PENANG SKILLED WORKFORCE STUDY

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Labour Skills for Growth and Change

This report is prepared by

PENANG INSTITUTE
making ideas work

for Penang state government

with support from PSDC Inspiring Talent

Published in Malaysia in 2017 by Penang Institute
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Penang,
MALAYSIA.

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Cover artwork by Teoh Huey Wen

Printed by
The Phoenix Press Sdn Bhd (1723K)
2509, Jalan Perusahaan Baru,
Prai Industrial Complex,
13600 Prai,
Penang, Malaysia.

This report consists of two parts, namely main report and technical report. The framework of the study, analysis of labour market situations and the proposal of skill augmentation are included in this report.

Technical Report is an addendum to this report, which records the details of identification, measurement, procedures, and techniques with regard to vacancy analysis and mobility patterns. To view this report, please click the following link: -

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Appendices consist of additional information pertaining to vacancy database, employer survey, and details of educational institutions, which are not presented in this report. To view the details of Appendices of the main report, please click the following link: -

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Preface

This report is commissioned by the Penang State Government as a result of continued concerns raised by the members of State Executive Councillor committee Human Resource Development with regards to the skills availability of high-qualified workers. The concerns lie on the misalignment of high-qualified workforce and market needs focusing in the core economic growth sectors. Penang Institute was encouraged by the committee to look into the subject, and provide analysis and suggestions for a human capital and skills strategy.

Acknowledgements

Special thanks to industry stakeholders, associates, and colleagues who have contributed in many ways to the formation of this report. In particular, we like to thank the members of Human Resource Development State Executive Councillor committee and the Technical Committee of this research for their incisive comments. We are also grateful to the kindness of industry associates, including the Career Assistance and Training (CAT) Centre, Federation of Malaysian Manufacturers (FMM), Malaysian International Chamber of Commerce (MICCI) and Small and Medium Enterprises Association (SAMENTA). They have supported the research by disseminating the employer survey schedule through their contacts with industries.

The project was ably led by Ms Ong Wooi Leng, Head of Penang Institute's Social Studies and Statistics Programme, with Associate Professor Dr. Leo van Grunsven from Utrecht University as research advisor.

Our special appreciation goes to the Penang Skills Development Centre (PSDC), which has selflessly supported the study by gathering survey responses and verifying skill profiles. Besides, our deepest gratitude also goes to recruitment agencies and educational institutions who had participated in focus group discussions; their insights are invaluable to this report in assessing the skills and labour market situations in Penang. Last but not least, this report would not be made possible without the endless research assistance contributed by the following persons – Philip Khor Qing An, Jesse Terhorst, Thomas Verbraeken, David van Reekum and Swarna Rajagopal.

Contents

Abbreviations

ACCA	Association of Chartered Certified Accountants
AMMI	Association of Malaysian Medical Industries
APHA	Association of Private Hospitals of Malaysia
APS	Advanced Producer Services
BDA	Big Data Analytics
BKIP	Batu Kawan Industrial Park
BPO	Business Process Outsourcing
CAT	Career, Assistance and Training
CCNA	Cisco Certified Network Associate
Cedefop	Centre for the Development of Vocational Training
CGPA	Cumulative Grade Points Average
CIPE	Capital Investment per Employee ratio
CNC	Computer Numerical Control
COL	Critical Occupation List
CPA	Certified Public Accountant
CREST	Collaborative Research in Engineering, Science and Technology
CSC	Critical Skills Monitoring Committee
CSL	Critical Skills List
CV	Curriculum Vitae
DFTZ	Digital Free Trade Zone
DOSM	Department of Statistics Malaysia
E & E	Electrical and Electronic
EMS	Electronics Manufacturing Services
EPF	Employee Provident Fund
ERP	Enterprise Resource Planning
E-to-E	Employer-to-employer
ETP	Economic Transformation Program
EU	European Union
FDI	Foreign Direct Investment
FMCG	Fast Moving Consumer Goods
FMM	Federation of Malaysian Manufacturers
GaWC	Globalisation and World Cities
GBS	Global Business Services
GDP	Gross Domestic Product
GRP	Gross Regional Product
HR	Human Resource
HRDF	Human Resources Development Fund
HRM	Human Resource Management
HTFV	Hard-To-Fill Vacancies
ICT	Information and Communications Technology
IEAP	Industry Expert Advisory Panel
ILMIA	Institute for Labour Market Information and Analysis
IoT	Internet of Things
IP	Internet Protocol
ISIC	International Standard Industrial Classification
IC	Integrated Circuit
IT	Information Technology
ITO	Information Technology Outsourcing
KPO	Knowledge Process Outsourcing
LED	Light-Emitting Diode
LLC	Local Large Companies

MAC	Migration Advisory Committee
MAICSA	Malaysia Institute of Chartered Secretaries and Administrators
MASCO	Malaysia Standard Classification of Occupation
MBA	Master of Business Administration
MBPP	Majlis Bandaraya Pulau Pinang (Penang City Council)
MCSE	Microsoft Certified Solutions Expert
MDEC	Malaysia Digital Economy Corporation
MFRS	Malaysian Financial Reporting Standard
MICCI	Malaysian International Chamber Of Commerce and Industry
MICE	Meetings, Incentives, Conferencing, Exhibitions
MIDA	Malaysian Investment Development Authority
MNC	Multinational Corporation
MOHE	Ministry of Higher Education
MOHR	Ministry of Human Resource
MPER	Malaysian Private Entity Reporting
MPSP	Majlis Perbandaran Seberang Perai (Seberang Perai Municipal Council)
MQA	Malaysian Qualification Agency
MSC	Multimedia Super Corridor
MSIC	Malaysian Standard Industrial Classification
NCER	Northern Corridor Economic Region
NCIA	Northern Corridor Implementation Authority
NKEA	National Key Economic Area
NPI	New Product Introduction
O&G	Oil and Gas
ODM	Original Design Manufacturing
PAC	Penang Automation Cluster
PC	Personal computer
PCCC	Penang Chinese Chamber of Commerce
PCET	Penang Centre of Education Tourism
Penang CAT	Penang Career Assistance and Talent Centre
PENFEIA	Penang Foundry & Engineering Industries Association
PR	Permanent Resident
PSC	Public Service Commission
PSDC	Penang Skills Development Centre
QA	Quality Assurance
R&D	Research and Development
REP	Returning Expert Programme
ROC	Registrar of Companies
RPGT	Real Property Gains Tax
RP-T	Residence Pass-Talent
SMART Centre	Small and Medium Enterprises Market Advisory Resource and Training Centre
SME	Small and Medium Enterprise
SOCSO	Social Security Organisation
sPICE	Subterranean Penang International Convention and Exhibition
SSC	Shared Service Centre
SSM	Suruhanjaya Syarikat Malaysia
SSO	Shared Service Outsourcing
STEM	Science, Technology, Engineering and Mathematics
TVET	Technical and Vocational Education and Training
UiTM	Universiti Teknologi MARA
UKCES	United Kingdom Commission for Employment and Skills
UNESCO	United Nations Educational, Scientific and Cultural Organization
USM	Universiti Sains Malaysia
WOU	Wawasan Open University

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EXECUTIVE SUMMARY

This study analyses the demand and supply of higher-qualified labour in key manufacturing and services industries in Penang. This transpired from continued concerns raised by stakeholders with regard to skills availability in the market vis-á-vis the changing demand of firms and industries; skills proficiency level of current high-qualified employees in relation to the demand of firms; and labour mobility affecting the availability of skills.

The question of skills readiness was also raised by the Penang state government and industry players with the hope of growing new industries. While Penang is at a crossroad in terms of economic strategy, the fundamental question of the demand structure and availability of a high-qualified workforce remains unclear. Therefore, an examination of the current skill supply and its constraints, as well as an effective strategy on human capital development, is necessary.

The main objective of this study is to obtain insight into skill shortages and gaps, and to analyse high-qualified labour market dynamics. In particular, we aim to identify the types of skill shortages and skill gaps in different industries, and the role of labour mobility in skill shortages and gaps. A skills strategy is then proposed based on the skills issues and challenges faced by firms, and the current skills institutional setting.

Skill shortages and gaps are examined in three perspectives: macro (market), meso (industry) and micro (firm and worker) levels. For each perspective, the study has respectively devised methodologies for the analysis of market demand and supply; the analysis of skill demand and supply of industries and firms; and the analysis of worker mobility.

In terms of industry focus, the study covers the skill issues among these key development areas: High-Tech Manufacturing (industrial electronics, semiconductors and optoelectronics); Other High-Tech Manufacturing (electronics manufacturing services, telecommunication and digital storage); Precision Engineering and Automation; Medical Devices and Life Sciences; Global Business Services; Advanced Producer and Financial Services; Hospitality Services; Medical Tourism; Information Technology; Logistics and Transport; and Education and Training.

Market: Skill demand

The demand for high-qualified workers is expected to remain high as new investments continue to generate new jobs in Penang. The demand is shifting towards higher skills with more emphasis on specific hard and soft skills. The skill requirements are likely to embrace new technologies and business practices in leveraging the digital transformation of Industry 4.0. The key findings of the analysis is summarised as follow:

- According to the job vacancy database, recruitment activity is more prevalent in manufacturing industries than in services industries. In particular, high-tech manufacturing industries have the largest number of vacancies advertised, followed by other high-tech manufacturing and GBS. In essence, the pattern of vacancies reflects the state's growth areas. In addition, the advertised positions are generated as a result of the expansion of firms and the replacement of outgoing employees.

- Investments have continued to generate a significant number of new jobs: a total of over 86,000 jobs between 2011 and 2016, with the electronics and electrical (E&E) industry contributing about 57%. A majority of the jobs created require the workforce to have at least a certificate as educational qualification.

- The job vacancies are also reflected in labour circulation. Firm recruitment of high-qualified labour is for replacement rather than expansion. The actual and net demand is difficult to estimate due to a chain effect (job shifts). This study has found that labour circulation is high in Penang as a result of a constrained labour market coupled with the presence of worker behaviour and employability issues among workers (including youths) in Penang.

- Job openings are dominated by engineering-related positions – the functions of which include product development, manufacturing process and quality management.

- Positions that are in high demand, as revealed by job vacancies, combined with the persistency of vacancies, indicate the depth of labour shortage. Senior executives are particularly in high demand; most of the advertised positions require at least five years' work experience. Therefore, a substantial staff turnover is predicted to occur among experienced workers.

- In terms of skill classes, soft skills are now widely required in most high-demand positions. These include achievements, relationships and services skills. Interestingly, as the level of job position becomes higher, soft skill requirements become more pronounced compared to hard skills.

- Many vacancies prioritise the importance of specific hard skills instead of generic hard skills. This is especially the case with software design positions.

- Language competencies (including both English and foreign languages such as Mandarin, Japanese and Thai), on the other hand, feature strongly in skill requirements. These are the most sought-after generic hard skills.

- In the coming years, skill demand of employers will shift towards hiring personnel with creativity and decision-making skills as well as technical and ICT expertise such as big data analysis and cybersecurity expertise. Existing employees are required to acquire new skills. This change has been evident in manufacturing industries, and changes in services sector may be seen in near future.

Market: Skill supply

The supply of high-qualified labour and skills consists of four categories: fresh graduates (primary supply), existing workforce (secondary supply), unconventional workforce (tertiary supply) and international workforce (quaternary supply). Changes in labour force participation rates provide an indication of the labour and skills supply landscape. The key findings and observations are highlighted as follow:

- Penang's labour force has experienced resilient growth in the past three years. The participation rate amounts to 70%, which is the third highest in the country after Putrajaya and Selangor. A relative shift of workforce from the manufacturing sector to the services sector reflects the shift of growth areas towards non-production parts of the value chain.

