244	Social science and related professionals
293	"WRITERS AND CREATIVE OR PERFORMING ARTISTS"	245	Writers and creative or performing artists
294	"RELIGIOUS PROFESSIONALS"	246	Religious professionals
339	"TEACHING ASSOCIATE PROFESSIONALS NOT ELSEWHERE CLASSIFIED"	334	Other teaching associate professionals
350	"SUPERVISORS"	343	Administrative associate professionals
391	"GOVERNMENT ASSOCIATE PROFESSIONALS"	343	Administrative associate professionals
392	"STATISTICAL, ADMINISTRATIVE AND RELATED ASSOCIATE PROFESSIONALS"	343	Administrative associate professionals
393	"SOCIAL WORK ASSOCIATE PROFESSIONALS"	346	Social work associate professionals
394	"PHILOLOGISTS, TRANSLATORS AND INTERPRETERS"	244	Social science and related professionals
395	"ARTISTIC, ENTERTAINMENT AND SPORTS ASSOCIATE PROFESSIONALS"	347	Artistic, entertainment and sports associate professionals
396	"RELIGIOUS ASSOCIATE PROFESSIONALS"	348	Religious associate professionals
415	"MATERIAL-RECORDING CLERKS"	413	Material-recording and transport clerks
430	"MAIL DISTRIBUTION CLERKS"	414	Library, mail and related clerks
440	"TRANSPORT CLERKS"	413	Material-recording and transport clerks
490	"CLERICAL WORKERS NOT ELSEWHERE CLASSIFIED"	419	Other office clerks
622	"HUNTERS AND TRAPPERS AND GATHERERS"	615	Fishery workers, hunters and trappers
820	#N/A	#N/A	
920	"MESSENGERS, PORTERS, ATTENDANTS AND RELATED WORKERS"	915	Messengers, porters, doorkeepers and related workers
923	#N/A	#N/A	
934	"TRANSPORT LABOURERS AND RELATED WORKERS"	933	Transport labourers and freight handlers

Finally, the ratio of active workers in a given occupation in Malaysia to the total active labor force in Malaysia is combined with the information on skill content by occupation. Averages across the occupations are calculated for each skill category and weighted by the occupational structure of the economy such that:

$$\text{SKILL\_STRUCTURE}_{\text{MALAYSIA}} = \theta_{\text{MALAYSIA}}X = \begin{bmatrix} \sum_i \theta_i X_i^{NON-ROUTINE\ COGNITIVE\ (ANALYTICAL)} \\ \sum_i \theta_i X_i^{NON-ROUTINE\ COGNITIVE\ (INTERPERSONAL)} \\ \sum_i \theta_i X_i^{ROUTINE\ COGNITIVE} \\ \sum_i \theta_i X_i^{ROUTINE\ MANUAL} \\ \sum_i \theta_i X_i^{NON-ROUTINE\ MANUAL\ PHYSICAL} \end{bmatrix} \quad [1]$$

for an occupation i where $X_i^{NON-ROUTINE\ COGNITIVE\ (ANALYTICAL)}$ is a skills aggregate of skills requirements including the ability to analyze data/information, think creatively, and interpret information from others with scores ranging from 1 to 5 such that:

$$X_i^{NON-ROUTINE\ COGNITIVE\ (ANALYTICAL)} = \text{f}(X_i^{ANALYZE}, X_i^{THINK}, X_i^{INTERPRET}); \quad [1a]$$

$X_i^{NON-ROUTINE\ COGNITIVE\ (INTERPERSONAL)}$ is a skills aggregate of skills requirements including the capacity to establish and maintain personal relationships; the capacity to guide, direct, and motivate subordinate; and the capacity to coach/develop others with scores ranging from 1 to 5 such that:

$$X_i^{NON-ROUTINE\ COGNITIVE\ (INTERPERSONAL)} = \text{f}(X_i^{RELATIONSHIPS}, X_i^{GUIDE}, X_i^{COACH}); \quad [1b]$$

$X_i^{ROUTINE\ COGNITIVE}$ is a skills aggregate of skills requirements including the ability to repeat the same task, the ability to be exact or accurate, and the ability to handle structured vs. unstructured work with scores ranging from 1 to 5 such that:

$$X_i^{ROUTINE\ COGNITIVE} = \text{f}(X_i^{REPEAT}, X_i^{ACCURATE}, X_i^{STRUCTURED}) \quad [1c]$$

$X_i^{ROUTINE\ MANUAL}$ is a skills aggregate of skills requirements including the ability to adapt to a pace determined by the speed of equipment, the ability to control machines and processes, and the ability to spend time making repetitive motions with scores ranging from 1 to 5 such that:

$$X_i^{ROUTINE\ MANUAL} = \text{f}(X_i^{SPEED}, X_i^{CONTROL}, X_i^{REPETITIVE}) \quad [1d]$$

$X_i^{NON-ROUTINE\ MANUAL\ PHYSICAL}$ is a skills aggregate of skills requirements including the ability to operate vehicles, mechanized devices, or equipment; the ability to spend time using hands to handle, control, or feel objects, tools, or controls; manual dexterity; and spatial orientation with scores ranging from 1 to 5 such that:

$$X_i^{NON-ROUTINE\ MANUAL\ PHYSICAL} = \text{f}(X_i^{OPERATE}, X_i^{HANDLE}, X_i^{MANUAL}, X_i^{SPATIAL}); \quad [1e]$$

and θ_i is the occupational structure of a given occupation i such that:

$$\theta_i = \frac{Active\ workers\ in\ occupation\ i}{Total\ active\ labor\ force} \qquad [1f]$$

Results are presented in three ways: in the original scores, in mean percentiles, and in standardized z-scores. Results for subsamples are also included, along with cross-country comparisons with other economies. The presentation in mean percentiles involves a three-step procedure: the distribution of skills for each skill category and the median skills content level is calculated for 2001; the median skills content level is calculated for each comparison year; and the comparison year's median skills content level is projected into the 2001 skills distribution. The difference between 2001's median and the median of the comparison year is the percentile change over time. As Aedo et al., 2013 describe, in this technique "Skills per occupation are held constant so that changes in skill structure will reflect changes in the occupation structure." (Aedo et al., at p.9) The presentation in standardized z-scores subtracts 2001's mean skills score for each skills category from each subsequent year's score for that category and divides by 2001's standard deviation for that category to provide a standardized way of demonstrating the skills evolution.

Section 2.3 Characterizing the Pool of Part-time, Non-working, Inactive "Potential" Workforce

A simple regression equation used is as follows:

$$p_i^e = \alpha + \sum_j \beta_j \mathrm{EDUC}_{ij} + \gamma \mathrm{X}_i + \varepsilon_I \qquad (A.1)$$

where p_i^e is a dummy variable equal to one if individual i's employment status is e (e=inactive, unemployed or underemployed), and EDUC_j is a dummy variable that indicates completion of j-th level of education after primary level. The term X_i represents a set of explanatory variables such as gender and state in which a worker is employed, while ε_i is the individual-specific error term. The coefficient β_j represents the impact that investing in j-th level of education has on the probability of being in employment status e. In order to assess how the choice of a certain field of study affects the probability of being in employment status e, the following equation is estimated:

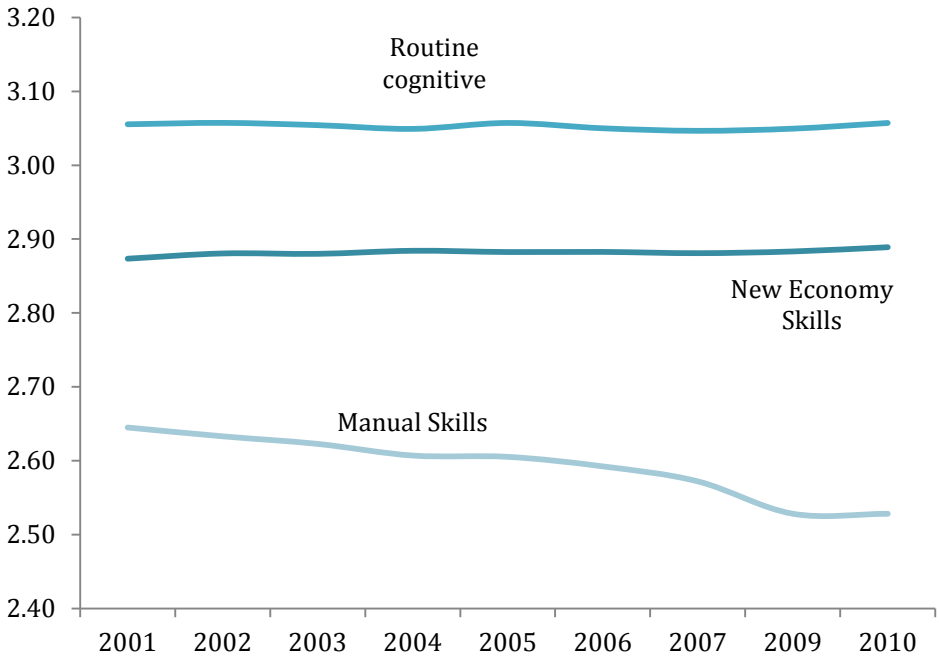
$$p_i^e = \alpha + \sum_j \beta_j \mathrm{FIELD}_{ij} + \gamma \mathrm{X}_i + \varepsilon_i \qquad (A.2)$$

where all the variables in equation A.2 correspond to those in equation A.1 except for FIELD_{ij}, which is a dummy variable equal to one if individual i's field of study is j.

Figure 2: Evolution of Scores in an Aggregated Scale

All occupations

	New Economy Skills	Routine cognitive	Manual Skills
2001	2.87	3.06	2.65
2002	2.88	3.06	2.63
2003	2.88	3.05	2.62
2004	2.88	3.05	2.61
2005	2.88	3.06	2.61
2006	2.88	3.05	2.59
2007	2.88	3.05	2.57
2009	2.88	3.05	2.53
2010	2.89	3.06	2.53



Note: "New economy skills" is an aggregate of non-routine cognitive (analytical) and non-routine cognitive (interpersonal). "Manual Skills" is an aggregate of routine manual and non-routine manual.

Table 3: Occupational Shares at 1- and 2 Digit ISCO code

National Sample	Year of the survey								
	2001	2002	2003	2004	2005	2006	2007	2009	2010
Legislators, senior officials and managers	7.3	8.2	8.0	8.6	7.7	8.1	7.3	7.6	7.5
Professionals	4.9	5.1	5.4	5.6	5.5	5.5	5.7	6.3	6.4
Technicians and associate professionals	12.1	12.5	12.3	12.1	12.6	12.7	13.3	14.3	14.8
Clerks	9.6	9.3	9.5	9.3	9.9	9.4	9.8	10.0	10.2
Service workers and shop and market sales workers	13.9	13.7	14.2	14.8	14.8	15.5	16.2	17.1	16.8
Skilled agricultural and fishery workers	14.1	13.2	12.7	13.2	12.6	13.0	12.9	11.5	11.3
Craft and related trade workers	12.3	12.2	12.5	11.7	11.4	11.2	10.8	10.4	10.5
Plant and machine operators and assemblers	15.3	14.4	14.4	14.1	14.2	13.7	12.8	11.4	11.8
Elementary occupations	10.5	11.3	11.0	10.7	11.2	10.8	11.4	11.4	10.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	90,334	88,536	105,367	148,347	130,539	132,001	141,768	157,246	152,039
	2001	2002	2003	2004	2005	2006	2007	2009	2010
Legislators and senior officials	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Corporate managers 1	3.2	3.8	3.6	3.9	3.8	3.9	3.7	3.7	3.7
General managers 2	4.0	4.2	4.3	4.5	3.7	4.0	3.4	3.7	3.6
Physical, mathematical and engineering science professionals	1.5	1.4	1.5	1.6	1.6	1.5	1.6	1.7	1.8
Life science and health professional	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4
Teaching professionals	1.8	1.9	2.1	2.1	2.0	1.9	2.0	2.3	2.4
Other professionals	1.3	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.8
Physical and engineering science associate professionals	3.2	3.3	3.0	2.7	3.1	2.9	3.1	3.3	3.5
Life science and health associate professionals	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.2
Teaching associate professionals	2.8	2.7	3.0	3.0	3.0	2.9	3.0	3.1	3.2
Other associate professionals	5.0	5.4	5.2	5.2	5.2	5.5	5.8	6.4	6.9
Office clerks	8.4	8.3	8.3	8.1	8.5	8.2	8.6	8.7	8.8
Customer service clerks	1.1	1.1	1.2	1.2	1.3	1.2	1.1	1.3	1.4
Personal and protective services workers	6.9	7.0	7.3	7.4	7.3	7.7	8.1	8.3	8.4
Models, salespersons and demonstrators	7.0	6.7	6.9	7.4	7.5	7.8	8.1	8.8	8.4
Market-oriented skilled agricultural and fishery workers	12.6	12.1	11.6	11.9	11.5	11.8	11.8	10.4	10.0
Subsistence agricultural and fishery workers	1.5	1.1	1.1	1.2	1.1	1.2	1.1	1.1	1.3
Extraction and building trade workers	4.5	4.5	4.7	4.4	4.3	4.1	3.7	3.5	3.6
Metal, machinery and related trades workers	4.9	4.6	4.9	4.4	4.7	4.8	4.8	4.8	4.7
Precision, handicraft, printing and related trades workers	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3
Other craft and related trades workers	2.6	2.8	2.7	2.6	2.2	2.1	2.0	1.9	1.9
Stationary plant and related operators	1.6	1.3	1.3	1.3	1.4	1.4	1.3	1.0	1.0
Machine operators and assemblers	8.2	7.6	7.5	7.1	7.0	6.9	6.2	5.0	5.3
Drivers and mobile plant operators	5.5	5.5	5.6	5.7	5.8	5.5	5.3	5.4	5.5
Sales and services elementary occupations	5.9	6.4	6.1	6.4	6.4	6.3	6.6	6.5	6.1
Agricultural, fishery and related labourers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Labourers in mining, construction, manufacturing and transport	4.5	4.9	4.8	4.3	4.8	4.5	4.7	4.9	4.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 4: Sample Sizes by Survey Year