- On the positive side, less working-age people are moving out of the state. There has been a significant drop in out-migration between 2013 and 2016, while intra-state migration has been on the rise.

- Supply seems to be abundant as firms receive an average of 50-100 applications for each job opening in most job specifications. However, there is a misconception here.

- Individual jobseekers indiscriminately apply to a large number of advertised job openings. This translates into a high level of labour mobility in the market, and the prevalence of generic transferable skills.

- In addition, university output shows inconsistency in meeting the labour market's pattern of demand. Lacklustre interest in science and engineering programmes is of great concern as graduates select programmes that do not run in parallel with industry needs, resulting in high graduate unemployment in the field of arts and social sciences. Hence, the preference of students, including non-voluntary preference, leads to a mismatch in demand and supply.

- Work-readiness is at times attributed to fresh graduates who remain unemployed. Some employers are of the view that graduates are not well equipped with qualitative skills to enter the labour market; they are either partly or poorly prepared for the positions due to lack of required hard skills: English and foreign language skills, soft skills, and practical knowledge and experience.

- Colleges and universities overemphasise theoretical knowledge and focus too little on the application of knowledge in soft skills, critical thinking and problem solving skills, and a lifelong learning culture. Lack of hands-on and practical experience of entrants lower employability given recruitment preferences.

- In a constrained labour market, there is genuine labour shortage in fields of high skill-specificity, and shortage in areas of professional (job-) specific skills.

    - While overall supply is moving in right direction, there is quantitative shortage in a number of critical occupations and functions. There is inadequate supply for positions that require specialised knowledge/skills. This is evident in positions within IT/software, cloud and web, and product development, as well as engineering positions.

- Failure in filling vacant high-qualified positions is due to qualitative issues rather than quantitative shortage.

- This is reflected in the persistency of vacancies advertised. Going by the criteria and applied analytical methods, some 13% of vacancies are considered to be hard to fill. While not excessive, it is still at a high level.

- Recruitment difficulties, as measured by length of time taken to fill a vacancy, particularly manifest in technical positions (taking a longer time to fill than non-technical positions). For example, the positions of software design, quality management and manufacturing process take a longer time to fill than accounts, finance and human resources positions. Specifically, software design ranks high in persistency, which is equivalent to hard-to-fill vacancies where genuine shortage is prevalent in positions of high specificity skills. Furthermore, these positions are also manifested in retention difficulties.

- Supply constraints lead to intense competition among firms for highly demanded skills and experienced workers. Firms remedy skill shortage through under-hiring, labour pinching and retention schemes. In particular, employers give a wide array of incentives including project-based bonuses and performance-based bonuses to retain skill-proficient employees.

  - Some employers pinch workers from other firms where supply is scarce. This phenomenon impinges on retention difficulties. It must be noted that labour poaching is an unhealthy practice, yet it is not a critical issue as it is the least-favoured measure to mitigate skill shortages. This practice is also experienced by attractive firms.

  - While MNCs may be perceived as buyers in the market (able to attract the best candidates), both MNCs and SMEs alike face a group of sellers in the market in possession of highly demanded skills. Firms respond at times by giving in to remuneration demands (substantially increasing costs); at other times they hire applicants that do not meet requirements, resulting in under-hiring and necessitating upskilling. They also resort to importing skills from abroad.
  - Pertaining to under-hiring, employers have to 'pay the price' by providing upskilling as new hires do not meet job requirements; firms with international reputations can hardly afford to under-hire as quality standards are at stake.

- Some firms are themselves responsible for skill shortage as they tend to be picky in the recruitment process, less concerned with their proposition to prospective high-quality employees. Work practices should also increasingly adapt to appeal to a younger generation of workers.

- Skills deficiency is more prevalent in generic hard skills compared to specific hard and soft skills, and it is in the latter two that improvements are most needed. Skills proficiency of current employees is satisfactory.

- Lack of soft skills is in part a consequence of constraints faced by educational institutions as far as primary supply is concerned; upskilling of secondary supply is still insufficient.

- The prime constraint of educational institutions concerns the inflexibility of regulations and procedures pertaining to the contents of study programmes.

- With reference to the ability to meet future needs, a majority of employers believe that their employees are able to meet soft and generic hard skills but are less likely to fulfil the requirements of specific hard skills. In manufacturing, the latter are also highly associated with Industry 4.0.

- Pertaining to unconventional supply, there is an encouraging trend in female participation in the labour force. Over the past 10 years, the participation rate has increased by about 10%, reaching 60% from 50% in 2005. Meanwhile, male participation rate has been stable at 80%. The increase in female workforce participation rate may be associated with measures taken to encourage and enable women to return to the workforce.

Industry: Skill shortages and gaps

The labour intake in high-qualified positions is larger in manufacturing industries than that of in services industries. The skills demand structure is also different in manufacturing and services industries. Likewise, the

in manufacturing and services industries. Likewise, the depth of skill shortages and gaps are also vary across industries. We compare these issues within the services and manufacturing sectors, and the main findings of this analysis are presented as follows.

Penang's core manufacturing industries

- The demand for high-qualified worker skills is different across manufacturing industries. Firms in semiconductor and electronics industries generate vacancies far above the average rate of all firms; firms in medical devices and precision engineering and automation industries show a contrasting picture.

- Senior executive positions are important in the demand and recruitment structure of high-tech manufacturing and medical devices and life sciences industries, while recruitment in precision engineering and automation industries leans towards the lower segment of high-qualified employees.

- Across all manufacturing industries, product development job functions dominate advertised vacancies. In this job function, the level of skill specificity – and thus requirements – increase as products and operations upgrade.

- Recruitment is due to both the expansion of operations and the replacement of employees who have left the company; the former is somewhat more prevalent in other high-tech manufacturing, precision engineering and automation, and medical devices industries than in high-tech manufacturing. All industries face the issue of replacement due to labour circulation; to a larger extent this is experienced by less-reputable companies.

- With regard to supply, semiconductor/electronics and medical devices companies are more successful in filling vacancies compared to other high-tech manufacturing and precision engineering and automation companies. Even so, most firms have difficulty filling positions according to skill requirements. This is primarily due to qualitative shortage.

- Semiconductor/electronics companies register a percentage of hard-to-fill vacancies that are above the overall average (16%). In contrast, precision engineering and automation firms encounter this issue less, given the fact that only 7% of vacancies are hard-to-fill. Specifically, positions in quality assurance and product development take a long time to fill.

- Proficiency in job-specific skills is rated highest in companies in the precision engineering and automation industry. This probably reflects the operational level of firms where skills demand and intake are more flexible. Proficiency in soft skills is rated better by companies in high-tech manufacturing compared to those in precision engineering and automation, and medical devices and life sciences.

- Most industries and firms envisage new skill requirements in the coming years. In view of meeting future needs, they are more optimistic with respect to soft and generic hard skills compared to function-specific skills.

Penang's growing services industries

- The growth of the GBS industry is evident as it takes the highest share of job openings. Medical tourism, on the other hand, has the lowest number of job openings.

- Junior executive positions are widely demanded across the services industry except in advanced producer services. High-demand positions also concern senior executives in GBS, education and training services, and advanced producer and financial services.

- Both GBS and info-tech firms have a relatively higher demand for software developers, engineers, programmers, as well as technical support engineers.

- The notion that preferred industries and companies attract more applications to advertised job vacancies is also valid across the services sector. Advanced producer services and GBS companies score significantly higher compared to the rest of the services industry.

- Being rather new industries, a large proportion of positions available and vacant in medical tourism, info-tech, and advanced producer and financial services have been created because of expansions. Vacancies in GBS and hospitality services stem from not only the emergence of new establishments and the expansion of existing operations, but also turnover, necessitating the replacement of employees.

- Notwithstanding being preferred employers, advanced producer services and GBS show a rate of hard-to-fill vacancies higher than the overall average. Meanwhile, going by their hard-to-fill vacancies rate, among all the manufacturing and services industries, hospitality, transport and logistics, education and training, and medical tourism are least confronted with skill shortages. This reverse situation from advanced producer services and GBS can be explained from the skills specificity of a segment of the job function that available skills have difficulty to meet.

- The services industry shows similarity to the manufacturing industry in terms of skill deficiencies. Generic hard skills are rated as more limited relative to soft and specific hard skills in all services industries except info-tech, and education and training services. Foreign languages and advanced IT are the skills rated most deficient in advanced producer and financial services, GBS and hospitality services.

- Compared to advanced and financial services, hospitality services, info-tech, and transport and logistics, proficiency in soft skills is rated lower in GBS, medical tourism and education and training.

Worker: The role of mobility in the labour market

Mobility plays a large role in the functioning of Penang's labour market as a process of shaping labour and skill shortage and gaps. Generation-Y employees, in particular, consider mobility as an integral part of their values, norms and lifestyle. The key observations of mobility analysis are highlighted as follow:

- Intra-industry and inter-firm labour flows have been evolving significantly. The emergence and rise of sectors apart from manufacturing have engendered significant labour flow from manufacturing to these sectors, in part catering to labour needs.

- Labour circulation is a vehicle of function-specific skills acquisition and employability improvement towards preferred industries/firms, rather than reflecting acquired skills and experience. This means that mobile workers still have skill deficiencies. This situation resembles a "positions carousel" where employees try to change employment in a designated trajectory of job functions over a period of time. This also shows a significant degree of skill-relatedness under a constrained labour market.

- Offering better remuneration packages, reputable firms are able to appropriate skills that are available and in demand in the market; less reputable firms in general experience recruitment difficulties.

- While financial reward is important, the role of career development clearly comes to the fore. This is parallel with other studies, and may be linked to the ubiquity of generic skills in the market. There are issues in this area.

- The ubiquity of generic skills still means that there is worker competition for available desired jobs. While this provides an incentive to move, lack of application skills and ill-defined specific skills constitute a hindrance. This may contribute to random job applications.

- Substantial mobility also appears to reflect a lack of information about the right opportunities, the lack of opportunities for career development with existing employers, and a perceived necessity to move to acquire new skills.

- High inclination to move has a negative impact on employability – more so as workers tend to 'over-exploit' transferability when demand shows a significant degree of skill-relatedness.

- However, mobility is not always desirable as employers perceive low commitment from employees, which could be counter-productive for skills and career advancement. Perceived low worker commitment has negatively influenced upskilling and training investment efforts.

- Employers indicate that a majority of younger workers have unrealistic expectations and possess declining loyalty and commitment vis-à-vis willingness to contribute.

- Individual mobility translates to various degrees of labour turnover. Engineering positions from high-tech manufacturing, precision engineering and medical devices industries suffer a particularly high rate of employee turnover.

- Chain effects also lead to skill shortages and gaps;

skill-relatedness is an important determinant of the 'location' where these effects occur.

  - Taking GBS as a case study, the work histories of employed persons show heterogeneity of job functions and inter-firm skill-relatedness, which has promoted lateral – intra-industry – mobility.

  - Mobility towards GBS operations affects accountancy, customer services, and executive roles and management positions in other industries, forcing firms to recruit such positions from a more constrained market.

- Consequently, the high-mobility inclination of workers may produce positive outcomes for firms in both existing and new industries to acquire skills within the secondary supply – more so when skill-relatedness is significant. However, there are also downsides.

- Mobility dynamics in the secondary labour market present significant burden to employers and generates negative perceptions of mobile workers. Labour loss through turnover contributes to skill gaps and has negative impact on incentives for upskilling. However, many firms are 'dual' in their attitude: on one hand, they frown upon job-hopping; on the other hand, engage in labour pinching.

Stakeholder responses and strategies

Labour upskilling programmes are made available to address skill shortages and gaps in the labour market. As part of the initiative to retain employees, to attract the right talent and to upgrade under-skilled workers, private training agencies and individual firms adopt a variety of strategies in responding to these skill issues. The main observations on labour upskilling are described as such:

- Despite the fact that Penang's upskilling infrastructure is sizeable and diverse, it inevitably reflects skill deficiencies of high-qualified workers. Beyond the formal education system, skill augmentation programmes are developed by private agencies and public institutions such as the Northern Corridor Implementation Authority (NCIA) and TalentCorp.

- Firms overcome skill gaps using multi-pronged measures. These include changing of work hours, re-allocation of tasks, more supervision by experienced employees and labour training. In particular, upskilling is widely used by most firms, and it is either carried out internally and/or by external providers.

  - It should be noted that universities and colleges necessarily prepare graduates to become proficient in generic skills instead of training on industry- and job-specific skills. Unconventional skill training programmes provided by private upskilling firms and public institutions complement specific skills that are not taught at universities. A substantial skills training and upskilling infrastructure gears towards higher-qualified labour in specific hard and soft skills.

- With regard to skills that are not available in the market, several interventions have been in place by actors and stakefolders. However, they have controlled over their own programmes and schemes, with limited coordination with other institutions in upskilling programmes.

- The effectiveness of upskilling programmes, schemes and interventions are still immature. Given a multitude of skill-related actors and stakeholders, visibility, coordination and monitoring of upskilling infrastructure are necessary. Therefore, little can be said about the effectiveness of interventions (programmes and schemes, activities of the range of actors) given the fragmented nature of information on the skills situation and interventions.

Augmenting skills: Recommendations and policy initiatives

A joint effort by all stakeholders, and institutional and private agencies is necessary to streamline and complement existing interventions. The core recommendation is to:

Develop a coherent, encompassing state skills strategy, departing from a clear vision – shared by stakeholders – and reflecting ambitions

This report offers ideas for a **short-term skills strategy** as practical elaboration of a set of recommendations, which are illustrated in the following diagram.

Ideas for a short-term skills strategy

Market: Demand

- Implement avenues to ease high-qualified labour demand;
- Further implementation of labour-saving technologies in work processes; and
- Accelerate phasing out of operations in industries that are cost-based or incompatible with upgrading ambitions.

Market: Supply

- Devise opportunities for more effective labour capture through the regional labour field;
- Increase intake of students in areas of shortage;
- Increase supply by tapping tertiary supply (unconventional sources);
- Redirect preferences of students towards fields of study that are more in line with labour market needs (esp. areas of shortage of critical occupations); and
- Reorient education and training (teaching and learning) towards less emphasis on qualification(s) and more on skills and exposure that come with the qualification.

Industry and firm

- Increase intake of students specifically in areas that show high persistent vacancy rates;
- Enhance opportunities for students/entrants to acquire industry- and function-specific skills and practical experience before entering the labour market;
- Change and improve entrants and existing employees' skill sets towards more specificity;
- Tap avenues for new sources of supply that bring experience;
- Level the playing field on which companies operate in the aspect of improving access to skills, labour recruitment and retention; and
- Devise ways to lower the quit rate of employees.

Worker

- Improve the infrastructure for information, career advice and job application skills learning by expanding the role of the Career Assistance and Training (CAT) centre;
- Devise and implement programs to instill different values in jobseekers/employees; and
- Employers to get better acquainted with, recognise and act upon new generation values.

Organisational framework

- Establish a Penang Employment and Skills Unit at state level, dedicated to oversee a skills strategy including policies, programmes and plans of actors and stakeholders in a coordinated and coherent fashion; and
- Develop and implement an (institutional) structure or Skills Information System through which timely and reliable information on skills demand and supply trends are recorded.

RINGKASAN EKSEKUTIF

Kajian ini menganalisa permintaan dan penawaran tenaga buruh berkelayakan tinggi dalam industri perkhidmatan dan pembuatan utama di Pulau Pinang. Ia bertitik-tolak daripada kebimbangan berterusan oleh pihak-pihak berkepentingan tentang ketersediaan tenaga kerja dalam pasaran serta perubahan dalam permintaan tenaga kerja oleh firma-firma dan industri-industri; tahap kemahiran para pekerja berkelayakan tinggi yang sedia ada berkaitan dengan permintaan firma-firma; dan mobiliti tenaga buruh juga memberi kesan kepada ketersediaan tenaga kerja.

Isu berkenaan kesediaan kemahiran tenaga kerja turut dibangkitkan oleh kerajaan negeri Pulau Pinang dan pemain-pemain industri terutamanya dalam membangun industri-industri yang baru. Walaupun Pulau Pinang boleh dikatakan berada di persimpangan dalam aspek strategi ekonomi, persoalan asas struktur permintaan dan ketersediaan tenaga kerja berkelayakan tinggi masih tidak jelas. Oleh itu, penelitian terhadap penawaran tenaga kerja yang sedia ada, kekangannya dan strategi berkesan berkenaan pembangunan modal insan adalah sangat diperlukan.

Objektif utama kajian ini adalah untuk mendapatkan gambaran tentang jurang serta kekurangan kemahiran tenaga kerja dan menganalisa dinamik pasaran buruh berkelayakan tinggi. Secara lebih khusus, kami ingin mengenalpasti jenis kekurangan dan jurang kemahiran tenaga kerja dalam industri-industri utama serta peranan mobiliti tenaga buruh yang terlibat dalam isu kekurangan dan jurang tenaga kerja ini. Strategi tenaga kerja telah dicadangkan berdasarkan isu-isu dan cabaran-cabaran semasa yang dihadapi oleh firma-firma berkaitan dengan tenaga kerja.

Kekurangan dan jurang tenaga kerja dikaji dalam tiga perspektif: tahap makro (pasaran), meso (industri) dan mikro (firma dan pekerja). Bagi setiap perspektif, kajian ini menggunakan metodologi-metodologi analisis permintaan dan penawaran pasaran; analisis permintaan dan penawaran kemahiran tenaga kerja industri-industri dan firma-firma; dan analisis mobiliti tenaga kerja.

Dari segi fokus industri, kajian ini mengkaji isu-isu tenaga kerja khususnya dalam bidang-bidang pembangunan utama: Pembuatan Berteknologi Tinggi (elektronik perindustrian, semikonduktor dan optoelektronik); Pembuatan Berteknologi Tinggi lain (perkhidmatan pembuatan elektronik, telekomunikasi dan penyimpanan digital); Kejuruteraan Ketepatan dan Automasi; Peranti Perubatan dan Sains Hayat; Perkhidmatan Perniagaan Global; Pengeluar Termaju dan Perkhidmatan Kewangan; Perkhidmatan Hospitaliti; Pelancongan Perubatan; Teknologi Maklumat; Logistik dan Pengangkutan, serta Pendidikan dan Latihan.

Pasaran: Permintaan tenaga kerja

Permintaan bagi pekerja berkelayakan tinggi dijangka kekal tinggi disebabkan oleh kehadiran pelaburan-pelaburan baru yang terus menjana peluang pekerjaan baru di negeri ini. Permintaan ini memberi penekanan yang lebih kepada kemahiran-kemahiran yang memerlukan pengetahuan tinggi termasuk kemahiran insani dan kemahiran teknikal tertentu. Syarat kemahiran tampaknya akan mengambilkira teknologi-teknologi dan amalan-amalan perniagaan baru bagi memanfaatkan transformasi digital Industri 4.0. Penemuan-penemuan utama analisis ini adalah seperti berikut:

- Menurut pangkalan data jawatan kosong, aktiviti pengambilan pekerja lebih banyak berlaku dalam industri pembuatan berbanding dengan industri perkhidmatan. Secara khusus, industri-industri pembuatan berteknologi tinggi mencatatkan jumlah pengiklanan jawatan kosong yang paling tinggi, diikuti dengan industri pembuatan berteknologi tinggi lain dan Perkhidmatan Perniagaan Global (PPG). Pada dasarnya, corak jawatan kosong ini turut mencerminkan bidang pertumbuhan semasa di negeri ini. Di samping itu, jawatan-jawatan kosong yang diiklankan wujud akibat daripada pertumbuhan firma-firma dan proses penggantian para pekerja yang telah tamat perkhidmatan.

- Aktiviti pelaburan terus menjana banyak pekerjaan baru: dianggarkan lebih daripada 86,000 pekerjaan antara tahun 2011 dan 2016, dengan industri elektrik dan elektronik (E&E) menyumbang kira-kira 57%. Majoriti pekerjaan ini memerlukan para pekerja untuk memiliki sekurang-kurangnya sijil sebagai salah satu kelayakan pendidikan.

- Jawatan-jawatan kosong ini juga mencerminkan ciri-ciri kitaran tenaga buruh. Tujuan utama pengambilan tenaga kerja berkelayakan tinggi oleh firma adalah untuk menggantikan pekerja yang tamat perkhidmatan berbanding dengan pertumbuhan firma-firma. Permintaan bersih dan sebenar sukar dijangkakan disebabkan oleh kesan rantaian (peralihan kerja). Kajian ini mendapati bahawa peredaran tenaga buruh adalah tinggi

akibat wujudnya kekangan dalam pasaran buruh termasuk masalah-masalah tingkah laku pekerja dan kebolehkerjaan dalam kalangan pekerja (termasuk belia) di Pulau Pinang.

- Peluang pekerjaan di Pulau Pinang adalah didominasi oleh jawatan-jawatan yang berkait dengan bidang kejuruteraan termasuk pembangunan produk, proses pembuatan dan pengurusan kualiti. Hal ini menggambarkan syarat-syarat kemahiran yang diperlukan oleh struktur-struktur pelaburan.

- Permintaan jawatan-jawatan yang tinggi dari segi permintaan sepertimana yang didedahkan dalam iklan jawatan-jawatan kosong, ditambah dengan kekosongan jawatan berterusan menggambarkan tahap kekurangan tenaga buruh. Jawatan eksekutif kanan merupakan jawatan yang mendapat permintaan tertinggi; kebanyakan jawatan yang diiklankan memerlukan sekurang-kurangnya lima tahun pengalaman kerja. Oleh yang demikian, keluar masuk kakitangan yang besar dijangka berlaku di kalangan pekerja berpengalaman.

- Dari segi kelas kemahiran, kemahiran insani sangat diperlukan bagi kebanyakan jawatan berpermintaan tinggi. Ini termasuklah tahap pencapaian serta perhubungan dan perkhidmatan. Semakin tinggi tahap jawatan, keperluan terhadap kemahiran insani menjadi semakin penting berbanding dengan kemahiran teknikal.

- Kebanyakan jawatan kosong ini mengutamakan kemahiran-kemahiran teknikal spesifik berbanding dengan kemahiran-kemahiran teknikal generik, khususnya bagi jawatan-jawatan dalam reka bentuk perisian.

- Sebaliknya, keterampilan berbahasa (termasuk bahasa Inggeris dan bahasa-bahasa lain seperti Mandarin, Jepun dan Thai) dikelaskan sebagai salah satu keperluan kemahiran teknikal generik.