Sample Sizes by Survey Year

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
Cases	90,334	88,536	105,367	148,347	130,539	132,001	141,768	157,246	152,039	1,146,177

Cohort Sample Sizes by Survey Year (unweighted)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
Before 1965	41,009	39,670	44,157	60,645	51,118	48,696	49,548	46,954	41,811	423,608
1965-1974	27,171	25,348	29,291	40,134	33,786	33,485	35,338	39,112	37,248	300,913
After 1974	22,154	23,518	31,919	47,568	45,635	49,820	56,882	71,180	72,980	421,656
Total	90,334	88,536	105,367	148,347	130,539	132,001	141,768	157,246	152,039	1,146,177

Cohort Composition by Survey Year (adjusted by weights)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
Before 1965	42.0	41.7	39.0	37.6	34.6	32.8	30.7	26.7	24.7	34.1
1965-1974	30.5	29.3	28.5	28.6	27.7	27.0	26.4	25.8	25.1	27.6
After 1974	27.5	29.0	32.5	33.8	37.7	40.3	42.9	47.6	50.2	38.3

Education Level Sample Sizes by Survey Year (unweighted)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
High	4,958	5,016	6,265	9,059	8,027	8,672	8,800	12,964	13,540	77,301
Technical	5,300	5,773	7,110	10,749	10,150	10,196	12,441	16,314	15,934	93,967
Medium	30,439	30,320	36,790	52,331	48,318	49,268	54,143	62,899	61,745	426,253
Low	49,637	47,427	55,202	76,208	64,044	63,865	66,384	65,069	60,820	548,656
Total	90,334	88,536	105,367	148,347	130,539	132,001	141,768	157,246	152,039	1,146,177

Education Level Composition by Survey Year (adjusted by weights)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
High	5.7	6.3	6.6	7.1	7.3	7.8	7.5	9.2	10.0	7.6
Technical	6.1	6.8	7.3	7.7	8.4	8.1	9.4	10.5	10.6	8.4
Medium	33.4	33.6	34.6	34.5	36.2	37.1	37.8	39.7	40.5	36.5
Low	54.9	53.3	51.5	50.8	48.1	47.0	45.5	40.6	38.9	47.6

Economic Sectors Sample Sizes by Survey Year (unweighted)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
Agriculture and Mining	13,034	13,217	15,672	23,024	20,865	21,360	22,605	23,562	22,648	175,987
Low-value added Manufacturing	8,647	8,038	9,790	12,983	10,900	10,821	10,947	10,459	10,738	93,323
High-value added Manufacturing	10,742	10,041	11,596	16,428	14,259	15,168	15,120	13,744	14,114	121,212
High-value added Services	20,373	20,390	24,287	34,825	31,605	31,232	34,625	43,709	42,520	283,566
Low-value added Services	28,575	27,951	33,303	47,604	41,312	41,935	45,979	51,440	48,643	366,742
Construction	8,097	8,288	9,820	12,957	11,276	11,206	12,159	14,072	13,192	101,067
Total	89,468	87,925	104,468	147,821	130,217	131,722	141,435	156,986	151,855	1,141,897

Economic Sectors Composition by Survey Year (adjusted by weights)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
Agriculture and Mining	16.21	15.32	14.68	15.18	15.03	15.08	15.2	14.08	14	14.95
Low-value added Manufacturing	9.31	9.07	9.15	8.96	8.36	8.3	7.55	6.82	7.06	8.24
High-value added Manufacturing	12.53	12.07	11.83	11.06	11.24	11.79	11.05	9.62	10.17	11.22
High-value added Services	21.77	22.33	22.69	23.05	23.7	23.17	24.26	26.01	26.19	23.76
Low-value added Services	31.22	31.66	32.03	32.81	32.64	32.8	33.18	34.13	33.43	32.7
Construction	8.96	9.55	9.62	8.95	9.03	8.87	8.77	9.34	9.14	9.13

Note: The total number of unweighted cases is different from number reported in other tables. This is due to cases with missing values in the economic sector classification variable.

Gender Sample Sizes by Survey Year (unweighted)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
Male	32,507	32,024	38,400	54,442	46,961	47,356	51,149	57,770	55,663	416,272
Female	57,827	56,512	66,967	93,905	83,578	84,645	90,619	99,476	96,376	729,905
Total	90,334	88,536	105,367	148,347	130,539	132,001	141,768	157,246	152,039	1,146,177

Gender Composition by Survey Year (adjusted by weights)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
Female	34.85	35.64	35.93	35.94	35.59	35.59	35.97	36.17	36.1	35.77
Male	65.15	64.36	64.07	64.06	64.41	64.41	64.03	63.83	63.9	64.23

Nativity Sample Sizes by Survey Year (unweighted)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
Malaysian	83,040	82,594	96,932	137,224	121,486	121,627	130,633	144,461	139,437	1,057,434
Non-Malaysian	7,294	5,942	8,435	11,123	9,053	10,374	11,135	12,785	12,602	88,743
Total	90,334	88,536	105,367	148,347	130,539	132,001	141,768	157,246	152,039	1,146,177

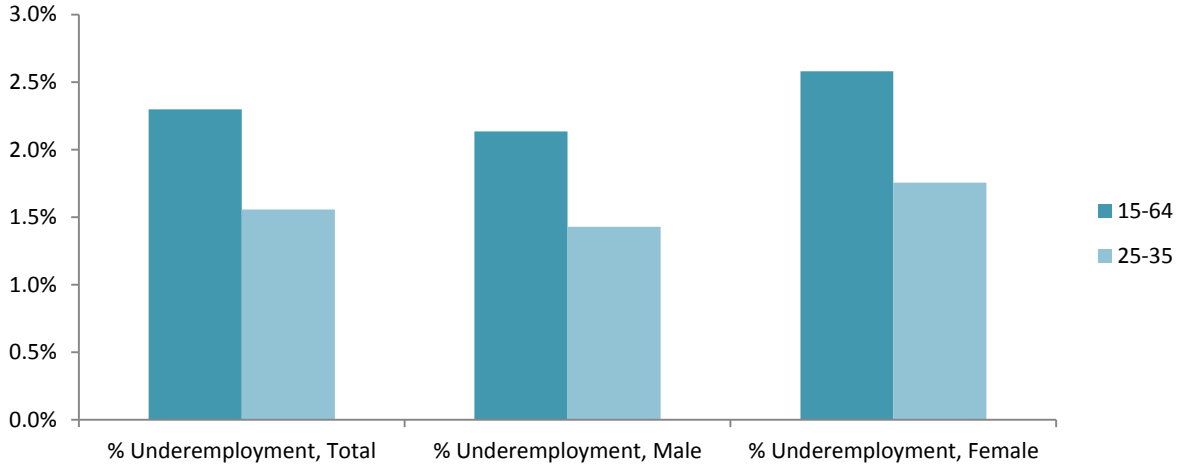
Nativity Composition by Survey Year (adjusted by weights)

	2001	2002	2003	2004	2005	2006	2007	2009	2010	Total
Malaysian	91.0	90.3	90.1	90.2	89.9	90.1	90.1	90.2	90.3	90.2
Non-Malaysian	9.0	9.8	9.9	9.8	10.1	9.9	9.9	9.8	9.7	9.8

Underemployment

Only a small fraction of the Malaysian population is underemployed. This is true for the whole working age population and for new labor market entrants. In 2010, only around 240,000 Malaysians, or one percent of the working age population, were involuntarily working part time. The same is true for Malaysians with less work experience, i.e. the group ages 25 to 35. These results are in line with findings from the previous sub-sections showing that the labor market offers a large number of job opportunities for those who decide to enter the labor force (we've shown low unemployment but not really talked about job market). However, unlike unemployment, underemployment is not more pronounced for certain age groups, nor is it significantly different between men and women. Given that individuals ages 25 to 35 years old have most likely recently completed their studies and started their careers, the analysis below will focus on this cohort and on the entire working age population.

Figure 3: Underemployment incidence by gender and age group

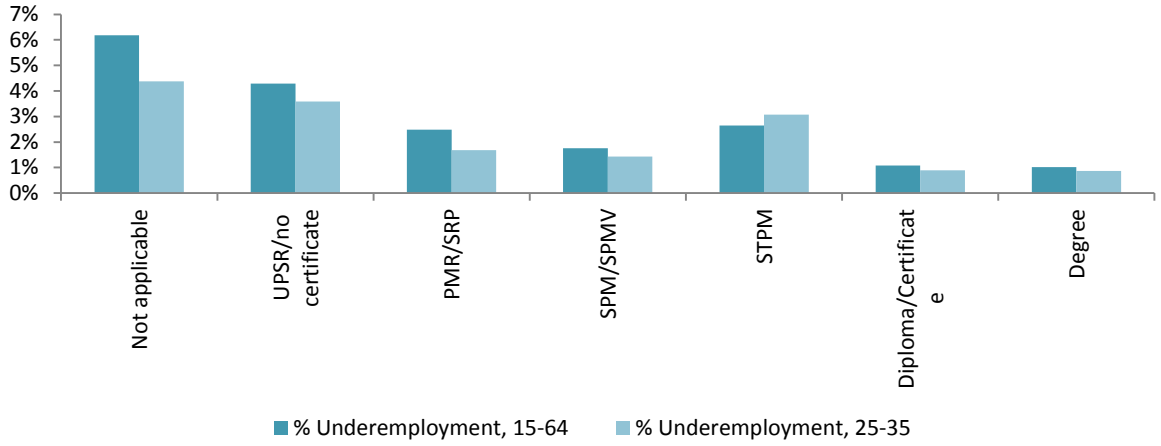


Source: Malaysian LFS 2010

The incidence of underemployment decreases consistently as workers' educational levels increase, except for STPM holders. Taking the size of the educational group into account, underemployment is highest among workers without applicable education levels (6.2 percent for the group ages 15 to 64, and 4.4 percent for the group ages 25 to 35) and lowest among degree holders (1 percent for the group ages 15 to 64, and 0.9 percent for the group ages 25 to 35). STPM holders represent an anomaly in this pattern, as the incidence of underemployment is higher than for lower levels of education. In addition, this education category is the only one for which underemployment among the younger cohort (25 to 35 years old) is higher than the corresponding rate for all people of working age. Generally consistent with this pattern, the probability of being underemployed decreases as workers complete at least lower secondary education (PMR / SRP), though the effect is small. STPM represents an exception, as previously noted, as it decreases the probability of being underemployed for the group ages 15 to 64 years old by slightly less than that for the other

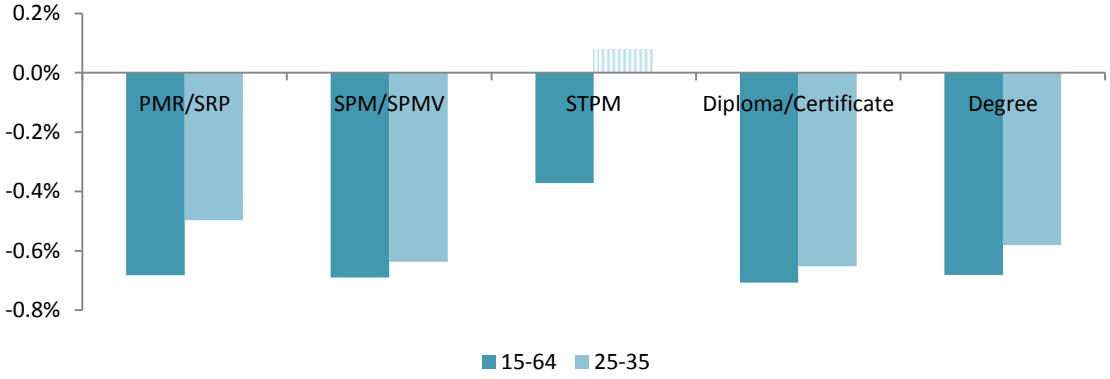
educational groups. For the group ages 25 to 35 years old, however, STPM does not decrease the probability of being underemployed, compared to the lowest educated group.

Figure 4: Underemployment incidence by education and age group



Source: Malaysian LFS 2010

Figure 5: Changes in probability to be underemployed by education level and age group (no formal / primary education= reference group)

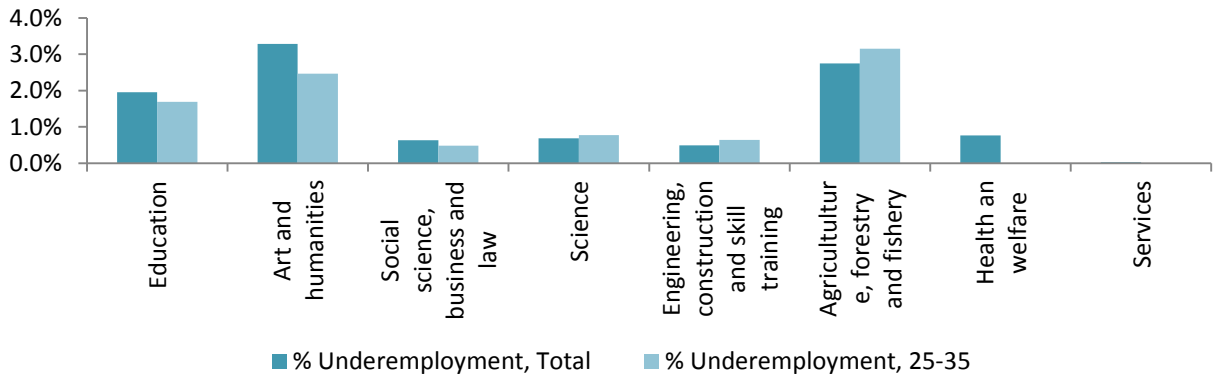


Source: Authors' analysis based on Malaysian LFS 2010

Note: Bars with shaded areas indicate not statistically significant results.

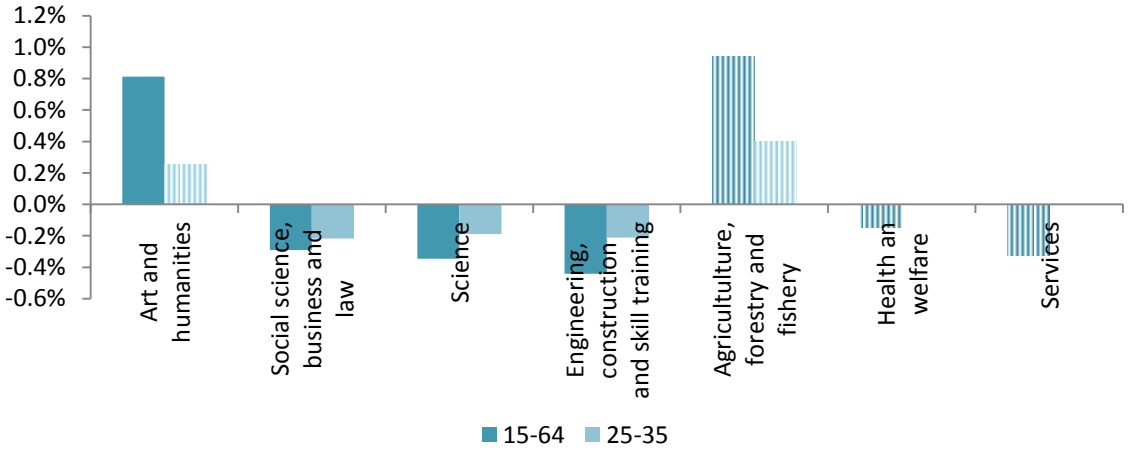
Underemployment is also quite low for degree holders. The rate is somewhat higher in the fields of Agriculture, Forestry & Fishery, Art & Humanities, and Education. For graduates in disciplines related to Health & Welfare or Services, underemployment is almost non-existent. In general, the picture that emerges is that underemployment is uncommon across all fields of academic studies. A degree in Engineering, Construction & Skill Training, Science, or Social Science, Business & Law marginally reduces the probability of being underemployed, though the choice of field of study for degree holders has a minimal impact on the probability of being underemployed.

Figure 6: Underemployment for Malaysians with Degrees



Source: Malaysian LFS 2010

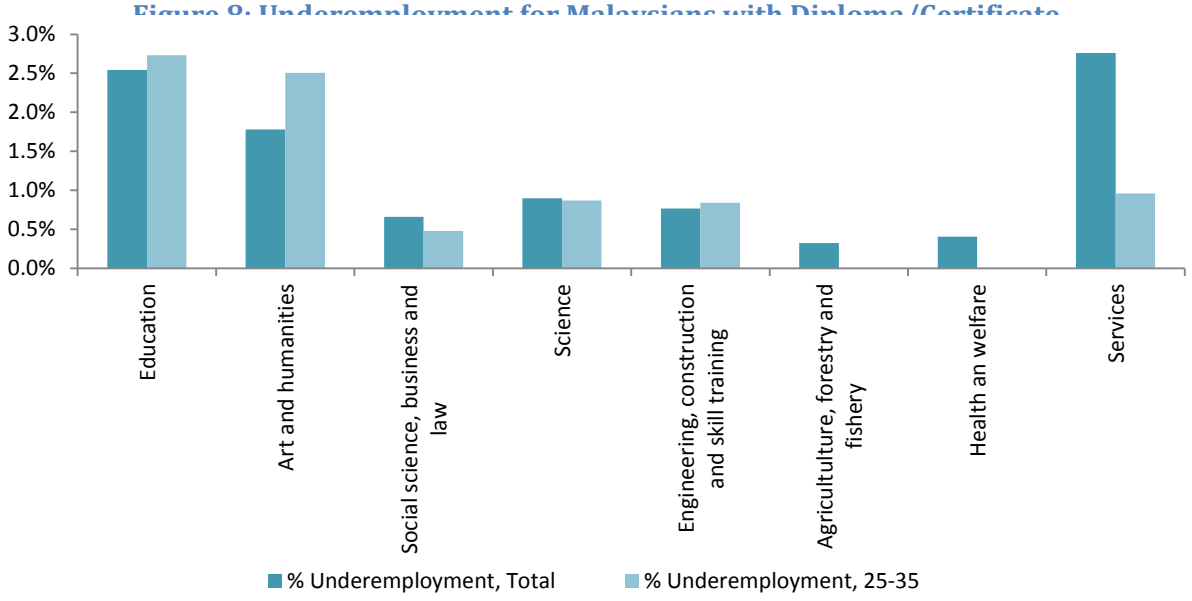
Figure 7: Changes in probability of underemployment by field of academic study and age (education= reference group)



Source: Authors' analysis based on Malaysian LFS 2010

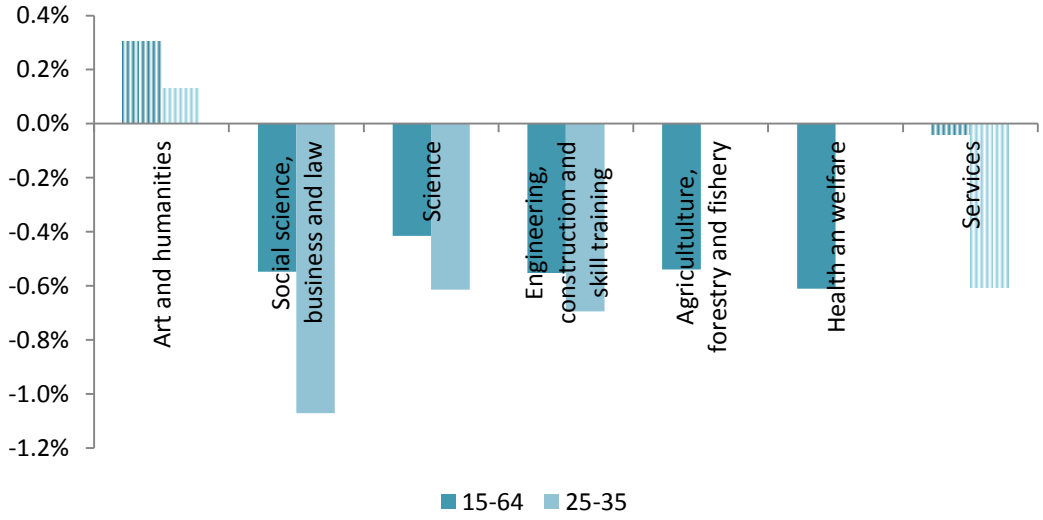
Note: Bars with shaded areas indicate not statistically significant results.

Underemployment remains minimal for vocationally educated workers, with these workers (together with degree holders) the least affected by underemployment. Underemployment is highest (though still minimal) for the fields of Education (2.5 percent for the group ages 15 to 64 years old and 2.7 percent for the group 25 to 35 years old), Art & Humanities (1.8 percent for the group ages 15 to 64 years old and 2.5 percent for the group ages 25 to 35 years old), and Services (2.8 percent for the group ages 15-64 years old and 1.0 percent for the group ages 25 to 35 years old).Education, Art & Humanities, and Services are the fields of vocational studies associated with the highest probability of underemployment.



Source: Malaysian LFS 2010

Figure 9: Changes in probability of underemployment by field of vocational study and age (education= reference group)



Source: Authors' analysis based on Malaysian LFS 2010

Note: Bars with shaded areas indicate not statistically significant results.

ANNEX: CHAPTER 3

Data

In the four years of Labor Force Survey, 113,481 out of 198,625 respondents were employed in public and private sector. Wage earnings information are made available for 108,455 individuals (95.6%) out of the 113,481 employees. Table 1 displays the components of the wage earners sample by gender and year of survey (January-March for 2007-09 samples and January-June for 2010 sample.

Table 1: Components by year and gender

Wage earners sample, age 18-64						
	2007	2008	2009	2010	Total	Gender %
Male	12,243	12,716	13,913	28,041	66,913	61.7%
Female	7,313	7,848	8,544	17,837	41,542	38.3%
Total	19,556	20,564	24,466	45,878	108,455	100%
Year %	18.0%	19.0%	22.6%	42.3%	100%	

Source: Malaysian Labor Force Survey, 2007-2010

Heckman selection model

OLS estimations are restricted to individuals with observed wage information which excludes the self-employed, own-account workers and family workers as well as those absent from the labor force. It can lead to biased estimates due to nonrandom sampling, as the a few characteristics that are determinants of income, such as education, age (experience), proportion of ethnic groups, places of residence, differ across various employment sectors. The sample selection model (Heckman, 1979) that adjusts for sample selection is outlined as follows.

$$Y_i^* = X_i'\beta + \varepsilon_i$$
$$D_i = \begin{cases} 1 & \text{if } Z_i'\theta + u_i > 0 \\ 0 & \text{otherwise} \end{cases}$$
$$Y_i = Y_i^* D_i$$

Y_i^* and Y_i denote individuals' latent and observed wages (in logarithmic term) respectively. D_i is the indicator variable for individual's participation in the combined public and private sector (referred as wage sector henceforth). Then the observed wage is equal to latent wage for individuals in the wage sector which are public and private employees in our sample, and zero otherwise. X_i is a

vector of determinants of individuals' wage offers and Z_i is the vector of variables affecting individual's decision to participate in the wage sector.

The parameters can be estimated using either (full information) maximum likelihood (ML) estimator or two-step (TS) estimator proposed by Heckman (1976, 1979), which addresses the self-selection into wage earning sectors caused by correlation between the error terms u_i and ε_i and such that $E(\varepsilon_i|D_i = 1, X_i) \neq 0$. Normality assumption on the error terms has to be imposed for estimation, i.e. $\binom{\varepsilon_i}{u_i} \sim N(\binom{0}{0}, \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix})$. The ML estimator is obtained by maximizing the likelihood function

$$L = \prod_{D_i=0} [1 - \Phi(\frac{Z_i'\theta}{\sigma_2})] \prod_{D_i=1} \Phi\left\{(Z_i'\theta + \frac{\sigma_{12}}{\sigma_1^2}(Y_i - X_i'\beta)\sqrt{\sigma_2^2 - \frac{\sigma_{12}^2}{\sigma_1^2}}\right\} \times \frac{1}{\sigma_1}\phi(\frac{Y_i - X_i'\beta}{\sigma_1})$$

where $\Phi(.)$ and $\phi(.)$ are the cdf. and pdf. of standard normal distribution, respectively.

In context of study, the TS estimator is to estimate a probit model in the first step on individuals' selection into wage sector. The selection term named "inverse Mills ratio" is computed as

$$\lambda\left(\frac{Z_i'\theta}{\sigma_2}\right) = \frac{\phi(\frac{Z_i'\theta}{\sigma_2})}{\Phi(\frac{Z_i'\theta}{\sigma_2})}$$

and included as an extra explanatory variable in the second step (OLS regression) running only on the subsample with wage earnings information available

$$Y_i = X_i'\beta + \frac{\sigma_{12}}{\sigma_2}\lambda\left(\frac{Z_i'\theta}{\sigma_2}\right) + \varepsilon_i.$$

The selection-adjusted regression results are presented along with the unadjusted OLS results in Table 2 for men and Table 3 for women.

Table 2: Returns to schooling by birth cohort: Men 18-64

Dependent variable: log monthly wage earnings

	Men Pre-1964			Men Post-1965		
	(1)	(2)	(3)	(1)	(2)	(3)
VARIABLES	OLS	Heckman ML	Heckman TS	OLS	Heckman ML	Heckman TS
Education dummies:						
Low secondary	0.254***	0.234***	0.217***	0.126***	0.100***	0.0224
	(0.0149)	(0.0282)	(0.0173)	(0.0124)	(0.0132)	(0.0171)
Upper secondary	0.598***	0.565***	0.537***	0.340***	0.300***	0.179***
	(0.0170)	(0.0419)	(0.0229)	(0.0145)	(0.0145)	(0.0171)
Pre-university	0.928***	0.887***	0.854***	0.566***	0.530***	0.415***
	(0.0229)	(0.0523)	(0.0320)	(0.0174)	(0.0173)	(0.0221)
Certificate/Diploma	1.220***	1.154***	1.100***	0.859***	0.805***	0.637***
	(0.0230)	(0.0815)	(0.0445)	(0.0210)	(0.0193)	(0.0241)
University & above	1.620***	1.559***	1.509***	1.203***	1.127***	0.885***
	(0.0229)	(0.0751)	(0.0406)	(0.0213)	(0.0194)	(0.0288)
Proxy for experience:						
Age	0.271***	0.215***	0.171***	0.0783***	0.0583***	-0.00499
	(0.0196)	(0.0664)	(0.0367)	(0.00378)	(0.00414)	(0.00785)
Age square	-0.00266***	-0.00206***	-0.00158***	-0.000886***	-0.000555***	0.000491***
	(0.000188)	(0.000710)	(0.000388)	(6.03e-05)	(6.60e-05)	(0.000126)
Ethnic group dummies:						
Chinese	0.154***	0.198***	0.232***	0.202***	0.246***	0.384***
	(0.0162)	(0.0551)	(0.0284)	(0.0104)	(0.0116)	(0.0173)
Indian	-0.0737***	-0.0899***	-0.103***	-0.0198*	-0.0215	-0.0277
	(0.0155)	(0.0260)	(0.0187)	(0.0111)	(0.0137)	(0.0180)
Natives	-0.0225	-0.00968	-0.00125	0.0108	0.0186	0.0408**
	(0.0210)	(0.0278)	(0.0222)	(0.0241)	(0.0217)	(0.0201)
Location dummies:						
Rural	-0.148***	-0.109**	-0.0783***	-0.129***	-0.0889***	0.0396***
	(0.00992)	(0.0462)	(0.0250)	(0.00770)	(0.00849)	(0.0146)
State of residence controls	Yes	Yes	Yes	Yes	Yes	Yes
Other controls:						
Married (1 if Yes)	0.222***	0.212***	0.204***	0.231***	0.206***	0.125***
	(0.0179)	(0.0212)	(0.0171)	(0.00731)	(0.00695)	(0.0133)
Month of survey	Yes	Yes	Yes	Yes	Yes	Yes
Year of survey	Yes	Yes	Yes	Yes	Yes	Yes
Industry and occupation	No	No	No	No	No	No
lambda	-	-	-0.357***	-	-	-1.064***
			(0.118)			(0.0690)
Observations	19054	19054/37527	19054/37527	47859	47859/72168	47859/72168
R-squared	0.509	-	-	0.519	-	-