- Dalam industri perkhidmatan, perubahan besar akan dilihat dalam masa terdekat. Permintaan tenaga kerja oleh para majikan akan beralih ke permintaan terhadap pekerja yang memiliki kreativiti dan kemahiran membuat keputusan serta kepakaran teknikal dan Teknologi Maklumat, seperti analisis data besar (big data) dan kepakaran dalam keselamatan siber. Para pekerja sedia ada dikehendaki untuk memperoleh kemahiran-kemahiran baru tersebut kerana ia bukan sahaja boleh mengubah syarat-syarat kemahiran dalam industri pembuatan, tetapi juga akan turut mempengaruhi proses perkhidmatan dalam masa yang akan datang.

Pasaran: Penawaran Tenaga Kerja

Penawaran tenaga kerja berkelayakan tinggi terdiri daripada empat kategori: graduan baru (bekalan utama), tenaga kerja sedia ada (bekalan sekunder), tenaga kerja bukan konvensional (bekalan tertiari) dan tenaga kerja antarabangsa (bekalan kuaterner). Perubahan-perubahan dalam kadar penyertaan tenaga kerja memberikan petunjuk terhadap landskap penawaran buruh dan tenaga kerja. Temuan-temuan dan pemerhatian-pemerhatian utama adalah seperti berikut:

- Tenaga buruh Pulau Pinang telah mengalami pertumbuhan yang baik sejak tiga tahun yang lalu. Kadar penyertaan tenaga buruh adalah sebanyak 70%, tempat ketiga tertinggi selepas Putrajaya dan Selangor. Anjakan relatif tenaga kerja dari sektor pembuatan kepada sektor perkhidmatan juga mencerminkan peralihan bidang-bidang pertumbuhan ke rantaian nilai bukan pengeluaran.

- Dari sudut positif, tidak ramai orang yang berada dalam kategori umur layak bekerja berhijrah keluar dari negeri ini. Antara tahun 2013 dan 2016, terdapat penurunan ketara dalam penghijrahan keluar, sementara penghijrahan dalam negeri semakin meningkat.

- Jumlah penawaran tenaga buruh nampaknya banyak disebabkan oleh firma-firma secara puratanya menerima 50-100 permohonan untuk setiap peluang pekerjaan bagi kebanyakan spesifikasi pekerjaan. Walau bagaimanapun, hal ini merupakan suatu tanggapan yang salah.

- Pencari kerja pada masa yang sama memohon sebilangan besar jawatan kosong yang diiklankan. Ini menunjukkan bahawa terdapatnya mobiliti tenaga buruh yang tinggi dalam pasaran dan penyebarluasan kemahiran generik yang boleh dipindahmilik.

- Tambahan lagi, output universiti menunjukkan ketidakkonsistenan dalam memenuhi corak permintaan pasaran buruh. Minat yang rendah terhadap program-program sains dan kejuruteraan adalah amat membimbangkan kerana para graduan memilih program-program yang tidak selari dengan keperluan-keperluan industri. Hal ini mengakibatkan

peningkatan kadar pengangguran siswazah dalam bidang seni dan sains sosial. Oleh yang demikian, minat pelajar termasuk minat bukan sukarela, menyebabkan ketidaksepadanan dengan permintaan dan penawaran tenaga kerja.

- Isu kesediaan untuk bekerja kadangkala bersangkut-paut dengan graduan baru yang masih menganggur. Sesetengah majikan beranggapan bahawa para graduan tidak memiliki kemahiran kualitatif yang cukup untuk memasuki pasaran kerja; mereka kurang bersedia disebabkan oleh kekurangan kemahiran-kemahiran teknikal yang dimiliki: kemahiran berbahasa Inggeris dan bahasa lain, kemahiran insani serta pengetahuan praktikal dan pengalaman yang berkaitan dengan jawatan yang diiklankan.

- Kolej-kolej dan universiti-universiti terlalu memberi penekanan terhadap ilmu teoritikal dan memberi tumpuan yang sedikit terhadap pengaplikasian ilmu dalam kemahiran insani, kemahiran penyelesaian masalah dan pemikiran kritis serta budaya pembelajaran seumur hidup. Kekurangan pengalaman praktikal oleh pemohon juga menyumbang kepada aspek kebolehpasaran graduan berbanding dengan ciri-ciri keutamaan pengambilan pekerja yang diingini.

- Dalam pasaran buruh yang terkekang, kekurangan tenaga buruh sebenar (genuine) wujud dalam bidang kemahiran berspesifikasi tinggi serta kekurangan dalam bidang kemahiran profesional yang berspesifik pekerjaan.

    - Walaupun permintaan keseluruhan bergerak ke arah yang betul, masih terdapat kekurangan kuantitatif dalam pekerjaan dan fungsi kerja kritikal. Ketidakcukupan penawaran bagi jawatan-jawatan yang memerlukan kemahiran/ pengetahuan spesifik juga wujud. Hal ini terbukti bagi jawatan yang terletak dalam kategori pembangunan IT/perisian, laman web dan produk pembangunan serta kejuruteraan.

    - Kegagalan dalam mengisi jawatan-jawatan berkelayakan tinggi adalah disebabkan oleh isu-isu kualiti tenaga kerja berbanding dengan kekurangan bilangan tenaga kerja.

    - Hal ini digambarkan melalui jawatan-jawatan kosong yang diiklankan secara berterusan di mana kira-kira 13% jawatan kosong dianggap sebagai sukar diisi. Walaupun tidak berlebihan, ia masih berada pada tahap yang tinggi.

    - Kesukaran pengambilan pekerja sepertimana yang diukur melalui tempoh masa yang diambil untuk mengisi sesuatu jawatan kosong dapat dilihat dalam jawatan-jawatan teknikal (mengambil masa yang lebih lama untuk diisi berbanding jawatan-jawatan bukan teknikal). Sebagai contoh, jawatan-jawatan berkaitan reka bentuk perisian, pengurusan kualiti dan proses pembuatan mengambil masa yang lebih lama untuk diisi berbanding jawatan-jawatan bidang perakaunan, kewangan dan sumber manusia. Secara spesifik, jawatan kosong bagi reka bentuk perisian mengambil tempat yang tinggi dari segi keberterusan dalam pengambilan pekerja, setara dengan jawatan-jawatan yang sukar untuk diisi di mana kekurangan sebenar jelas bagi jawatan-jawatan spesifik berkemahiran tinggi. Tambahan pula, jawatan-jawatan ini turut termanisfestasi dalam kesukaran bagi mengekalkan pekerja.

- Kekangan dalam penawaran menyebabkan persaingan sengit dalam kalangan firma terhadap pekerja berkemahiran dan berpengalaman tinggi. Firma mengatasi masalah kekurangan tenaga kerja melalui pengambilan pekerja yang tidak memenuhi syarat kemahiran yang sepenuhnya, mencari tenaga kerja dari firma lain dan melaksanakan strategi pengekalan pekerja. Secara khusus, para majikan memberi pelbagai insentif termasuklah bonus berasaskan projek dan prestasi bagi mengekalkan para pekerja mahir.

    - Sesetengah majikan mengambil pekerja dari firma-firma lain apabila penawaran tidak mencukupi. Fenomena ini memberi implikasi kepada kesulitan bagi mengekalkan pekerja. Bagi firma, walaupun isu ini bukanlah kritikal dan bukan pilihan utama dalam mengatasi masalah kekurangan pekerja, tetapi ia merupakan suatu amalan yang tidak sihat. Lebih-lebih lagi, amalan ini juga turut berlaku kepada firma yang berdaya tarik tinggi.

    - Walaupun syarikat-syarikat multinasional (MNC) mungkin dianggap sebagai pembeli dalam pasaran (kerana mampu untuk menarik calon-calon pekerja yang terbaik), namun kedua-dua MNC dan Perusahaan Kecil dan Sederhana (PKS) menghadapi sekumpulan penjual dalam

pasaran yang memiliki kemahiran tenaga kerja yang sangat diperlukan. Firma-firma bertindakbalas dengan memberikan ganjaran (meningkatkan kos yang tinggi) serta mengambil pekerja yang tidak memenuhi kelayakan. Ini mengakibatkan berlakunya pengupahan tenaga buruh yang tidak memenuhi keperluan (under-hiring) dan mewajibkan program peningkatan kemahiran. Mereka juga terpaksa mengimport tenaga kerja dari luar negara.

  - Dalam konteks ini, para majikan perlu 'menanggung kos' dengan menyediakan program peningkatan kemahiran kerana para pekerja baru tidak memenuhi keperluan kerja; firma-firma dengan reputasi antarabangsa tidak mampu untuk mengambil perkerja yang kurang mahir kerana standard kualiti mungkin terjejas.

- Sesetengah firma sendiri bertanggungjawab terhadap kekurangan pekerja kerana mereka cenderung bersikap cerewet dalam proses pengambilan pekerja. Mereka juga kurang prihatin terhadap calon-calon pekerja yang berkualiti tinggi. Oleh yang demikian, amalan kerja juga perlu sentiasa diubahsuai bagi menarik minat pekerja daripada golongan muda.

- Kekurangan kemahiran lebih jelas dalam aspek kemahiran teknikal generik berbanding dengan kemahiran teknikal spesifik dan insani, sedangkan penambahbaikan bagi kedua-dua kemahiran teknikal spesifik dan insani adalah amat diperlukan. Tahap kemahiran pekerja sedia ada adalah memuaskan.

- Kekurangan kemahiran insani merupakan kesan daripada sebahagian kekangan yang dihadapi oleh institusi-institusi pendidikan yang melibatkan bekalan buruh utama; usaha untuk meningkatkan kemahiran dalam penawaran sekunder masih belum mencukupi.

- Kekangan utama institusi-institusi pendidikan termasuklah peraturan-peraturan dan prosedur-prosedur penyelarasan kurikulum pengajian yang kurang fleksibel.

- Merujuk kepada keupayaan pekerja untuk memenuhi keperluan masa depan, majoriti majikan percaya bahawa para pekerja mampu memenuhi keperluan kemahiran insani dan teknikal tetapi kurang berkemampuan untuk memenuhi keperluan kemahiran teknikal spesifik. Dalam sektor pembuatan, kemahiran teknikal spesifik adalah sangat berkait rapat dengan Industri 4.0.

- Bagi penawaran tidak konvensional, penyertaan golongan wanita dalam tenaga buruh menunjukkan trend yang menggalakkan. Sejak 10 tahun yang lalu, kadar penyertaan wanita telah meningkat sebanyak 10%, mencecah 60% dari 50% pada tahun 2005. Manakala, kadar penyertaan tenaga buruh lelaki pula stabil pada sekitar 80%. Peningkatan dalam kadar penyertaan wanita dalam tenaga buruh mungkin dikaitkan dengan langkah-langkah yang telah diambil bagi menggalakkan dan membolehkan wanita untuk kembali ke pasaran tenaga kerja.

Industri: Kekurangan dan jurang tenaga kerja

Pengambilan pekerja bagi jawatan berkelayakan tinggi dalam industri pembuatan adalah besar berbanding dengan industri perkhidmatan. Namun struktur permintaan tenaga kerja juga berbeza bagi setiap industri pembuatan dan perkhidmatan termasuk tahap kekurangan dan jurang tenaga kerja turut berbeza mengikut industri. Kami membandingkan isu-isu ini mengikut sektor perkhidmatan dan pembuatan di mana temuan utama analisis ini adalah seperti berikut.