*** p<0.01, ** p<0.05, * p<0.10. Standard errors in parentheses (clustered at state*year*urban/rural level for [1] [2])

Table 3: Returns to schooling by birth cohort: Women 18-64

Dependent variable: log monthly wage earnings

	Women Pre-1964			Women Post-1965		
	(1)	(2)	(3)	(1)	(2)	(3)
VARIABLES	OLS	Heckman ML	Heckman TS	OLS	Heckman ML	Heckman TS
Education dummies:						
Low secondary	0.329***	0.313***	0.266***	0.175***	0.140***	0.0814***
	(0.0248)	(0.0268)	(0.0255)	(0.0161)	(0.0189)	(0.0162)
Upper secondary	0.902***	0.858***	0.727***	0.540***	0.448***	0.296***
	(0.0249)	(0.0342)	(0.0445)	(0.0195)	(0.0327)	(0.0224)
Pre-university	1.344***	1.284***	1.107***	0.814***	0.720***	0.565***
	(0.0303)	(0.0461)	(0.0623)	(0.0236)	(0.0343)	(0.0243)
Certificate/Diploma	1.625***	1.540***	1.290***	1.142***	1.012***	0.796***
	(0.0295)	(0.0526)	(0.0826)	(0.0313)	(0.0403)	(0.0304)
University & above	1.955***	1.875***	1.637***	1.482***	1.338***	1.099***
	(0.0321)	(0.0519)	(0.0794)	(0.0287)	(0.0431)	(0.0330)
Proxy for experience:						
Age	0.317***	0.284***	0.188***	0.0804***	0.0630***	0.0348***
	(0.0279)	(0.0291)	(0.0395)	(0.00492)	(0.00749)	(0.00547)
Age square	-0.00302***	-0.00268***	-0.00165***	-0.000890***	-0.000629***	-0.000203**
	(0.000270)	(0.000288)	(0.000406)	(8.18e-05)	(0.000117)	(8.47e-05)
Ethnic group dummies:						
Chinese	0.0433**	0.0531***	0.0813***	0.140***	0.151***	0.166***
	(0.0187)	(0.0205)	(0.0187)	(0.0113)	(0.0119)	(0.00860)
Indian	-0.109***	-0.123***	-0.168***	-0.0642***	-0.0689***	-0.0766***
	(0.0193)	(0.0194)	(0.0267)	(0.0130)	(0.0125)	(0.0124)
Indigenous	-0.0122	-0.00218	0.0273	-0.00917	0.0101	0.0416***
	(0.0290)	(0.0294)	(0.0355)	(0.0187)	(0.0207)	(0.0153)
Location dummies:						
Rural	-0.165***	-0.154***	-0.120***	-0.120***	-0.0997***	-0.0661***
	(0.0159)	(0.0179)	(0.0177)	(0.00873)	(0.0116)	(0.00790)
State of residence controls	Yes	Yes	Yes	Yes	Yes	Yes
Other controls:						
Married (1 if Yes)	0.114***	0.125***	0.158***	0.116***	0.149***	0.204***
	(0.0165)	(0.0160)	(0.0179)	(0.00792)	(0.0152)	(0.00993)
Month of survey	Yes	Yes	Yes	Yes	Yes	Yes
Year of survey	Yes	Yes	Yes	Yes	Yes	Yes
Industry and occupation	No	No	No	No	No	No
lambda	-	-	-0.361***	-	-	-0.510***
			(0.0851)			(0.0396)
Observations	8695	8695/26195	8695/26195	32847	32847/57899	32847/57899
R-squared	0.638	-	-	0.566	-	-

*** p<0.01, ** p<0.05, * p<0.10. Standard errors in parentheses (clustered at state*year*urban/rural level for [1] [2])

The Heckman-adjusted annualized rates of returns are compared against the OLS rates in Table 4.

Table 4: Annualized rates of returns to schooling by cohort: Men and women 18-64

	Men		Women	
EDU. LEVELS	Pre-1964	Post-1965	Pre-1964	Post-1965
		OLS		
LOWSEC - NOCERT	5.82%	2.83%	7.59%	3.96%
UPPSEC - LOWSEC	18.74%	11.29%	33.15%	20.02%
PREUNI - UPPSEC	17.95%	12.01%	24.74%	14.67%
DIPLOM - PREUNI	15.73%	15.73%	15.08%	17.87%
UNIVER - PREUNI	18.89%	17.26%	16.52%	18.18%
		Heckman ML		
LOWSEC - NOCERT	5.33%	2.25%	7.21%	3.15%
UPPSEC - LOWSEC	17.98%	10.52%	31.29%	16.66%
PREUNI - UPPSEC	17.52%	12.14%	23.77%	14.57%
DIPLOM - PREUNI	14.23%	14.77%	13.65%	15.73%
UNIVER - PREUNI	18.28%	16.11%	15.91%	16.71%
		Heckman TS		
LOWSEC - NOCERT	4.94%	0.50%	6.08%	1.82%
UPPSEC - LOWSEC	17.35%	8.12%	25.93%	11.35%
PREUNI - UPPSEC	17.18%	12.54%	20.95%	14.36%
DIPLOM - PREUNI	13.09%	11.74%	9.55%	12.25%
UNIVER - PREUNI	17.80%	12.48%	14.16%	14.30%
Sample size	19,054	47,859	8,695	32,847

Quintile Regression model

Estimates obtained by mean-based approaches such OLS are evaluated at conditional mean of individuals' log wage earnings. Therefore, OLS estimation implicitly assumes homogeneous returns for all individuals of the same observed characteristics while throughout the conditional distribution of log wages. On the other hand, quantile regression allows the parameters to vary across the distribution of the dependent variable conditional on regressors and is more robust to outliers (Koenker and Basset, 1978; Buchinsky, 1998). The standard quantile regression framework (Koenker and Basset, 1978; Buchinsky, 1998) can be written as:

$ln(W_i) = \boldsymbol{x_i}\boldsymbol{\beta_\theta} + u_{\theta i}$ where $Quant_\theta[ln(W_i)|\boldsymbol{x_i}] = \boldsymbol{x_i}\boldsymbol{\beta_\theta}, \quad 0 < \theta < 1$

$\boldsymbol{x_i}$ is a vector of exogenous variables while $\boldsymbol{\beta_\theta}$ is the vector of parameters. $Quant_\theta[ln(W_i)|\boldsymbol{x_i}]$ refers to the θ-th quantile of $ln(W_i)$ conditional on $\boldsymbol{x_i}$. The θ-th conditional quantile does not carry a closed-form solution and thus is solved by a linear programing approach.

$$\min_{\beta \epsilon R^k} \left\{ \sum_{i:y_i \geq x_i\beta} \theta \left| \ln w_i - x_i\beta_\theta \right| + \sum_{i:y_i < x_i\beta} (1-\theta) \left| \ln w_i - x_i\beta_\theta \right| \right\}$$

Here θ varies from 0 to 1, among which median regression (θ = 0.5) is a special case. In our study, standard errors are obtained by Monte Carlo bootstrapping with 200 times of repetition

ANNEX: CHAPTER 4

Table 1: Jobs With Not Available Occupation-Specific Growth 2007-2010

3-digit MASCO Occupation	Wage Growth 2007-2010
MINERS, SHOTFIRERS, STONE CUTTERS AND CARVERS	n/a
BUSINESS SERVICES AGENTS AND TRADE BROKERS	n/a
RAILWAY ENGINE DRIVERS AND RELATED	n/a
MATHEMATICIANS, STATISTICIANS AND RELATED	n/a
POTTERS, GLASS MAKERS AND RELATED	n/a
TEACHING PROFESSIONALS NEC	n/a
MINING AND MINERAL PROCESSING PLANT OPERATORS	n/a
GLASS, CERAMICS AND RELATED PLANT OPERATORS	n/a
STREET VENDORS AND RELATED	n/a
SENIOR OFFICIALS OF SPECIAL-INTEREST ORGANISATIONS	n/a
PHILOLOGISTS, TRANSLATORS AND INTERPRETERS	n/a
RELIGIOUS PROFESSIONALS	n/a
ARCHIVISTS, CURATORS AND LIBRARIANS	n/a
PRINTING AND RELATED	n/a
WRITERS AND CREATIVE OR PERFORMING ARTISTS	n/a
RELIGIOUS ASSOCIATE PROFESSIONALS	n/a
BUILDING CARETAKERS, WINDOW AND RELATED CLEANERS	n/a
SHIP'S DECK CREWS AND RELATED	n/a
PELT, LEATHER AND SHOEMAKING TRADES WORKERS	n/a
PHYSICAL SCIENCE PROFESSIONALS	n/a
TRADITIONAL MEDICINE PRACTITIONERS AND FAITH HEALERS	n/a
AUTOMATED ASSEMBLY LINE AND INDUSTRIAL ROBOT OPERATORS	n/a
TRAVEL ATTENDANTS AND RELATED	n/a
HUNTERS AND TRAPPERS AND GATHERERS	n/a
SOCIAL WORK ASSOCIATE PROFESSIONALS	n/a
SOCIAL SCIENCE AND RELATED	n/a
OPTICAL AND ELECTRONIC EQUIPMENT OPERATORS	n/a
MIXED FARMING WORKERS	n/a
LEGAL PROFESSIONALS	n/a
TRADITIONAL CHIEFS AND HEADS OF VILLAGES	n/a
FASHION AND OTHER MODELS	n/a
FINANCIAL ANALYSTS AND RELATED	n/a
LIFE SCIENCE PROFESSIONALS	n/a
LEGISLATORS	n/a
CLERICAL WORKERS NEC	n/a

SPECIAL EDUCATION TEACHING PROFESSIONALS	**n/a**
ASTROLOGERS, FORTUNE TELLERS AND RELATED	**n/a**
STATISTICAL CLERKS AND COMPUTER OPERATORS	**n/a**
COMPUTER SUPPORT TECHNICIANS	**n/a**
PRECISION WORKERS IN METAL AND RELATED MATERIALS	**n/a**
TRANSPORT CLERKS	**n/a**

Source: Authors' analysis based on Malaysian LFS 2007-2010

ANNEX: CHAPTER 5

Methodology

The Figures presented in the Chapter show differentials in a variable *Y* by categorical variable *Z* *conditional* on a set of covariates *X*. In particular, consider the generic regression model

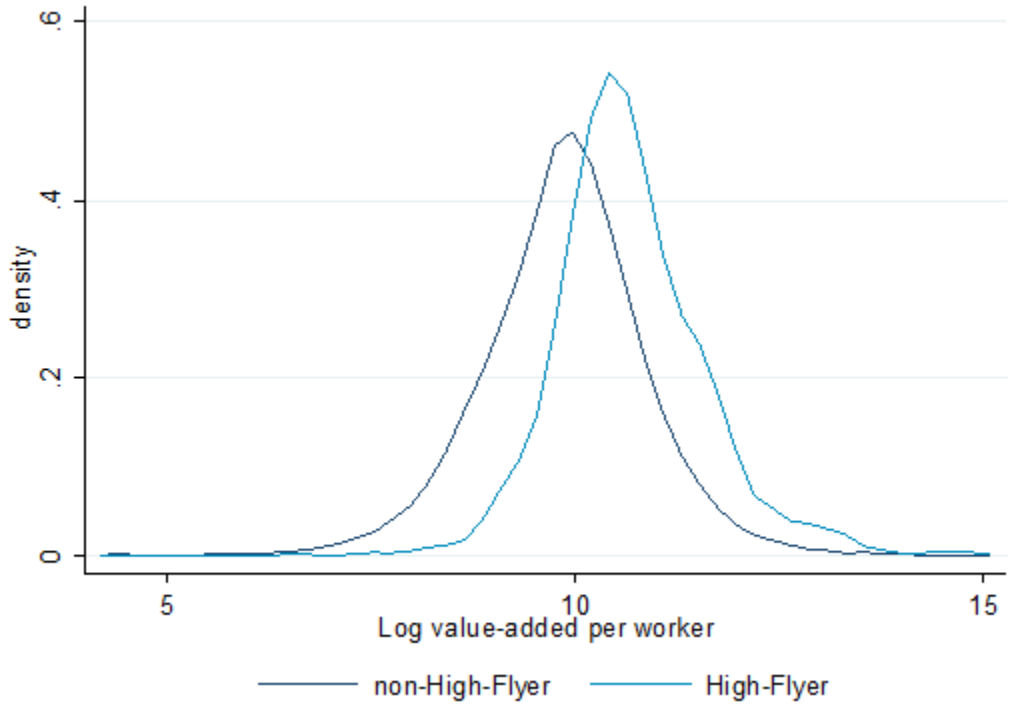
$$Y_{ik} = \alpha_k + \sum_j \beta_{kj} Z_{ijk} + \gamma'_k X_{ik} + \varepsilon_{ik}$$

Where the *i* subscript denotes firm, the *j* subscript denotes a category and the *k* subscript denotes sub-type (e.g., sector of firm, occupation category within firm). Thus, for example, in some graphs, *i* would be the firm, Z_{ijk} would collapse to a single dummy variable for firm type (high-flyer/non-high-flyer), and *k* would be sector; the figure thus reports OLS estimates of β_k along with their standard errors. In some other figures, *j* indexes different education categories of workers and Z_{ijk} represents the proportion of workers in firm *i* in occupation *k* with education level *j* (there are thus 6 x 6 = 36 distinct β_{kj}). The notes to the figures indicate the particular set of controls, X_{ik}, each of which has a vector of regression coefficients γ_k specific to type *k*.

Additional Results

Even with the more expansive definition of high-flyer made possible by the NER, the conclusion that high-flyers are at the technological vanguard remains valid, subject to the caveat that these are not, by and large, NKEA firms[71]. **Error! Not a valid bookmark self-reference.** Figure 1 shows that indeed they are; the distribution of labor productivity for high-flyers lies far to the right of that of non-high-flyers.

Figure 1: Are high-flyers as defined in the NER more productive?



Source: Authors' calculations based on NER 2011

[71] As mentioned in the Chapter, NER and Economic Census data can be matched at the firm-level for a subset of around 3000 firms, nearly all in manufacturing.

ANNEX: CHAPTER 6

1970 Policy Change

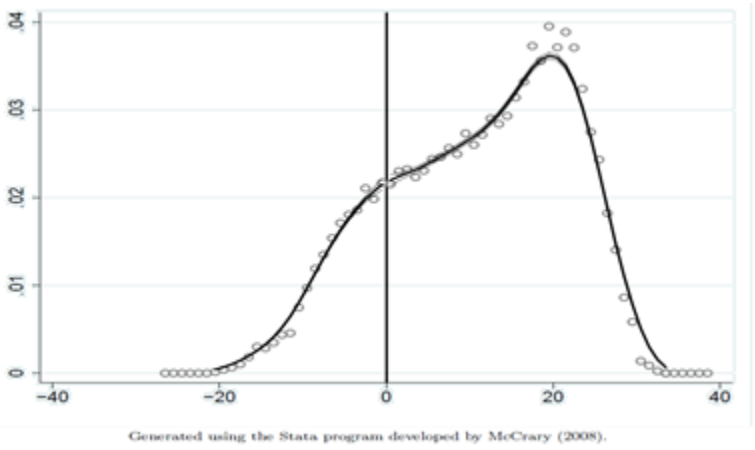
Specification tests in the LFS

We begin by confirming the bandwidth that is possible for our reduced-form regression outcomes in the Labor Force Survey (LFS): education and wage. We focus on the LFS data for this test as the LFS is both comprehensive and sizeable. We do this by including the right-hand-side variables for our main specification (a piecewise linear function of year of birth, a dummy for the cutoff year of birth, and survey year controls) as well as dummies for every possible year of birth (up to multicollinearity concerns). We then test the dummies for joint significance, following Lee (2008). Significant dummies indicate misspecification.

For a variety of outcomes and sample restrictions, bandwidths less than or equal to seven years on either side of the cutoff pass this test, with the set of dummies never achieving significance at even the 10 percent level. For bandwidths of 8 or 9 years, some outcomes produce jointly significant dummies with p-values of 0.05 or smaller, and for bandwidths of 10 years or more, all outcomes produce significant p-values of 0.05 or smaller.

Thus, we restrict attention in this work to a bandwidth of seven years around the cutoff. Following McCrary (2008), we also test the density around the cutoff, and find no evidence of a jump in the density of labor force surveys around the cutoff. There is no reason to suspect one, since age cannot be manipulated ex-post, and the policy change wasn't announced until seven years after one would have needed to be born to be affected by it, so no endogenous fertility response is plausible. Nonetheless, we check in the data (see Figure 1) and confirm that the data tensity is smooth near the cutoff year.

Figure 1: Regression Discontinuity Validity: density smoothness test for year of birth



Additional Tables

Table 1: Data Sources

Data source:	LFS	LFS	LFS	LFS	MFLS2	Census	Census	Census
Data years:	2007	2008	2009	2010	1988-89	1980	1991	2000
Age if born in 1963:	43-44	44-45	45-46	46-47	24-26	16-17	27-28	36-37
Variables:								
Demographics:	Age	Age	Age	Age	Age	Age	Age	Age
	Sex	Sex	Sex	Sex	Sex	Sex	Sex	Sex
	Ethnicity	Ethnicity	Ethnicity	Ethnicity	Ethnicity	Ethnicity	Ethnicity	Ethnicity
	Res. State	Res. State	Res. State	Res. State	Res. State	Res. State	Res. State	Res. State
	—	—	—	—	Birth State	Birth State	Birth State	Birth State
Education:	—	—	—	—	—	Years	Years	—
	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Language:	—	—	—	—	Lang: Spoken	Lang: Spoken	—	—
	—	—	—	—	Lang: read/write	—	—	—
	—	—	—	—	(see above)	Literacy y/n	—	Literacy y/n
Economics:	(employed*)	(employed*)	(employed*)	(employed*)	Employment	Employment	Employment	Employment
	Industry	Industry	Industry	Industry	—	Industry	Industry	Industry
	Occupation	Occupation	Occupation	Occupation	Occupation	Occupation	Occupation	Occupation
Sample size:								
Total:	21,448	22,927	24,825	50,616	up to 23,816	182,601	347,892	435,300
Within band:	n,nnn	n,nnn	n,nnn	n,nnn	n,nnn	n,nnn	n,nnn	n,nnn

*Note that the labor force survey (LFS) includes only employed respondents.

Table 2: Effect of Policy Change on Literacy – Census 2000

Ethnicities:	All	Malay	Chinese and Indian	All	Malay	Chinese and Indian
Geography:	All	All	All	Peninsula	Peninsula	Peninsula
Column number:	1	2	3	4	5	6
Born 1963 or later	0.0091**	0.0003	0.0017	0.0007	0.0005	0.0005
	(0.0037)	(0.004)	(0.0055)	(0.0035)	(0.004)	(0.0059)
Constant	0.9233***	0.9593***	0.943***	0.9518***	0.9634***	0.944***
	(0.0031)	(0.0034)	(0.0046)	(0.0029)	(0.0033)	(0.0048)
Observations	84581	43356	31607	69514	40327	28212

*** p<0.01, ** p<0.05, * p<0.1, based on robust standard errors. Bandwidth 7 years in all specifications. The only controls are piecewise linear trends as a function of year of birth on either side of the cutoff year, 1963.

Table 3: Effect of Treatment on Schooling – Minimal Specification (LFS 2007-2010)

Ethnicities:	All	Malay	Chinese and Indian
Geography:	Peninsula	Peninsula	Peninsula
Column number:	1	2	3
Born 1963 or later	0.066	0.382**	-0.337
	(0.18)	(0.156)	(0.247)
Constant	9.881***	10.682***	9.549***
	(0.137)	(0.12)	(0.214)
Observations	31543	21290	8982

*** p<0.01, ** p<0.05, * p<0.1, based on robust standard errors. Bandwidth 7 years in all specifications. The only controls are piecewise linear trends as a function of year of birth on either side of the cutoff year, 1963.

Table 4: Effect of Treatment on Schooling – All (LFS 2007-2010)

Sample: All ethnicities, peninsula

Outcome	Years of school			Upper Secondary	Post-Secondary	Certificate-Diploma	Degree
Bandwidth	7 yrs	8 yrs	9 yrs	7 yrs	7 yrs	7 yrs	7 yrs
Panel A: Without covariates, at least lower secondary education.							
Treatment	0.269**	0.245**	0.206*	0.019	0.064***	0.051**	0.024*
	(0.127)	(0.117)	(0.111)	(0.027)	(0.024)	(0.021)	(0.013)
Observations	24026	26998	29944	24130	24130	24130	24130
Panel B: With covariates, at least lower secondary education.							
Treatment	0.231***	0.195**	0.192***	0.018	0.057***	0.042***	0.019
	(0.083)	(0.076)	(0.071)	(0.019)	(0.015)	(0.013)	(0.013)
Observations	24026	26998	29944	24130	24130	24130	24130
Panel C: Without covariates, UNCONDITIONAL w.r.t. education.							
Treatment	0.082	0.132	0.125	0.002	0.045**	0.035**	0.017
	(0.148)	(0.136)	(0.132)	(0.026)	(0.021)	(0.018)	(0.011)
Observations	30407	34069	37716	30512	30512	30512	30512
Panel D: With covariates, UNCONDITIONAL w.r.t. education.							
Treatment	0.065	0.102	0.155	0.002	0.04***	0.029***	0.014
	(0.115)	(0.111)	(0.107)	(0.017)	(0.013)	(0.011)	(0.01)
Observations	30407	34069	37716	30512	30512	30512	30512

*** p<0.01, ** p<0.05, * p<0.1. Panel A shows results from regressions without covariates (except for survey year dummies, year of birth and the interaction between our treatment and year of birth). Panel B shows results from regressions including dummies for rural location, gender, state and sector. Outcome in columns 1-3 is respondent's highest level of schooling. The treatment variable takes values 0 if the respondent was born in 1963 or before, and 1 if the respondent was born after 1963. We restrict the sample to individuals with at least lower secondary education (PMR) and surveyed in Peninsular Malaysia. Standard errors are clustered by gender-year of birth-year of the survey.

Table 5: Effect of Treatment on Schooling – Malay (LFS 2007-2010)

Sample: Malay, peninsula

Outcome	Years of school			Upper Secondary	Post-Secondary	Certificate-Diploma	Degree
Bandwidth	7 yrs	8 yrs	9 yrs	7 yrs	7 yrs	7 yrs	7 yrs
Panel A: Without covariates, at least lower secondary education.							
Treatment	0.33**	0.339***	0.353***	-0.001	0.074***	0.06**	0.046***
	(0.13)	(0.123)	(0.115)	(0.024)	(0.027)	(0.025)	(0.014)
Observations	18079	20232	22428	18162	18162	18162	18162
Panel B: With covariates, at least lower secondary education.							
Treatment	0.291***	0.28***	0.319***	0.002	0.067***	0.049***	0.04***
	(0.089)	(0.088)	(0.082)	(0.018)	(0.019)	(0.016)	(0.015)
Observations	18079	20232	22428	18162	18162	18162	18162
Panel C: Without covariates, UNCONDITIONAL w.r.t. education.							
Treatment	0.386***	0.463***	0.515***	0.008	0.067***	0.054**	0.041***
	(0.148)	(0.137)	(0.132)	(0.024)	(0.023)	(0.022)	(0.012)
Observations	21290	23793	26365	21374	21374	21374	21374
Panel D: With covariates, UNCONDITIONAL w.r.t. education.							
Treatment	0.349***	0.392***	0.49***	0.009	0.059***	0.044***	0.036***
	(0.113)	(0.11)	(0.11)	(0.017)	(0.016)	(0.014)	(0.013)
Observations	21290	23793	26365	21374	21374	21374	21374

*** p<0.01, ** p<0.05, * p<0.1. Panel A shows results from regressions without covariates (except for survey year dummies, year of birth and the interaction between our treatment and year of birth). Panel B shows results from regressions including dummies for rural location, gender, state and sector. Outcome in columns 1-3 is respondent's highest level of schooling. The treatment variable takes values 0 if the respondent was born in 1963 or before, and 1 if the respondent was born after 1963. We restrict the sample to individuals with at least lower secondary education (PMR) and surveyed in Peninsular Malaysia. Standard errors are clustered by gender-year of birth-year of the survey.

Table 6: Effect of Treatment on Schooling – Chinese and Indian (LFS 2007-2010)

Sample: Chinese + Indian, peninsula

Outcome	Years of school			Upper Secondary	Post-Secondary	Certificate-Diploma	Degree
Bandwidth	7 yrs	8 yrs	9 yrs	7 yrs	7 yrs	7 yrs	7 yrs
Panel A: Without covariates, at least lower secondary education.							
Treatment	0.099	0.019	-0.105	0.042	0.04	0.029	-0.02
	(0.203)	(0.194)	(0.185)	(0.04)	(0.037)	(0.03)	(0.025)
Observations	5875	6675	7406	5896	5896	5896	5896
Panel B: With covariates, at least lower secondary education.							
Treatment	0.084	0.02	-0.052	0.038	0.036	0.026	-0.022
	(0.177)	(0.166)	(0.156)	(0.033)	(0.03)	(0.027)	(0.023)
Observations	5875	6675	7406	5896	5896	5896	5896
Panel C: Without covariates, UNCONDITIONAL w.r.t. education.							
Treatment	-0.341	-0.333	-0.437**	-0.008	0.011	0.005	-0.021
	(0.243)	(0.231)	(0.219)	(0.038)	(0.028)	(0.023)	(0.017)
Observations	8982	10113	11161	9003	9003	9003	9003
Panel D: With covariates, UNCONDITIONAL w.r.t. education.							
Treatment	-0.327	-0.294	-0.331*	-0.007	0.01	0.005	-0.021
	(0.222)	(0.214)	(0.198)	(0.029)	(0.022)	(0.02)	(0.016)
Observations	8982	10113	11161	9003	9003	9003	9003

*** p<0.01, ** p<0.05, * p<0.1. Panel A shows results from regressions without covariates (except for survey year dummies, year of birth and the interaction between our treatment and year of birth). Panel B shows results from regressions including dummies for rural location, gender, state and sector. Outcome in columns 1-3 is respondent's highest level of schooling. The treatment variable takes values 0 if the respondent was born in 1963 or before, and 1 if the respondent was born after 1963. We restrict the sample to individuals with at least lower secondary education (PMR) and surveyed in Peninsular Malaysia. Standard errors are clustered by gender-year of birth-year of the survey.

Table 7: Effect of Treatment on Schooling – Census 2000, 7 years bandwidth

Ethnicities:	All	Malay	Chinese and Indian	All	Malay	Chinese and Indian
Geography:	All	All	All	Peninsula	Peninsula	Peninsula
Column number:	1	2	3	4	5	6
Panel A: Minimal controls						
Born 1963 or later	0.23***	0.129*	0.078	0.101*	0.111	0.075
	(0.055)	(0.071)	(0.084)	(0.057)	(0.073)	(0.089)
Constant	9.006***	9.731***	9.112***	9.481***	9.850***	9.081***
	(0.044)	(0.059)	(0.067)	(0.046)	(0.06)	(0.072)
Observations	82852	42498	30926	68097	39540	27612
Panel B: Additional fixed effects						
Born 1963 or later	0.182***	0.11	0.098	0.103*	0.099	0.095
	(0.052)	(0.068)	(0.082)	(0.055)	(0.07)	(0.087)
Observations	82852	42498	30926	68097	39540	27612

*** p<0.01, ** p<0.05, * p<0.1, based on robust standard errors. Bandwidth 7 years in all specifications. In Panel A, the only controls are piecewise linear trends as a function of year of birth on either side of the cutoff year, 1963. In Panel B, added controls are gender and state fixed effects.