Industri pembuatan utama Pulau Pinang

- Permintaan bagi tenaga kerja berkelayakan tinggi dalam setiap industri pembuatan adalah berbeza. Secara keseluruhan, firma dalam industri semikonduktor dan elektronik telah menjana peluang pekerjaan yang jauh lebih tinggi berbanding dengan kadar purata jawatan kosong bagi firma lain.

- Jawatan eksekutif kanan adalah penting dalam struktur permintaan dan pengambilan bagi industri pembuatan berteknologi tinggi dan industri perubatan dan sains hayat, sementara pengambilan pekerja dalam industri kejuruteraan perisian dan automasi condong ke arah pekerja yang berkelayakan lebih rendah seperti pekerja berkelayakan sijil dan diploma.

- Bagi keseluruhan industri pembuatan, jawatan pembangunan produk telah mendominasi jumlah kekosongan jawatan yang diiklankan. Secara ringkas, tahap pengkhususan serta syarat kemahiran turut meningkat apabila produk dan operasi dinaiktaraf.

- Pengambilan pekerja adalah disebabkan oleh

peluasan operasi firma dan penggantian pekerja sedia ada yang telah berhenti daripada berkhidmat, di mana pengambilan pekerja akibat daripada peluasan operasi lebih jelas dalam industri pembuatan berteknologi tinggi yang lain. Semua industri menghadapi isu penggantian pekerja yang disebabkan oleh kitaran tenaga buruh; pada sudut yang lebih luas, isu ini lebih ketara dialami oleh syarikat-syarikat bereputasi rendah.

- Dari segi penawaran, syarikat-syarikat semikonduktor/elektronik dan perubatan lebih berjaya dalam mengisi jawatan kosong berbanding dengan syarikat-syarikat pembuatan berteknologi tinggi lain dan kejuruteraan ketepatan dan automasi. Walaupun begitu, kebanyakan firma menghadapi kesulitan bagi mengisi jawatan kosong mengikut syarat-syarat kemahiran yang diperlukan. Hal ini akibat daripada kekurangan kualiti pekerja.

- Secara purata, syarikat-syarikat semikonduktor/elektronik mencatatkan peratusan jawatan kosong sukar diisi yang lebih tinggi (16%) berbanding dengan syarikat kejuruteraan ketepatan dan automasi yang hanya mencatatkan 7% jawatan kosong yang dianggap sukar diisi. Secara khusus, jawatan dalam bidang jaminan kualiti dan pembangunan produk mengambil masa yang lama untuk diisi.

- Kemahiran berkaitan dengan kerja-spesifik adalah paling tinggi dalam industri kejuruteraan ketepatan dan automasi. Hal ini mungkin mencerminkan permintaan dan pengambilan tenaga kerja mahir yang lebih anjal. Kemahiran insani dilihat lebih memuaskan bagi syarikat-syarikat dalam bidang pembuatan berteknologi tinggi berbanding dengan industri kejuruteraan ketepatan dan automasi, dan perkakasan perubatan serta sains hayat.

- Kebanyakan industri dan firma meramalkan bahawa keperluan kemahiran baru akan wujud pada tahun-tahun yang akan datang. Bagi memenuhi keperluan masa depan, mereka lebih optimistik terhadap kemahiran-kemahiran insani dan teknikal generik berbanding dengan kemahiran-kemahiran teknikal spesifik.

Industri perkhidmatan yang berkembang Pulau Pinang

- Pertumbuhan industri PPG terbukti apabila ia memiliki syer terbesar dalam penawaran kerja dalam sektor perkhidmatan. Sebaliknya, pelancongan perubatan memiliki jumlah penawaran bilangan kerja yang paling rendah.

- Jawatan eksekutif junior adalah jawatan yang paling banyak dipohon bagi seluruh industri perkhidmatan kecuali bagi perkhidmatan pengeluar termaju. Jawatan yang mendapat permintaan tinggi adalah eksekutif kanan dari industri PPG, pendidikan dan latihan serta pengeluar termaju dan perkhidmatan kewangan.

- Kedua-dua firma dari PPG dan teknologi maklumat memiliki permintaan yang lebih tinggi bagi bidang pembangun perisian, jurutera, pengaturcara perisian dan juga jurutera sokongan teknikal.

- Tanggapan bahawa industri dan syarikat sektor perkhidmatan telah menarik lebih ramai pemohon adalah benar. Pencapaian syarikat ini adalah lebih tinggi bagi perkhidmatan pengeluar termaju dan PPG berbanding dengan industri perkhidmatan yang lain.

- Sebagai industri yang agak baru, sebahagian besar jawatan kosong yang diisi dalam bidang pelancongan perubatan dan teknologi maklumat, serta perkhidmatan pengeluar termaju dan kewangan wujud disebabkan oleh pengembangan firma. Jawatan kosong di PPG dan perkhidmatan hospitaliti wujud bukan sahaja disebabkan oleh kemunculan operasi-operasi baru atau perkembangan operasi firma yang sedia ada tetapi juga disebabkan oleh keperluan terhadap penggantian pekerja yang berhenti berkhidmat.

- Meskipun sektor perkhidmatan pengeluar termaju dan PPG digemari oleh kebanyakan pekerja, ia masih menunjukkan kadar yang lebih tinggi dalam jawatan kosong yang sukar untuk diisi berbanding dengan purata keseluruhan. Sementara itu, berdasarkan kadar kekosongan jawatan yang sukar untuk diisi dalam kalangan industri-industri pembuatan dan perkhidmatan, hospitaliti, pengangkutan dan logistik, pendidikan dan latihan serta pelancongan perubatan adalah industri-industri yang paling kurang berhadapan dengan kekurangan tenaga kerja. Situasi dalam perkhidmatan pengeluar termaju dan PPG boleh dijelaskan melalui permintaan tenaga kerja mahir yang mempunyai kemahiran spesifik adalah sukar untuk ditemui.

- Industri perkhidmatan menunjukkan persamaan dengan industri pembuatan dari segi kekurangan kemahiran. Kemahiran-kemahiran teknikal generik

dinilai kurang memuaskan berbanding dengan kemahiran-kemahiran insani dan teknikal spesifik dalam semua industri perkhidmatan kecuali teknologi maklumat dan pendidikan dan latihan. Bahasa asing dan IT adalah kemahiran-kemahiran yang dinilai paling lembap dalam perkhidmatan pengeluar termaju dan kewangan, PPG dan hospitaliti.

- Perbandingan yang dibuat terhadap perkhidmatan-perkhidmatan termaju dan kewangan, hospitaliti, teknologi maklumat dan pengangkutan serta logistik, kebolehan dalam kemahiran insani dinilai rendah dalam sektor PPG, pelancongan perubatan dan pendidikan serta latihan.

Pekerja: Peranan mobiliti dalam pasaran tenaga buruh

Mobiliti tenaga kerja memainkan peranan penting dalam menentukan kekurangan dan jurang tenaga kerja mahir dalam pasaran buruh di Pulau Pinang. Secara khusus, pekerja Generasi-Y menganggap mobiliti adalah lumrah bagi nilai, norma dan cara hidup mereka. Pemerhatian utama analisis ini adalah seperti berikut:

- Aliran tenaga buruh intra-industri dan antara-firma telah berkembang dengan agak ketara. Kemunculan dan peningkatan sektor-sektor selain daripada sektor pembuatan telah mengakibatkan aliran tenaga buruh yang ketara dari sektor pembuatan ke sektor-sektor ini bagi memenuhi keperluan tenaga buruh.

- Kitaran tenaga buruh merupakan penggerak bagi pekerja untuk memperoleh kemahiran berasaskan fungsi spesifik dan menambahbaik kebolehkerjaan dalam industri/firma yang diingini selain daripada mencerminkan kemahiran dan pengalaman yang diperolehi. Hal ini bermaksud bahawa pekerja yang berpindah dari satu pekerjaan ke pekerjaan lain masih memiliki kekurangan dalam kemahiran. Situasi ini menyerupai "karusel jawatan" di mana pekerja cuba menukar pekerjaan dalam trajektori fungsi kerja yang ditetapkan dalam tempoh masa tertentu. Keadaan ini juga menunjukkan tahap keterkaitan kemahiran yang ketara dalam pasaran tenaga buruh yang terkekang ini.

- Dengan menawarkan pakej-pakej imbuhan yang lebih baik, firma-firma yang bereputasi tinggi dapat mengambil tenaga kerja sedia ada yang lebih mahir serta diperlukan dalam pasaran; firma-firma yang rendah reputasinya secara umum menghadapi kesulitan dalam pengambilan pekerja.

- Walaupun ganjaran dalam bentuk kewangan adalah penting, peranan pembangunan kerjaya turut menjadi tarikan utama. Hal ini seiring dengan kajian-kajian lain dan mungkin bersangkut-paut dengan ketersediaan kemahiran generik yang wujud dalam pasaran.

- Ketersediaan kemahiran generik bermaksud terdapatnya persaingan pekerja bagi kerja kemahiran yang diingini. Walaupun hal ini memberikan suatu insentif bagi pekerja menukar pekerjaan, kekurangan dalam kemahiran aplikasi serta kemahiran spesifik yang kurang jelas turut menjadi halangan. Hal ini mungkin menyumbang kepada permohonan kerja yang rawak.

- Kadar mobiliti yang tinggi turut mencerminkan kekurangan maklumat yang tepat tentang peluang pekerjaan. Ini juga mencerminkan kekurangan peluang pembangunan kerjaya yang disediakan oleh para majikan dan keperluan dalam memperoleh kemahiran-kemahiran baru.

- Kecenderungan yang tinggi untuk menukar pekerjaan memberi impak negatif terhadap kebolehpasaran tenaga buruh. Para pekerja cenderung untuk 'mengeksploitasi secara berlebihan' kemahiran mudah dipindah milik khususnya apabila permintaan tenaga kerja berada pada suatu tahap keterkaitan kemahiran yang ketara.

- Walau bagaimanapun, mobiliti tidak selalunya diinginkan oleh majikan apabila pekerja memberi komitmen yang rendah di mana ia boleh menjadi penghalang kepada kemajuan dan kemahiran kerjaya. Komitmen pekerja yang rendah juga telah mempengaruhi usaha-usaha firma dalam peningkatan kemahiran dan perancangan pelaburan dalam latihan.

- Para majikan menegaskan bahawa majoriti pekerja muda memiliki jangkaan yang tidak realistik dan mempunyai tahap kesetiaan, komitmen dan kesediaan untuk menyumbang yang semakin menurun.

- Mobiliti individu boleh diterjemahkan kepada pelbagai tahap keluar masuk tenaga buruh. Jawatan-jawatan kejuruteraan dari industri pembuatan berteknologi tinggi, kejuruteraan ketepatan dan perkakas

perubatan mengalami kadar keluar masuk pekerja yang lebih tinggi.

  - Dalam sektor PPG misalnya, sejarah pengalaman bekerja bagi orang yang bekerja menunjukkan heterogeniti fungsi kerja dan keterkaitan kemahiran antara syarikat yang telah menggalakkan mobiliti intra-industri.

  - Mobiliti dalam operasi PPG memberi impak kepada bidang perakaunan, perkhidmatan pelanggan dan peranan-peranan eksekutif serta jawatan-jawatan pengurusan dalam industri-industri lain. Keadaan ini memaksa firma sentiasa merekrut jawatan-jawatan tersebut dalam pasaran yang terkekang.