Table 8: Effect of Treatment on Probability of Schooling Level – Census 2000, 7 years bandwidth

ETHNICITIES:	All	Malay	Chinese and Indian	All	Malay	Chinese and Indian
GEOGRAPHY:	All	All	All	Peninsula	Peninsula	Peninsula
COLUMN NUMBER:	1	2	3	4	5	6
Panel A: Outcome: any schooling						
Born 1963 or later	0.011***	0.002	0.0005	0.0004	0.0006	-0.0001
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
Constant	0.938***	0.967***	0.974***	0.968***	0.971***	0.974***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.004)
Observations	83441	42914	31074	68635	39941	27746
Panel B: Outcome: at least some primary school						
Born 1963 or later	0.011***	0.002	0.0005	0.0004	0.0006	-0.0001
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
Constant	0.938***	0.967***	0.974***	0.968***	0.971***	0.974***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.004)
Observations	83441	42914	31074	68635	39941	27746
Panel C: Outcome: at least some post-primary school						
Born 1963 or later	0.032***	0.023***	0.018*	0.021***	0.022***	0.018
	(0.006)	(0.008)	(0.01)	(0.007)	(0.008)	(0.011)
Constant	0.726***	0.798***	0.728***	0.77***	0.812***	0.723***
	(0.005)	(0.007)	(0.009)	(0.006)	(0.007)	(0.009)
Observations	83441	42914	31074	68635	39941	27746
Panel D: Outcome: at least some post-secondary school						
Born 1963 or later	0.016***	0.015**	0.013	0.014**	0.015**	0.012
	(0.005)	(0.007)	(0.008)	(0.006)	(0.007)	(0.008)
Constant	0.134***	0.153***	0.137***	0.149***	0.157***	0.138***
	(0.004)	(0.005)	(0.006)	(0.004)	(0.006)	(0.006)
Observations	83441	42914	31074	68635	39941	27746
Panel E: Outcome: university-level						
Born 1963 or later	0.007*	0.005	0.005	0.004	0.005	0.004
	(0.004)	(0.006)	(0.007)	(0.005)	(0.006)	(0.007)
Constant	0.098***	0.111***	0.102***	0.109***	0.112***	0.104***
	(0.003)	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)
Observations	83441	42914	31074	68635	39941	27746

*** p<0.01, ** p<0.05, * p<0.1, based on robust standard errors. Bandwidth 7 years in all specifications. The only controls are piecewise linear trends as a function of year of birth on either side of the cutoff year, 1963. Only the outcome variable—an indicator for schooling level attained—changes across Panels A through E.

Table 9: Effect of Treatment on Wages – LFS, 7 years bandwidth, minimal specification:

ETHNICITIES:	All	Malay	Chinese and Indian
GEOGRAPHY:	Peninsula	Peninsula	Peninsula
COLUMN NUMBER:	1	2	3
Born 1963 or later	0.036	0.052**	0.041
	(0.024)	(0.026)	(0.039)
Constant	7.492***	7.557***	7.498***
	(0.022)	(0.022)	(0.036)
Observations	31654	21374	9003

*** p<0.01, ** p<0.05, * p<0.1, based on robust standard errors. Bandwidth 7 years in all specifications. The only controls are a gender indicator, and piecewise linear trends as a function of year of birth on either side of the cutoff year, 1963.

Table 10: Effect of Treatment on Wages – LFS, 7 years bandwidth, alternative specification

Sample: Peninsula
Bandwidth: 7 yrs.

	Outcome: Log Wages				
	ALL	MALAY	CHINESE	INDIAN	CHINESE+INDIAN
Panel B: Reduced-form RD, at least lower sec ed.					
Treatment	0.062***	0.057**	0.078	0.007	0.088**
	(0.024)	(0.028)	(0.049)	(0.069)	(0.039)
Observations	24130	18162	4145	1751	5896
Panel B-U: Reduced-form RD, UNCONDITIONAL w.r.t. ed.					
Treatment	0.046**	0.057**	0.043	-0.073	0.035
	(0.02)	(0.023)	(0.042)	(0.047)	(0.036)
Observations	30512	21374	6026	2977	9003

*** p<0.01, ** p<0.05, * p<0.1. We use log wages (winsorized at 5.6 and 8.9) as the dependent variable in all specifications. In Panel A the set of explanatory variables includes education levels, dummies for rural location, gender, state and sector. Panel B reports reduced-form RD estimates using survey year dummies, year of birth and the interaction between our treatment and year of birth as independent in addition to those used in Panel A. In Panel C we present 2SLS Regression Discontinuity estimates, where being born after 1963 is used as an instrument for level of education. The explanatory variables are exactly the same as those used in Panel B. The treatment variable takes values 0 if the respondent was born in 1963 or before, and 1 if the respondent was born after 1963. We restrict the sample to individuals with at least lower secondary education (PMR) and surveyed in Peninsular Malaysia. Standard errors are clustered by gender-year of birth-year of the survey.

Policy Change in 2003

Review of the literature

There have been several studies examining the recent switch in the language of instruction in mathematics and science. Ong and Lan (2008) discuss the difficulties that teachers and students faced when the policy change came about. Specifically, the authors find that most teachers struggled with the teaching of mathematics and science in English as they had been accustomed to teaching mathematics and science in Malay. Although some teachers managed the change well, they constantly needed to translate materials from English into Malay, as students were not proficient in English. Indeed, Nor et al. (2011) reveal that students prefer the abolishment of the new policy because they are more comfortable with learning mathematics and science in Malay. These studies indicate that the government did not prepare the teachers and students sufficiently for the policy change. Given the lack of preparation, the effects of the policy change on students' outcomes are likely to be negative.

Previous studies indicate that switching the language of instruction from Malay to English is unlikely to effectively improve the English proficiency of Malaysian students. For instance, Angrist et al. (2006) examine the change of language of instruction from Spanish to English in Puerto Rico in 1949 and find no evidence that the change in the language of instruction improves the English proficiency Puerto Ricans.

The students most affected by the policy change are likely those progressing from primary school into secondary school between 2003 and 2008. These students had to switch from learning mathematics and science in their mother tongue (Malay, Chinese, or Tamil) into a non-mother tongue – English. Students who progressed from primary school to secondary school after 2008 were less affected by the new policy as they would learn the two subjects in English since primary school. Nevertheless, they would always learn the two subjects in a non-mother tongue, which recent findings suggest to be detrimental to learning outcomes. Specifically, Walter and Chou (2011) provide experimental evidence that primary school students who learn in mother-tongue outperform those who learn in English in Cameroon.

Table 11: Differences-in-Differences Estimates of the Effects of Language Policy Change on Achievement of Malaysian Eighth Graders

	(1)	(2)	(3)	(4)
Post x Malaysia	-0.077	-0.078	-0.044	-0.047
	(0.019)***	(0.019)***	(0.016)***	(0.016)***
Post	0.025	0.018	-0.001	0.001
	(0.010)***	(0.009)*	(0.009)	(0.009)
Malaysia	0.035	0.034	-0.052	-0.040
	(0.013)***	(0.013)***	(0.010)***	(0.011)***
Controlling for school characteristics	No	Yes	No	Yes
Number of obs.	45390	45390	44238	44238
R-squared	0.005	0.041	0.027	0.036

Notes: Control countries are Iran, Cyprus, Japan, and Russia for mathematics achievement, and Israel, United States, and Singapore for science achievement. School characteristics includes: instructional material shortage, math shortage items, and science shortage items. Sampling weights used. Robust standard errors clustered by school are reported in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 12: Differences-in-Differences Estimates of the Effects of Language Policy Change on Achievement of Malay Eighth Graders

	(1)	(2)	(3)	(4)
Post x Malay	-0.076	-0.077	-0.036	-0.038
	(0.019)***	(0.020)***	(0.016)**	(0.017)**
Post	0.025	0.017	-0.001	0.0005
	(0.010)***	(0.009)*	(0.009)	(0.009)
Malay	-0.011	-0.013	-0.073	-0.061
	(0.013)	(0.013)	(0.010)***	(0.011)***
Controlling for school characteristics	No	Yes	No	Yes
Number of obs.	40365	40365	39209	39209
R-squared	0.008	0.050	0.025	0.034

Notes: Control countries are Iran, Cyprus, Japan, and Russia for mathematics achievement, and Israel, United States, and Singapore for science achievement. School characteristics includes: instructional material shortage, math shortage items, and science shortage items. Sampling weights used. Robust standard errors clustered by school are reported in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 13: Differences-in-Differences Estimates of the Effects of Language Policy Change on Achievement of Non-Malay Eighth Graders

	(1)	(2)	(3)	(4)
Post x Non-Malay	-0.081	-0.083	-0.053	-0.059
	(0.024)***	(0.024)***	(0.020)***	(0.021)***
Post	0.025	0.017	-0.001	0.001
	(0.010)***	(0.009)*	(0.009)	(0.009)
Non-Malay	0.083	0.083	-0.031	-0.012
	(0.017)***	(0.016)***	(0.013)**	(0.013)
Controlling for school characteristics	No	Yes	No	Yes
Number of obs.	40643	40643	39492	39492
R-squared	0.007	0.049	0.012	0.024

Notes: Control countries are Iran, Cyprus, Japan, and Russia for mathematics achievement, and Israel, United States, and Singapore for science achievement. School characteristics includes: instructional material shortage, math shortage items, and science shortage items. Sampling weights used. Robust standard errors clustered by school are reported in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

ANNEX: CHAPTER 7

Technical Summary of CGE Exercise

The Model

The economy is disaggregated into 23 sectors, with 21 different factors of production, corresponding to labor of 20 different skill types, and physical capital. At the sectoral level, value added is a nested constant elasticity of substitution (CES) function of Capital and Labor. The Labor aggregate is disaggregated into three bundles: a High skilled labor bundle, a Medium skilled labor bundle and a Low skilled labor bundle. The nested production structure allows for differentiated elasticities of substitution between various factors of production. Sectoral subscripts are omitted throughout for readability.

The production structure

Value added is a constant elasticity of substitution function of capital and a labor aggregate L:

$$X_t = A_t \left(\alpha_K * K_t^{1-\frac{1}{\sigma_1}} + \alpha_L * L_t^{1-\frac{1}{\sigma_1}} \right)^{\frac{1}{1-\frac{1}{\sigma_1}}}$$

The first order conditions imply the following factor demands:

$$K_t = A_t^{\sigma_1 - 1} * X_t * \left(\frac{\alpha_K VA_t}{R_t} \right)^{\sigma_1}$$

$$L_t = A_t^{\sigma_1 - 1} * X_t * \left(\frac{\alpha_L PVA_t}{PL_t} \right)^{\sigma_1}$$

At the following nest, L is decomposed into three bundles containing workers with academic degrees, vocationally trained, and secondary school graduates or lower:

$$L_t = \left(\alpha_{HS} * HSL_t^{1-\frac{1}{\sigma_2}} + \alpha_{MS} * MS_t^{1-\frac{1}{\sigma_2}} + \alpha_{LS} * LS_t^{1-\frac{1}{\sigma_2}} \right)^{\frac{1}{1-\frac{1}{\sigma_2}}}$$

Each labor bundle is a CES aggregate of workers of different skill types. The HSL bundle contains degree holders of 8 different types, corresponding to eight broad fields of study. The MS bundle contains vocationally trained, in the same 8 broad fields of study. Finally, the LS bundle contains workers of 4 educational categories: *primary and less*, *lower secondary*, *upper secondary*, and *pre-university*.

$$HSL_t = \left[\sum_i \beta_i \, LD_{HS,i,t}^{1-\frac{1}{\sigma_3}} \right]^{\frac{1}{1-\frac{1}{\sigma_3}}}$$

$$MS_t = \left[\sum_i \beta_i \, LD_{MS,i,t}^{1-\frac{1}{\sigma_4}} \right]^{\frac{1}{1-\frac{1}{\sigma_4}}}$$

$$LS_t = \left[\sum_i \beta_i \, LD_{LS,i,t}^{1-\frac{1}{\sigma_5}} \right]^{\frac{1}{1-\frac{1}{\sigma_5}}}$$

Furthermore, in the bottom nest of the production structure each skill group is decomposed into different age groups (for a full view of the production nesting structure, see page 8):

$$LD_{skill,i,t} = \left[\sum_a \gamma_a \, LDA_{skill,i,a,t}^{1-\frac{1}{\sigma_6}} \right]^{\frac{1}{1-\frac{1}{\sigma_6}}}$$

The above CES functions make up the production structure, from which demands for factors of production are derived.

Supply of labor

Educational dynamics

Facing the above demands for workers of various skill types and ages, the evolution of supply of workers is determined in an educational module based on data from past years. Students move between educational cycles conditional on dropout rates, and the willingness to join the labor market at the end of each cycle. For low skill content-cycles, these rates are calculated from figures obtained from the MOE.

$$dropout_c = \frac{enrolled_{c,2009} + inputs_{c,2010} - grad_{c,2009} - enrolled_{c,2010}}{enrolled_{c,2009}}$$

The dropout rate by cycle is thus calculated as a residual. It corresponds to disappearances from the stock of enrolled between 2009 and 2010, which are not accounted for, relative to the stock of enrolled in 2009. We make the assumption that repetition rates (for which we have no information) are negligible. Students graduating and leaving the educational system are captured by the parameter *exdip*:

$$exdip_c = \frac{grad_{c,2009} - \sum_c (inputs_{c2,2010} * transmap_{c,c2}) * \frac{grad_{c,2009}}{\sum_c equiv_{c,c2} * grad_{c2,2009}}}{grad_{c,2009}}$$

Where *transmap* is a mapping parameter between different educational cycles and *equiv* a parameter mapping cycles that are equivalent, in the sense that they can both precede c2. Thus, graduates who choose not to pursue into the next cycles is the residual of the graduates from cycle c, less entrants into the next cycle weighted by the importance of cycle c as a cycle of origin. As such, exdip refers to the percentage of graduates who leave a given cycle in 2009 less those who choose to continue into any of the next possible cycles.

We model the exdip parameter as endogenous in the choice of graduates from Form 5 to pursue further studies or not. The percentage of those choosing to pursue further studies (a Variable called CONT) is defined by the following equation (Fredriksson, 1997).

$$\log \frac{CONT_{c,t}}{1 - CONT_{c,t}} = \frac{\alpha \sum_c transmap_{c,c2} \sum_{lf,age} avfw_{lf,age,t} * (1 - ur_{lf,age,t}) * edumap_{c,lf}}{\sum_{lf,age} avfw_{lf,age,t} * (1 - ur_{lf,age,t}) * edumap_{c,lf}}$$

As such the ratio of students continuing on to the next cycle depends on the wage premium of pursuing studies into that cycle rather than starting to work at current skill level.

The educational cycles in the model are defined as follows:

Primary	Primary school
Form1-3	Lower secondary school
Form4-5	Upper secondary school (SMP is taken at the end of this cycle)
Form6mat	Pre-university cycle
Voc	Vocational diplomas and certificates
Degree	Academic degrees (bachelor, master, PhD)

The dynamics of education are the following:

$$GRAD_{c,t-1} = ENROL_{c,t-1} * (1 - dropout_c) - ENROL_{c,t} + NEWENR_{c,t}$$

That is, graduates from t-1 are equal to the decrease in enrolment between *t-1* and *t* not accounted for by drop outs, less the newly enrolled.

$$NEWENR_{c,t} = popent_{c,t} + \sum_{c} GRAD_{c2,t-1} * transmap_{c,c2} * (1 - exdip_{c,t-1})$$

Newly enrolled are equal to children arriving at school age (*popent*) for the primary cycle, plus last year graduates from preceding cycles, less those who choose not to pursue further studies.

As such, the number of enrolled is simply equal to the number of enrolled of the previous year, less graduates and dropouts, plus newly enrolled this year.

$$ENROL_{c,t} = ENROL_{c,t-1} * (1 - dropout_c) - GRAD_{c,t-1} + NEWENR_{c,t}$$

Students hence move through the educational system cycle by cycle, depending on *dropout* rates and the willingness to pursue further education; a willingness that is influenced by the expected rate of return to education. At the end of Form 5, students who choose to pursue higher education make a choice of entering pre-university education or seeking vocational training. This choice is modeled through a

constant elasticity of transformation function (CET) where the first order conditions render the following demands for vocational training and academic degrees respectively:

$$NEWENR_{voc,t} = \alpha_{voc} TOTNEWENR_t \left(\frac{\sum_{mslf} \left[LST_{mslf,t} * \left(1 - Ur_{mslf,t}\right) * avfw_{mslf,t} \right]}{\sum_{mslf} \left[LST_{mslf,t} \right]} \right. \\ \left. / \frac{\sum_{hslf} \left[LST_{hslf,t} * \left(1 - Ur_{hslf,t}\right) * avfw_{hslf,t} \right]}{\sum_{hslf} \left[LST_{hslf,t} \right]} \right)^{\sigma_{11}}$$

$$NEWENR_{deg,t} = \alpha_{deg} TOTNEWENR_t \left(\frac{\sum_{hslf} \left[LST_{hslf,t} * \left(1 - Ur_{hslf,t}\right) * avfw_{hslf,t} \right]}{\sum_{hslf} \left[LST_{hslf,t} \right]} \right. \\ \left. / \frac{\sum_{mslf} \left[LST_{mslf,t} * \left(1 - Ur_{mslf,t}\right) * avfw_{mslf,t} \right]}{\sum_{mslf} \left[LST_{mslf,t} \right]} \right)^{\sigma_{11}}$$

The demand for vocational training thus increases according to the relative mean wage of vocationally trained and degree holders respectively; and with an elasticity of σ_{11}.

Choice of fields of study

For medium and high skilled, newly enrolled choose different fields of study based on the expected wages of each. This choice is modeled through a constant elasticity of transformation function (CET) which gives an optimal allocation of demand for skills given expected wages. We here assume that workers have myopic expectations and believe the wage distribution by skill to remain constant and equal to that of the previous year.

The first order conditions imply the following demand for educational services of type *mslf*:

$$LSTANEW_{mslf,t} = A_{LSEDU,mslf} * LSTATOT_t * \left(\frac{\left(1 - Ur_{mslf,t-1}\right) * avfw_{mslf,t-1}}{avfwtot_t} \right)^{\sigma_{10}}$$

With the following constraint:

$$LSTATOT_t * avfwtot_t = \sum_{mslf} \left[LSTANEW_{mslf,t} * \left(1 - Ur_{mslf,t-1}\right) * avfw_{mslf,t-1} \right]$$

Each year, LSTATOT is fixed and equal to the sum of graduates in vocational studies. The same allocation is obtained for degree holders. These blocks of equations thereby give us desired educational demand by skill. These demands are confronted with supply in a sequential fashion: first, fields of study are ranked according to the wage premium associated with each one. Then, desired entrants into that field are confronted with the number of available places in the field. Students not accepted are regrouped with those desiring to enter the second rank field. A second cutoff is operated, with leftovers going into the

third ranked field of study. The mechanism is repeated throughout the list of fields of study, for vocationally trained and degree holders respectively.

This way, we end up with a number of educational entrants for each year. These entrants are then added to the youth labor force:

$$LSTA_{lf,youth,t} = LSTA_{lf,youth,t-1} * \left(1 - transage_{lf}\right) + CANDID_{lf,time-studytime}$$

Where *transage* is a parameter denoting the yearly rate of transition of young workers into the old workers group. Studytime denotes the average number of years required for a degree in the particular field of study. As such, decisions on skill acquisition will yield an impact on the labor force with a delay corresponding to the time spent acquiring knowledge.

The evolution of the old labor force is characterized by the following equation:

$$LSTA_{lf,old,t} = LSTA_{lf,old,t-1} * \left(1 - mort_{lf} - retir_{lf}\right) + transage_{lf} * LSAlf, youth, t-1$$

The number of old workers thus depends on the number of old workers from the previous year, less retired and deceased, plus young workers turning 'old'. Youth and old are categories of workers reflecting the idea of different levels of experience leading to imperfect substitutability between younger and older workers. The choice of a cutoff point is made after examination of the Malaysian wage structure. Labor Force surveys show that for higher skilled workers, a significant wage increase occurs by the age of 29. This age was thus chosen as a cutoff point, with younger workers being equal to those workers who are strictly below the age of 30.

Migrant labor supply

Immigrants are supposed to be attracted to Malaysia by various push- and pull factors. We model total migrant labor through a constant elasticity of transformation (CET) function, where the evolution of the migrant stock depends on the relative wage premium of migration in a given year compared to the relative wage premium in the base year.

$$SMIG_{lf,t} = \sum_{AC}\left(IMMIG_{AC,lf,2005}\right) * \left(\frac{\frac{avfmw_{lf,t}}{wdom_{lf,t}}}{\frac{avfmw_{lf,2005}}{wdom_{lf,2005}}}\right)^{\sigma_8}$$

Total migrant labor supply thus depends on the initial migrant labor supply, on the evolution of the migrant wage premium, and on the elasticity of substitution of migrant labor supply, σ8. Furthermore, the allocation of migrants among industries is determined

by a constant elasticity of transformation (CET) function.

$$SMIG_{lf,t} = \sum_{AC} \left[\gamma_{AC,lf} IMMIG_{AC,lf,t}^{1+\frac{1}{\sigma_9}} \right]^{\frac{1}{1+\frac{1}{\sigma_9}}}$$

Where γ is a share parameter. The first order conditions imply the following migrant sectoral supply function:

$$IMMIG_{AC,lf,t} = \gamma_{AC,lf} * SMIG_{lf,t} * \left(\frac{nwfim_{AC,lf,t}}{avfmw_{lf,t}}\right)^{\sigma_9}$$

Where *nwfim* is the net formal wage received by migrants, by sector and *avfmw* is the average formal wage received by migrants of a particular skill.

Migrants thus make their decision in two times. First, the decision to migrate is taken based on expected wages and the elasticity of substitution. Once immigrated, they'll reallocate between sectors depending on the wage rate and the elasticity of substitution of the migrant sectoral supply.

Labor market adjustments

Migrants and local workers' wages are assumed to be different due to an imperfect substitution by employers. It is assumed that the local wage does not clear the labor market, such that there is unemployment among locals. The wage is modeled using a wage curve, reflecting the often observed empirical relationship between wage and unemployment. The local average wage by skill is thus given by:

$$log\ afw_{lf,t} = \beta_{1,lf} + \beta_{2,lf} logUrlf, t$$

Sectoral wages are then equal to the average wage, plus an exogenous wage differential:

$$wf_{AC,lf,t} = afw_{lf,t} * fwdist_{AC,f}$$

Initially, the migrant wage clears the migrant labor market. We thus make the assumption that there is no migrant unemployment. Furthermore, migrants do not pay social security.

Following the minimum wage law in Malaysia in 2012, restrictions are imposed on the market wage from 2013. It follows that wages no longer clear the migrant labor market. Since there is no migrant unemployment, the introduction of a minimum wage -supposing it is binding -implies rationing of migrants in Malaysia. The level of the minimum wage is set according to the actual minimum wage

introduced, deflated to reflect 2005 prices (since the model is exempt from inflation). The minimum wage is introduced sequentially. First, market wages below the minimum wage level are fixed at the minimum wage rate. The model is then resolved to allow for sectoral adjustments to take place. Any market wage having fallen below the minimum wage rate is fixed at the minimum wage, and the procedure is repeated. The sequence stops when all wages are equal to or above the minimum wage rate.

Calibration

Model parameters include initial values of endogenous variables, as well as exogenous parameters. As for initial values, the Social Accounting Matrix provides such values for production and consumption, exports, imports etc. Labor Force Surveys provide us with information on wages and employment status of migrants and locals. Some inobservable parameters can be calculated using initial values obtained from these sources. Others, such as elasticities of substitution, have to be estimated.

As for the demand elasticity of substitution between high-skilled labor and capital, we follow Card & Lemieux (2001) and derive elasticities of substitution between workers of different age groups, education levels, fields of study as well as elasticities of different labor aggregates of these worker categories.

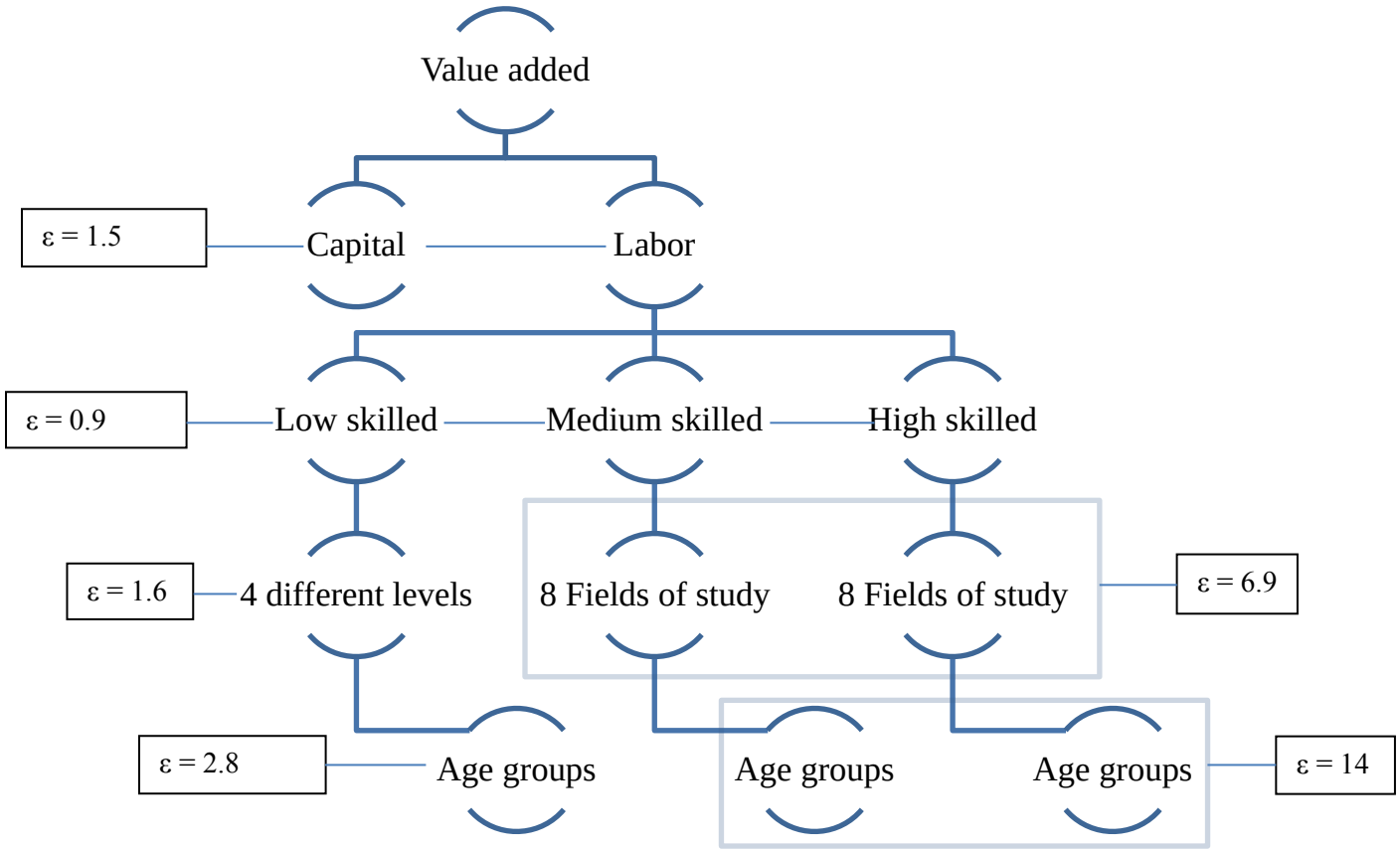
The Card & Lemieux methodology implies that relative wages of factors of production are regressed on relative quantities. The marginal product of labor equals the following, for the low skilled labor bundle:

$$L'_{LS,i,a,t} = \alpha_L L_t^{\rho_1-\rho_2} \alpha_{LS} LS_t^{\rho_2-\rho_3} \beta_i LD_{skill,i,t}^{\rho_3-\rho_6} \gamma_a LDA_{skill,i,a,t}^{\rho_6}$$

$$\text{Given } \rho_n = 1 - \frac{1}{\sigma_n}$$

Knowing that marginal productivity equals marginal wage, the right hand side of the above equation should equal the wage of labor category (*skill,i,a,t*). Taking logs of this equation, and by implementing fixed effects for year, skill group and age we can estimate ρ6 directly. Knowing ρ6, we can then estimate the age group share parameters as the age effects of a regression with only year effects, skill effects and age effects. This way, given the CES function that aggregates our labor bundles by age, estimates for the

labor bundles by skill are obtained. The method is then repeated, moving up the nesting structure, to obtain estimates for ρ2-ρ5.