- Kecenderungan mobiliti yang tinggi dalam kalangan pekerja mungkin memberikan hasil positif kepada kedua-dua firma yang sedia ada dan firma yang baru untuk memperoleh kemahiran daripada pekerja berpengalaman. Hal ini lebih jelas apabila kemahiran berkaitan memainkan peranan yang penting. Akan tetapi, kecenderungan ini memiliki aspek kelemahanya sendiri.

- Dinamik mobiliti dalam pasaran tenaga buruh sekunder memberi beban signifikan kepada para majikan serta memberikan persepsi negatif terhadap para pekerja yang kerap menukar kerja. Kehilangan tenaga kerja akibat kemasukan dan pengeluaran tenaga kerja menyumbang kepada jurang kemahiran dan memberi impak negatif terhadap insentif-insentif yang diberi dalam peningkatan kemahiran. Walau bagaimanapun, banyak firma bersikap 'dwi-sisi': Mereka tidak berkenan dengan pekerja yang sering bertukar tempat kerja; tetapi, mereka turut terlibat dalam pemburuan tenaga kerja.

Tindakan dan strategi pihak berkepentingan

Program-program peningkatan kemahiran adalah usaha yang dijalankan bagi menangani isu-isu kekurangan dan jurang tenaga kerja dalam pasaran buruh. Sesetengah inisiatif ini digunakan untuk mengekalkan para pekerja, menarik minat calon-calon pekerja yang tepat dan mempertingkatkan keupayaan pekerja yang kurang berkemahiran. Agensi-agensi latihan swasta dan firma-firma persendirian juga mengamalkan pelbagai jenis strategi dalam menangani isu kemahiran ini. Hasil pemerhatian terhadap program peningkatan kemahiran tenaga kerja adalah seperti berikut:

- Walaupun infrastruktur peningkatan kemahiran Pulau Pinang adalah agak besar dan berlainan, ia turut mencerminkan kekurangan pekerja berkelayakan tinggi. Selain daripada pendidikan formal, program peningkatan kemahiran dikembangkan oleh agensi swasta dan institusi awam seperti Pihak Berkuasa Pelaksanaan Koridor Utara (NCIA) dan TalentCorp.

- Firma-firma mengatasi isu jurang kemahiran ini dengan menggunakan pelbagai langkah. Langkah ini termasuk pengubahsuaian waktu kerja, penyusunan semula tugas, pengawasan lebih kerap oleh para pekerja yang berpengalaman dan penyediaan latihan kepada tenaga buruh. Secara khusus, peningkatan kemahiran digunakan secara meluas oleh kebanyakan firma, dan ia dijalankan sama ada secara dalaman dan/atau oleh agensi latihan swasta.

  - Perlu diambil perhatian bahawa universiti dan kolej menyediakan para graduan yang mahir dalam kemahiran generik dan bukannya bagi latihan berkaitan industri dan khusus sesuatu kerja. Program latihan kemahiran bukan konvensional telah disediakan oleh agensi dan institusi latihan bagi melengkapkan tenaga kerja dalam kemahiran spesifik yang tidak diajar di universiti. Latihan kemahiran dan infrastruktur latihan kemahiran memberi sumbangan penghasilan tenaga buruh yang berkelayakan tinggi dalam kemahiran teknikal dan insani.

- Bagi kemahiran yang tidak terdapat dalam pasaran, beberapa bentuk tindakan telah diambil oleh pihak-pihak yang bertanggungjawab. Walau bagaimanapun, pihak-pihak ini memiliki hak sepenuhnya untuk mengawal program-program dan skim-skim mereka sendiri dengan kurang penyelarasan bersama institusi-institusi lain berkaitan program peningkatan kemahiran.

- Keberkesanan segala program peningkatan kemahiran, skim dan bentuk campur tangan kerajaan adalah masih belum memadai. Namun terdapat pelbagai pihak berkepentingan terlibat dalam membekalkan latihan kemahiran, ketercapaian, penyelarasan dan pemantauan infrastruktur kemahiran adalah amat diperlukan. Oleh yang demikian, keberkesanan tindakan-tindakan yang telah diambil (program dan skim yang dijalankan oleh pelbagai pihak) masih tidak dapat dijangkakan memandangkan sifat maklumat ini yang terpecah-pecah.

Peningkatan kemahiran: Cadangan dan dasar

Usaha sama oleh semua pihak berkepentingan, institusi dan agensi swasta adalah perlu untuk menyelaraskan dan melengkapkan perancangan sedia ada. Cadangan utama kajian ini adalah untuk:

Membangun satu strategi kemahiran yang koheren pada peringkat negeri, bermula daripada visi yang jelas dan dikongsi bersama dengan semua pihak berkepentingan serta mencerminkan matlamat yang ingin dicapai.

Laporan ini menawarkan idea-idea bagi strategi kemahiran jangka pendek sebagai huraian praktikal bagi suatu set cadangan yang digambarkan dalam rajah berikut.

Strategi-Strategi Kemahiran Tenaga Kerja

Pasaran: Permintaan

- Mewujudkan pendekatan bagi meringankan kekangan dalam memenuhi permintaan tenaga kerja berkelayakan tinggi;
- Melaksanaan teknologi-teknologi penjimatan buruh dalam proses-proses kerja lebih lanjut; dan
- Mempercepat penamatan operasi-operasi yang berasaskan kos atau yang tidak sesuai dengan peningkatan matlamat dalam industri.

Pasaran: Penawaran

- Menyediakan peluang pekerjaan bagi pemerolehan buruh yang lebih efektif melalui tenaga buruh serantau;
- Meningkatkan pengambilan pelajar bagi bidang-bidang yang menghadapi kekurangan tenaga kerja;
- Meningkatkan penawaran dengan memanfaatkan penawaran tertiari (sumber bukan konvensional);
- Mengalihkan keutamaan pelajar ke bidang pengajian yang lebih selaras dengan keperluan pasaran tenaga buruh (terutamanya bagi bidang pekerjaan-pekerjaan kritikal yang menghadapi kekurangan); dan
- Mengubahsuai pendidikan dan latihan (pengajaran dan pembelajaran) dengan memberi penekanan yang kurang terhadap kelayakan tetapi lebih banyak kepada kemahiran dan pendedahan praktikal.

Industri dan firma

- Meningkatkan pengambilan pelajar khususnya bagi bidang-bidang pekerjaan yang menunjukkan kadar kekosongan jawatan berterusan yang tinggi;
- Meningkatkan peluang untuk pelajar memperoleh kemahiran berasaskan industri dan berfungsi spesifik serta pengalaman praktikal sebelum memasuki pasaran buruh;
- Menukar dan menambahbaik kemahiran peserta dan pekerja sedia ada menumpukan perhatian dalam kemahiran spesifik;
- Membuka peluang pekerjaan bagi sumber-sumber penawaran baru yang boleh menyumbang dari segi pengalaman;
- Menyamaratakan arena operasi syarikat-syarikat bagi akses terhadap kemahiran, pengambilan dan pengekalan buruh; dan
- Merangka cara-cara untuk meredakan kadar berhenti kerja.

Pekerja

- Menambahbaik infrastruktur maklumat, nasihat kerjaya dan pembelajaran kemahiran bagi permohonan kerja dengan memperluaskan peranan Pusat Bantuan dan Latihan Kerjaya (CAT);
- Menyusun dan melaksanakan program untuk memupuk nilai yang berbeza dalam kalangan pencari kerja/pekerja; dan
- Memperlengkapkan majikan supaya lebih memahami, mengiktiraf dan bertindak dengan lebih baik terhadap nilai-nilai generasi baru.

Kerangka kerja organisasi

- Menubuhkan sebuah Unit Pekerjaan dan Kemahiran Pulau Pinang di peringkat negeri yang bertanggungjawab untuk mengawasi Strategi Kemahiran termasukdasar-dasar, program-program dan pelan-pelan pihak berkepentingan yang selaras dan koheren; dan
- Membangun dan melaksanakan sebuah (institusi) struktur atau Sistem Maklumat Tenaga Kerja di mana maklumat yang tepat masa dan boleh dipercayai mengenai trend permintaan dan penawaran tenaga kerja.

1

INTRODUCTION

This chapter introduces the significance of this report by raising three key labour market issues observed in Malaysia and Penang in particular, which allure to the fundamental questions of availability of skills supply and demand of skilled workers in Penang. The perspectives and objectives of this study are also briefly elaborated in this chapter, followed by industry focus and deliverables.

1.1 The study

This study analyses the evolving demand-supply relationship of higher-qualified labour job-skills in firms from selected industries in Penang, Malaysia. As such, it juxtaposes labour market and labour-processes, as well as skill patterns, with the operational and structural dynamics in firms, industries, and the economy at large. The study has transpired from continuing concerns about misalignment of skills availability in firms/industries and in the external market, and what is demanded from highly qualified workers, as well as the shifts therein. While it is necessary to qualify such concerns, as the picture varies between firms and industries (for various reasons), misalignment pressure (quantitative and qualitative, expressed in terms of skill gaps, shortages, mismatches, or deficiencies), is widely felt.

As a preamble, three observations are in order. First, the concerns are not unique to the case examined in this report. Skill issues in the form of misalignments are a ubiquitous phenomenon as economies and the world of work change constantly. Manpower Group reports testify this in regard to advanced countries; while the World Bank reports substantiate this in regard to the Asia-Pacific region as a whole and individual countries in specific[1]. Each has their own specific challenges. In Malaysia, concerns have been expressed for some time at national level. Having the right human capital skills have been recognised as an important factor to accomplish the goals in the Economic Transformation Programme, which has sought to address the 'middle-income trap'[2]. Over the past five years or so, a plethora of studies have been conducted; some by academics, others by the Kuala Lumpur office of the World Bank, and others by independent consultants[3]. A number of these have been conducted under the auspices of the Institute for Labour Market Information and Analysis (ILMIA), a division of the Ministry of Human Resources established in 2012.

Second, ensuing these studies requires a substantial effort from federal, regional corridor and state agencies in Malaysia to devise policy intervention directed to the findings of the studies. This intervention takes in a number of the recommendations being offered. Five years ago (in 2012), the Ministry of Higher Education of Malaysia launched the National Graduate Employability Blueprint 2012–2017. The evaluation of results is yet to complete. In 2015, TalentCorp added the National Talent Roadmap[4]. These policy initiatives are not evident from the current 11th Malaysia Plan. While it addresses human capital issues, the focus in the Five-Year Plan is on vocational training (TVET) and upskilling middle-skilled labour rather than high-qualified labour. However, this void is currently filled by new policies and initiatives undertaken by *inter alia* TalentCorp, including the regional offices.

Third, at state and industry levels in Malaysia, the issue of higher-qualified skill supply proves to be rather enduring or pervasive as national initiatives take time to land at lower levels. This has produced a range of regional and industry-specific studies and policy suggestions. With respect to the regional level, Penang is no exception. Thus, this is not the first study done on skills in Penang and the northern region at large[5]. From these studies, policy recommendations have resulted in a number of policies that have been implemented by state agencies and northern corridor institutions (see footnotes: 3, 4 and 5).

The current study complements and augments existing research and policy efforts in the field of human capital skills. Its rationale derives from several factors. Over the past years, Penang has recorded a satisfactory GDP growth rate (above 5%), higher than the national growth rate. Quantitatively, Penang's labour market has been performing well, with labour force participation rate hovering at about 70%. According to the most recent Labour Force Survey published by the Department of Statistics, over 60% of Penang's total employed persons work in the services sector, and close to 30% are employed in manufacturing sector. The unemployment rate has maintained at a low level, which is below 2.2%. Such a low unemployment rate does not indicate the absence of quantitative and

Human capital development is key to the success of new economic initiatives without negatively affecting the rest of the economy. As Penang has been at the crossroads for some time in terms of economic strategy, a reconsideration of the current skills stock and constraints, as well as an effective human capital development policy framework is prompted.

[1] See e.g. World Bank (2014a)
[2] See Economic Planning Unit (2010, 2015); I LMIA & TalentCorp (2016).
[3] See Fleming & Søborg (2012); Jimenez et al. (2012); Junaimah and Yusliza (2011); ILMIA & UPM (2016), IPSOS Business Consulting (2012, 2014a); KPMG (2012), MCMC & ILMIA (2015); PwC (2013a, 2013b); World Bank (2011a); and World Bank & ILMIA (2014)
[4] See MOHE (2012); TalentCorp (2015, 2016a-f)
[5] See Kharas et al. (2010); Penang Institute (2015); PSDC (2012); and PwC (2013b)

low unemployment rate does not indicate the absence of quantitative and qualitative manpower issues.

On the contrary, it indicates an increasingly constrained labour situation, high-qualified labour in particular; while at the same time, it tends to conceal significant skill issues. Both aspects are problematic. First, according to the 11th Malaysia Plan, Penang's manufacturing and services sectors are projected to continue to grow steadily at an average annual rate of above 6% during the period 2016–2020. This leads to additional labour demand, while supply is facing constraints. Second, Penang is no exception to the phenomenon of middle-income trap. The state government has responded with concrete initiatives to further diversify the economy and develop new industrial pathways, such as global shared services.

Human capital development is key to the success of these initiatives, without affecting the rest of the economy. As Penang has been at the crossroads for some time in terms of economic strategy, a reconsideration of the current skill stock and constraints, as well as an effective human capital development policy framework are prompted. Next, in regard to the current economy and labour market, skill gaps and shortages of skilled workers in most economic sectors have been and will continue as a key issue that is frequently raised by industry players in Penang. Finally, work processes continue to evolve in many industries. There is a need to anticipate on trends that will become prevalent in the near future.

The fundamental question on the availability and demand of skilled workforce in Penang remains unclear, just as market structure and processes. This also applies to high-qualified labour. Understanding employee skill issues is important. In light of Penang's progressive economy into the next level of growth, skill shortages and gaps of high-qualified workforce are clearly undesirable. Identification of skill shortages against new economic directions is imperative to ensure human capital matches the skill sets required by potential investors.

This study responds to the urgency of coming to grips with the demand and supply of skills of high-qualified workforce in selected manufacturing and services industries in Penang. It frames human capital development not only by the existing or developing economic mix, but also through the vision of Penang's 'Next Economy'. The latter is defined by the agenda of economic diversification and deepening of the role in global value chains by attracting corporate non-manufacturing operations and new lines of business, (technological) upgrading of mandates of multinational corporations (MNCs) and minimisation of the impact of MNC assembly closures, and at the same time safeguarding growth and technological development opportunities of local firms, SMEs and large entities.

This study responds to the urgency of coming to grips with the demand and supply of skills of high-qualified workforce in selected manufacturing and services industries in Penang. It frames human capital development through the vision of Penang's next economy.

1.2 Perspectives and objectives of the study

Human capital and skill issues are not merely a demand side occurence, but also a supply side that has many facets and drivers. The objectives of this study relate to the following: stock-taking of skills availability, skill shortages, and gaps observed in selected key industries prioritised for growth, including the causes of skill issues, with a view to provide ideas for a roadmap of human capital development and skills in the near future. In all this, the scope of this study is *on higher-qualified labour*.

It is not the aim of this study to offer a detailed *prospective* analysis of worker skill requirements or *forecast* of the demand and/or demand-supply relationship (shortage or redundancy respectively) of specific skills and/or higher-qualified workers in a range of expertise, occupations, or industries, for a specified period. The feasibility of these is severely limited by data availability, in quantitative and qualitative respects. It is now generally recognised that quantitative forecasting is an outmoded approach for ascertaining trends in skill shortages, gaps, and so on, whether at the macro-level or the micro-level. The reason for this is the highly dynamic and volatile nature of factors that go into the equation. High level of uncertainty substantially diminishes the value of such an exercise.

[6] See Yusuf and Nabeshima (2009a)

The aim is rather to map and obtain insight into skills availability, shortages and gaps, and to analyse labour market dynamics to gain a better understanding. Such an understanding offers great help on what directions to take. Thus, our concern is with characteristics of the economy, firms, *processes* in the labour market at different levels, as well as characteristics and behaviour of actors (firms, workers and institutions), their opportunities and constraints, which influence – even determine – skills pattern development on the demand and supply side.

In this study, we adopt three perspectives from the aims listed above. These perspectives are: *macro, firm(s) and their constituent industries and worker(s)*. Macro refers to the 'market' at large, which is at a different – higher – level compared with industries and firms. Distinguishing these perspectives is important in view of the possibility of differentiation: what applies in the market does not necessarily apply in individual industries and firms (sets of, and/or individual), and vice versa. The micro – perspective of workers is important as these are – often overlooked yet important – *actors* in labour market processes, in part determining prevailing market structures. Their behaviour is an important determinant at the supply (as well as demand) side of the labour market. Behaviour is multifaceted, but includes the aspect of mobility, within and beyond the regional labour market. Skill transferability is one of the factors to gauge in the role of labour mobility in – differential – skill gaps and shortages. Figure 1.1 depicts the three perspectives and how they complement each other.

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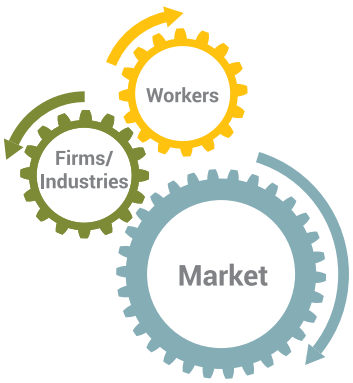
Figure 1.1: Three perspectives in the study of Penang skill gaps and shortages



We can now define the objectives of this study more specifically, as follows:

1. Identify demand and supply patterns and trends of high-qualified labour in the evolving Penang economy and labour market;
2. Identify types of skill shortages with respect to labour force relevant to the key industries and their constituent firms;
3. Identify skill gaps in key industries/segments of the economy and their constituent (groups of) firms;
4. Understand internal and external determinants and consequences of skill shortages and gaps in key industries;
5. Identify and analyse the infrastructure already in place in regard to education and upskilling of high-qualified labour;
6. Understand labour mobility patterns in terms of directions and drivers, the role of skill relatedness (industry branches and jobs) in mobility; and the role of mobility in skill shortages and gaps; and
7. To address skill shortages and gaps with respect to high-qualified labour.

1.3 Focus of the study

Penang has been experiencing skill issues in regard to different categories of labour. So far, substantial attention has been given to lower and medium skilled workers. As stated above, this study focuses on skill sets of high-qualified workers (at least tertiary education).

The scope of this study is circumscribed in terms of not only groups of workers in the labour market, but also industries and/or operations carried out by (multinational) firms in Penang. This study focuses on those that are envisaged to be part of Penang's 'Next Economy' and are targeted as such by policy makers and agencies for growth and investment. Below is a list of the industry focus. Further elaboration will follow in Chapter 3.

Table 1.1: Industry focus in brief

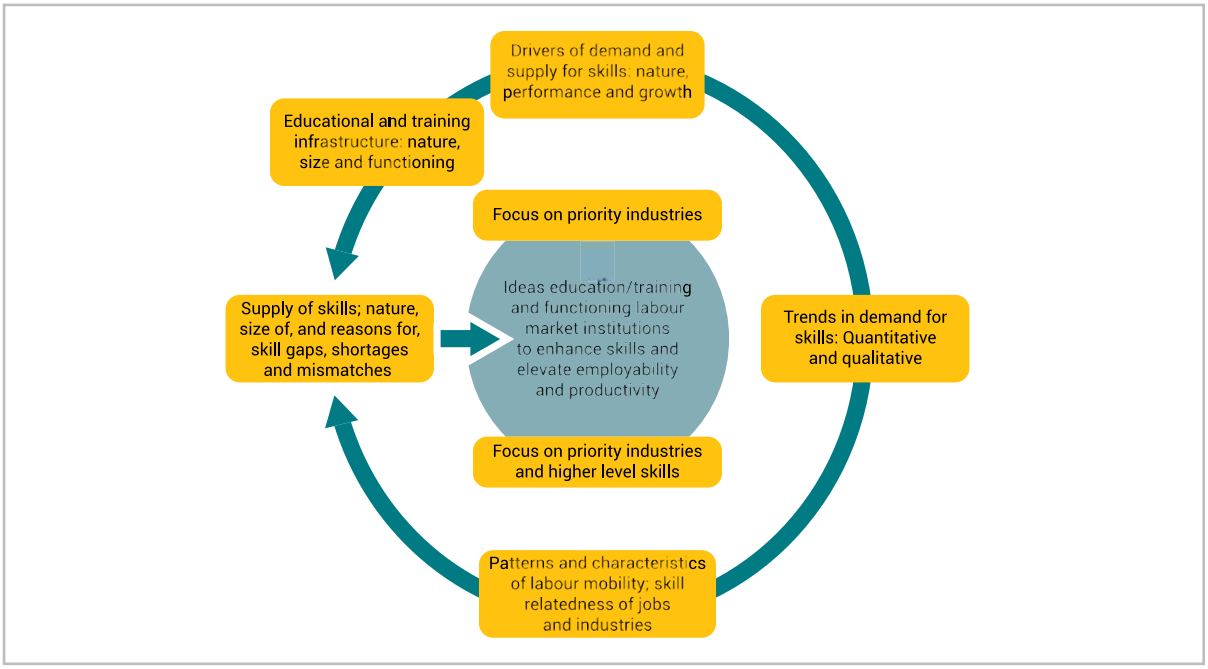
1. High-tech manufacturing: Industrial electronics, semiconductors and optoelectronics
2. High-tech manufacturing: Other industries
3. Precision engineering and automation
4. Medical devices and life sciences
5. Global Business Services
6. Advanced producer and financial services
7. Hospitality services

8. Medical tourism
9. Information technology
10. Logistics and Transport
11. Education and training

1.4 Knowledge deliverables

The study assesses skill gaps and shortages as well as programmes to address and alleviate skill deficiencies and mismatches, (to be) implemented by a range of agencies (Figure 1.2). Next, the study provides insight into drivers of the demand and supply of skills and competences comparing selected key industries. Along with its current and prospective growth, without engaging in formal forecasting, an attempt is made to assess the developments and factors driving skill needs of higher-qualified labour in the Penang economy at large and within our industry scope, at present and in the next 5–10 years. Some leads have led to the choice of industries of specific interest for this study. Insight into drivers helps to grasp the trends of skill demand over a period of time, be it qualitative skill deficiencies or quantitative skill shortages.