Since our LSTANEW variable reflects educational demand and not educational outcomes (due to rationing), it is difficult to calibrate without knowing students intentions. The number of applicants by field of study to vocational and degree issuing schools would have been a reasonable approximation of a counterfactual, but since this data was unavailable at the moment of the study, our calibration is carried out in the following way:

$$LSTANEW_{lf,2005} = accepted_{lf,2005} * wagegap_{lf,2005}$$

Demand for education in the base year is thus calculated as a multiple of the number of places available. This multiple reflects the expected wage associated with the field of study in question compared to the mean wage of the level of education considered.

Table 2: Projected Labor Demand: Reference Scenario

	2013	2014	2015	2016	2017	2018	2019	2020
GDP Growth	5%	5%	5%	5%	5%	5%	5%	5%
Employment of Foreign Workers (only wage-earners) (in millions)	1.29629	1.3999	1.51351	1.63563	1.76391	1.89523	2.03549	2.18444
Employment of Foreign Workers (including -self-employed) (in millions)	1.51791	1.63923	1.77226	1.91526	2.06547	2.21924	2.38348	2.5579
Employment of Malaysian Workers (only wage-earners) (in millions)	8.15941	8.37437	8.58275	8.78546	8.98186	9.17144	9.35384	9.52896
Employment of Malaysian Workers (including self-employed) (in millions)	11.06182	11.31718	11.57549	11.82458	12.06602	12.30042	12.52686	12.74461
Total Unemployment	3.2%	3.2%	3.1%	3.1%	3.0%	3.0%	2.9%	2.9%
Total investment (billion RM)	180.77	194.82	209.4	224.68	240.74	257.74	275.82	295.15
Number of Malaysians with different levels of education:								
UPSR / UPSA equivalent	1.26	1.23	1.20	1.17	1.14	1.11	1.08	1.05
PMR or equivalent	1.08	1.10	1.11	1.12	1.13	1.14	1.15	1.16
SPM or equivalent	3.56	3.68	3.79	3.90	4.01	4.11	4.21	4.30
STPM or equivalent	0.33	0.34	0.35	0.37	0.38	0.39	0.41	0.42
Certificate / Diploma: Arts & Humanities	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07
Certificate / Diploma: Social Science, Business and Law	0.33	0.34	0.35	0.36	0.37	0.37	0.38	0.39
Certificate / Diploma: Science, math, IT	0.20	0.21	0.22	0.23	0.24	0.24	0.25	0.26
Certificate / Diploma: Engineering	0.49	0.52	0.55	0.58	0.61	0.63	0.66	0.69
Certificate / Diploma: Agriculture	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06
Certificate / Diploma: Health	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.18
Certificate / Diploma: Services	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Certificate / Diploma: Education	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16
Degree: Arts & Humanities	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06
Degree: Social Science, Business and Law	0.31	0.32	0.34	0.35	0.36	0.38	0.39	0.40
Degree: Science, math, IT	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17
Degree: Engineering	0.15	0.16	0.17	0.18	0.18	0.19	0.20	0.21
Degree: Agriculture	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
Degree: Health	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Degree: Services	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Degree: Education	0.10	0.11	0.12	0.12	0.13	0.14	0.14	0.15

Table 3: Projected Labor Demand: 1% Increase in Worker Productivity	2013	2014	2015	2016	2017	2018	2019	2020
GDP Growth	5.18%	5.18%	5.18%	5.19%	5.19%	5.19%	5.19%	5.18%
Employment of Foreign Workers (only wage-earners) (in millions)	1.29797	1.40368	1.51986	1.64499	1.77602	1.91116	2.05571	2.20949
Employment of Foreign Workers (including -self-employed) (in millions)	1.51987	1.64365	1.77969	1.92621	2.07965	2.23789	2.40715	2.58723
Employment of Malaysian Workers (only wage-earners) (in millions)	8.16013	8.37591	8.58515	8.78878	8.98613	9.17665	9.36003	9.53613
Employment of Malaysian Workers (including self-employed) (in millions)	11.0626	11.3189	11.57882	11.82928	12.07222	12.30833	12.53639	12.75578
Total Unemployment	3.2%	3.1%	3.1%	3.1%	3.0%	2.9%	2.9%	2.8%
Total investment (billion RM)	180.95	195.14	209.9	225.37	241.65	258.9	277.25	296.88
Number of Malaysians with different levels of education:								
UPSR / UPSA equivalent	1.26	1.23	1.20	1.17	1.14	1.11	1.08	1.05
PMR or equivalent	1.08	1.10	1.11	1.12	1.13	1.14	1.15	1.16
SPM or equivalent	3.56	3.68	3.79	3.90	4.01	4.11	4.21	4.30
STPM or equivalent	0.33	0.34	0.35	0.37	0.38	0.39	0.41	0.42
Certificate / Diploma: Arts & Humanities	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07
Certificate / Diploma: Social Science, Business and Law	0.33	0.34	0.35	0.36	0.37	0.37	0.38	0.39
Certificate / Diploma: Science, math, IT	0.20	0.21	0.22	0.23	0.24	0.24	0.25	0.26
Certificate / Diploma: Engineering	0.49	0.52	0.55	0.58	0.61	0.63	0.66	0.69
Certificate / Diploma: Agriculture	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06
Certificate / Diploma: Health	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.18
Certificate / Diploma: Services	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Certificate / Diploma: Education	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16
Degree: Arts & Humanities	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06
Degree: Social Science, Business and Law	0.31	0.32	0.34	0.35	0.36	0.38	0.39	0.40
Degree: Science, math, IT	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17
Degree: Engineering	0.15	0.16	0.17	0.18	0.18	0.19	0.20	0.21
Degree: Agriculture	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
Degree: Health	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Degree: Services	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Degree: Education	0.10	0.11	0.12	0.12	0.13	0.14	0.14	0.15

Table 4. Projected Labor Demand: 30% Increase in Activity Rate	2013	2014	2015	2016	2017	2018	2019	2020
GDP Growth	5.07%	5.07%	5.06%	5.07%	5.06%	5.05%	5.05%	5.05%
Employment of Foreign Workers (only wage-earners) (in millions)	1.29666	1.40073	1.5149	1.63766	1.76648	1.89855	2.03961	2.18942
Employment of Foreign Workers (including -self-employed) (in millions)	1.51834	1.6402	1.77389	1.91763	2.06847	2.22313	2.3883	2.56372
Employment of Malaysian Workers (only wage-earners) (in millions)	8.16588	8.38745	8.60254	8.81205	9.0153	9.21178	9.40108	9.58307
Employment of Malaysian Workers (including self-employed) (in millions)	11.06955	11.33281	11.5993	11.85658	12.1063	12.34909	12.58386	12.80992
Total Unemployment	3.2%	3.2%	3.2%	3.1%	3.1%	3.0%	3.0%	2.9%
Total investment (billion RM)	180.81	194.89	209.52	224.84	240.95	258.01	276.15	295.54
Number of Malaysians with different levels of education:								
UPSR / UPSA equivalent	1.26	1.23	1.20	1.17	1.14	1.11	1.08	1.05
PMR or equivalent	1.08	1.10	1.11	1.12	1.13	1.14	1.15	1.16
SPM or equivalent	3.56	3.68	3.79	3.90	4.01	4.11	4.21	4.30
STPM or equivalent	0.33	0.34	0.35	0.37	0.38	0.39	0.41	0.42
Certificate / Diploma: Arts & Humanities	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07
Certificate / Diploma: Social Science, Business and Law	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40
Certificate / Diploma: Science, math, IT	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27
Certificate / Diploma: Engineering	0.49	0.52	0.55	0.59	0.61	0.64	0.67	0.70
Certificate / Diploma: Agriculture	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06
Certificate / Diploma: Health	0.12	0.13	0.14	0.15	0.15	0.16	0.17	0.18
Certificate / Diploma: Services	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04
Certificate / Diploma: Education	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16
Degree: Arts & Humanities	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06
Degree: Social Science, Business and Law	0.31	0.33	0.34	0.36	0.37	0.38	0.40	0.41
Degree: Science, math, IT	0.12	0.13	0.14	0.14	0.15	0.16	0.16	0.17
Degree: Engineering	0.15	0.16	0.17	0.18	0.18	0.19	0.20	0.21
Degree: Agriculture	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Degree: Health	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Degree: Services	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
Degree: Education	0.11	0.11	0.12	0.13	0.13	0.14	0.14	0.15

Table 5. Projected Labor Demand: 70% Increase in Activity Rate	2013	2014	2015	2016	2017	2018	2019	2020
GDP Growth	5.06%	5.05%	5.05%	5.05%	5.04%	5.04%	5.03%	5.03%
Employment of Foreign Workers (only wage-earners) (in millions)	1.29645	1.40026	1.51411	1.6365	1.76501	1.89666	2.03726	2.18659
Employment of Foreign Workers (including -self-employed) (in millions)	1.51809	1.63964	1.77296	1.91628	2.06676	2.22091	2.38556	2.56041
Employment of Malaysian Workers (only wage-earners) (in millions)	8.16218	8.37998	8.59124	8.79687	8.99621	9.18875	9.37411	9.55218
Employment of Malaysian Workers (including self-employed) (in millions)	11.06513	11.32388	11.5857	11.83831	12.0833	12.32131	12.55132	12.77264
Total Unemployment	3.2%	3.2%	3.1%	3.1%	3.1%	3.0%	2.9%	2.9%
Total investment (billion RM)	180.79	194.85	209.45	224.75	240.83	257.86	275.96	295.32
Number of Malaysians with different levels of education:								
UPSR / UPSA equivalent	1.26	1.23	1.20	1.17	1.14	1.11	1.08	1.05
PMR or equivalent	1.08	1.10	1.11	1.12	1.13	1.14	1.15	1.16
SPM or equivalent	3.56	3.68	3.79	3.90	4.01	4.11	4.21	4.30
STPM or equivalent	0.33	0.34	0.35	0.37	0.38	0.39	0.41	0.42
Certificate / Diploma: Arts & Humanities	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07
Certificate / Diploma: Social Science, Business and Law	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.39
Certificate / Diploma: Science, math, IT	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27
Certificate / Diploma: Engineering	0.49	0.52	0.55	0.58	0.61	0.64	0.67	0.69
Certificate / Diploma: Agriculture	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06
Certificate / Diploma: Health	0.12	0.13	0.14	0.15	0.15	0.16	0.17	0.18
Certificate / Diploma: Services	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Certificate / Diploma: Education	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16
Degree: Arts & Humanities	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06
Degree: Social Science, Business and Law	0.31	0.32	0.34	0.35	0.37	0.38	0.39	0.41
Degree: Science, math, IT	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17
Degree: Engineering	0.15	0.16	0.17	0.18	0.18	0.19	0.20	0.21
Degree: Agriculture	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
Degree: Health	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Degree: Services	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
Degree: Education	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15

ANNEX: CHAPTER 8

Table 1: Ministries and Their TVET Training Institutes

Ministry	**Institutes**
Ministry of Education (MOE)	• technical and vocational schools
Ministry of Higher Education (MOHE)	• community colleges • polytechnics • university colleges • universities
Ministry of Human Resources (MOHR)	• Industrial Training Institutes (ITI) • Centre for Instructor and Advanced Skill Training (CIAST) • Advanced Technology Training Centre (ADTEC) • Japan-Malaysia Technical Institute (JMTI)
Ministry of Rural and Regional Development (MRRD)	• Institut Kemahiran MARA (IKM) • Kolej Kemahiran Tinggi MARA (KKTM) • German-Malaysia Institute (GMI) • Universiti Kuala Lumpur (e.g. British-Malaysian Institute (BMI), Malaysia France Institute (MFI), Malaysia Spanish Institute (MSI), Malaysian Institute of Aviation Technology (MIAT))
Ministry of Youth and Sports (MYS)	• Institut Kemahiran Belia Negara (IKBN) • Institut Kemahiran Tinggi Belia Negara (IKTBN)

Ministry of Agriculture (MOA)	• Ministry of Agriculture Institutes (e.g., various Institut Pertanian, Institut Akuakultur Marin, Institut Perikanan Malaysia, and Institue Veterina Malaysia)
Ministry of Defense (MOD)	• Perhebat Institutes
Ministry of Works (MOW)	• Construction Industry Development Board (CIDB)
States	• State institutes

Sources: Jailani *et al.* (2009: 2), Mohd GazaliAbas (2012).

Note: SKM refers to Sijil Kemahiran Malaysia (Malaysian Skills Certification); See Table 3.1 for further details.