Figure 1.2: Knowledge deliverables



The functioning of the labour market – in the light of these drivers – will also answer the important question on the role of mobility among high-qualified employees in Penang in regard to labour market issues, skill gaps, and shortages in specific. Insight is provided into similarities and dissimilarities of skills required in different segments of the economy – or skill relatedness in industries – and worker inclinations. In turn, these produce insight into short- and long-term implications of mobility in regard to the structure and functioning of the labour market, access to labour, and the adequacy of labour in an economy. Next, an understanding is produced of the existing educational and training infrastructure. This provides additional knowledge of the skill mismatches related to occupations, qualifications, positions and industries. Finally, this study offers a skills strategy for education/training and functioning of labour market institutions to enhance skills and increase employability, skills availability, and productivity. The ideas aim to satisfy skills demand and provide supply in line with the demand of skilled workers in Penang.

1.5 The structure of the report

This report consists of two parts, a main report and a technical report. The former has the appendices to individual chapters and the latter has annexes as addendum to the main report. In large part, they relate to the methodology and implementation of this study,

analytical techniques used, and data additional to those included in the main report. This main report consists of 10 chapters, and the objectives of each chapter are relayed below.

Chapter 1 Introduction

Describes objectives and perspectives of the study; and outlines deliverables of the study.

Chapter 2 Framework for the Study and Key Observations

Offers a conceptual overview of labour market dynamics, skills and skill shortages and gaps; and presents key observations on Penang labour market emanating from the study.

Chapter 3 Approach and Methodological Notes

Outlines the main approach of the study; explains the three perspectives or components of skill issues and details the methodology used in each component; and discusses limitations of the study.

Chapter 4 High-Qualified Labour and Skills: The Demand Side

Sketches and analyses the demand side of Penang labour market, in quantitative and qualitative aspects, focusing on high-qualified employees; current drivers of, development of, and shifts in, demand for/towards high-qualified labour in relation to investment trends, job vacancies and firm recruitment patterns; and discusses the specifications of job vacancies and recruitment; and considers debates on the future of work/jobs and what that may imply for Penang.

Chapter 5 High-Qualified Labour and Skills: The Supply Side

Sketches the supply side of high-qualified labour and skills in Penang; offers general observations on labour force growth and participation rate and elaboration on relevant supply side developments and constraints; discusses availability of high-qualified labour and analyses skills supply in terms of occupations and skill sets, recruitment patterns, and difficulties in particular; and identifies skill shortages in the market and presents some observations on labour competition and how firms deal with this.

Chapter 6 Skill Deficiencies and Gaps: Upskilling Infrastructure

Focuses on the education and upskilling infrastructure in Penang in relation to skill deficiencies and gaps; deals with primary skill learning institutions and questions surrounding their output and quality, issues concerning the secondary supply and skill gaps in particular, the nature of these gaps, the role of upskilling and how firms in different industries overcome these, as well as the different avenues of upskilling, the impact of upskilling, regional and local institutional initiatives to enhance high-qualified human capital, and institutional skill augmentation initiatives.

Chapter 7 High-Qualified Labour and Skills in Core Manufacturing Industries

Discusses aspects dealt with in Chapters 4 and 5 specifically for Penang's key and targeted industries and their constituent firms whereby individual industries are treated separately. In this chapter, the focus is on electrical & electronics (high-tech manufacturing) and other high-tech manufacturing, precision engineering & automation, and medical devices.

Chapter 8 High-Qualified Labour and Skills in Growing Services Industries

This chapter focuses on growing services industries, which are also related to chapter 4 and 5.

Chapter 9 Mobility of High-Qualified Labour

Explores mobility flows, characteristics and drivers of high-qualified labour in Penang; the approach is one of a case study of recently set up operations in Global Business Services in Penang; and discusses issues of labour turnover and retention of surveyed firms and deals with current engagement approach.

Chapter 10 Augmenting Skills for the Next Economy: Ideas for a Skills Strategy

Ideas for a human capital augmenting strategy emanating from the findings of the study.

2

FRAMEWORK FOR THE STUDY AND KEY OBSERVATIONS

This chapter first offers a conceptual framework of relevant aspects in the study of skill gaps and shortages. It discusses skills taxonomy, the meaning of gaps and shortages, causes, and costs/consequences. To frame the empirical analysis in later chapters, three perspectives are introduced. Part of the frame concerns the relationship between economic structures, labour market functioning, and – related to these – differential sources of labour with required skills. The second part of the chapter offers key observations on Penang, related to the concepts discussed. This sets the scene for the detailed analysis in the later chapters.

2.1 Skills and related concepts

A skill is an ability to perform a task effectively (with a desired or needed result/outcome) from desired or necessary level of knowledge and expediency/ competence. To perform a particular task, a person with the right skill is likely to carry out the task better than someone who does not possess this skill. This person is most likely equipped with (a) a suitable qualification acquired through formal education and training, (b) attributes acquired in other ways, including informal learning and on-the-job experience. For this reason, there is no watertight relationship between qualification, occupation and skills. It has been argued that – as economic organisation and technology evolve – skills beyond 'learnt knowledge' are becoming more important. Nonetheless, skill-sets are frequently 'expressed' in terms of occupations. The skill typology can be classified into five categories. These include:-

1. Job-specific skills and generic skills;
2. Hard, soft and transportable skills;
3. Job- and task-related skills, cognitive skills and socio-emotional skills;
4. Employer-specific and non-employer specific or transferable skills; and
5. Low-wage generating and high-wage generating skills.

This study focuses on the second category, where Figure 2.1 further illustrates the skill typologies, and the details of skill taxonomies are included in Technical Report: Annex 2.

Figure 2.1: A typology of skills

	Hard skills Technical job-specific skills that are usually easily observed, measured, trained, and closely connected with knowledge.	Soft skills Non-job specific skills, which are usually intangible, hard to measure, and closely connected with attitudes.
General skills Skills applicable in most companies, occupations, and sectors.	Generic Hard skills	Generic Soft skills
Specific skills Skills applicable in a small number of companies, occupations, and sectors.	Specific Hard skills	Specific Soft skills

Source: RPIC-ViP (2011)

Figure 2.2: Concepts related to skills

Market	Industry/firm	Worker
• Demand/Needs • Supply • Shortage • (Mis)match	• Industry/firm/ job-specificity • Transferability • Shortages • Deficiencies • Gaps • Skill-relatedness • Recruitment difficulties	• Skill-set • Employability • Work-readiness • Competence • Transferability

This report adopts concepts related to skills that are summarised in Figure 2.2 at three levels: the market, the industry/firm and the individual employee. The details of these concepts can be found in the technical report: Annex 1. The concepts are particularly important at the level of skill specificity and transferability, impinging on employability.

Skills are acquired throughout the life course from a variety of sources. The level of command and how to apply it, ranging from basic to advanced level are of great importance, whether performing tasks becomes more routine, or knowledge/expertise applied is more complex. Pertaining to this, competence refers to the level of proficiency in the application of skills.

Issues related to skills are commonly couched in terms of skill shortage or mismatch leading to hiring difficulties. Skill gap is another common term of skill issues (which is different from shortages), as it does not refer to the market external to organisations but to employees who are currently employed in the firm. Figure 2.3 elucidates this distinction.

Figure 2.3: Skill shortages as distinct from skill gaps

Internal		External	
Current Employees		Vacancies	
Competent	Skill Gaps	Recruitment no problems	Hard-to-Fill Vacancies
			Other reasons / Skill Shortages

Source: MAC (2008b)

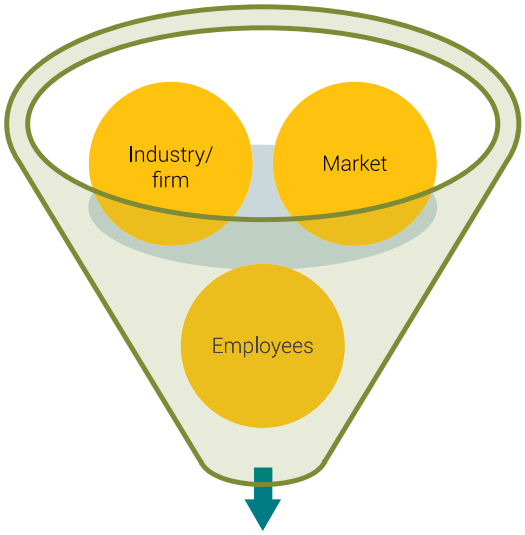
Skill shortages and gaps can be designated in quantitative terms; shortages very often are expressed in terms of occupations: the availability of individuals with specific occupations in the market. This should not be confused with 'critical occupations', which are defined as those that are sought-after and strategic in key industries in the economy. Equally important, skill shortages and gaps have a qualitative dimension, referring to the competence level of workers in the market and/or in the existing workforce in industries and companies.

Misalignment refers to competences at a lower level and/or lower level of skill application than what is demanded or desired by the employer (in current jobs and/or position(s) to be filled). It can be stated otherwise, a discrepancy between expected skill standard(s), based on e.g. qualifications and/or experience, and actual level/standard. The concepts of employability and recruitment difficulties directly link to qualitative shortage.

2.2 Framing skill issues of higher qualified labour: Perspectives

To obtain a well-rounded picture – with a view to formulating policy – skill issues have to be analysed from three perspectives. These are the market (macro-level), industries (meso-level) and firms, the individual employee/worker, and/or groups of employees (micro-level), as depicted in Figure 2.4. Skill issues are not just about 'measuring' deficiencies or mismatches and forecasting needs and discrepancies between demand and supply, but also about understanding the underlying functioning of the economy and labour market, as well as labour processes.

Figure 2.4: Three perspectives of skill issues



The macro-level is perhaps most straightforward as it pertains to demand and supply at the highest level of aggregation. The demand side is governed by the dynamics of the economy in terms of growth/decline, composition and structural changes in regard to industries and firms. Another factor is the dynamics of work/jobs, reflecting – changes in – operations, technology, organisations at industry and firm levels. Economic upgrading implies significant shifts in demand patterns of labour skills.

Box 2.1 categorises sources of supply of labour and of skills in any labour market. The secondary supply does not add to or subtract from the total market; as such it does not have significance at the macro-level. Labour mobility or circulation, however, can be of great significance (positive and negative, beneficial and non-beneficial) at the level of industries and firms. Thus, the picture at meso- and micro-levels may be at variance with the one at macro-level.

A tertiary and quaternary supply can be of significance in regard to overall quantitative labour/skill supply issues. Qualitative issues are applicable to all sources of supply. A 'third party' training infrastructure, as much as reflecting shortages, can assist in overcoming deficiencies in the market and in the existing labour force. Therefore, it enhances supply; on the other hand, it reflects the presence of deficiencies in primary and other sources of supply due to market failure and/or other factors.

Box 2.1: Sources of supply in a labour market

1. **Primary supply:**
   Educational institutions locally, nationally; entrants minus voluntary unemployed, brain drain, and retirement.
2. **Secondary supply:**
   Existing workforce; worker movement and upskilled workers available for recruitment elsewhere; workers made redundant by e.g. closures (with/without reskilling).
3. **Tertiary (or unconventional) supply:**
   Lure back workforce into the labour force after career interruption (re-entrants).
4. **Quaternary supply:**
   Attracting talents from abroad.

2.2.1 Causes of skill issues

The causes of skill issues include drivers of new skill demand. A distinction can be made between those at the firm level (micro) and those at the overall economy level (macro). Furthermore, factors impinging on the quantitative side of skill gaps and shortages are to be distinguished from those impinging on the qualitative side. Overall, demand side factors can be differentiated from supply side factors. Figure 2.5 provides an overview of causes of skill shortages and gaps from these aspects.

In regard to macro demand and supply, economic and industries growth, and employment growth faster than supply can expand at short term. They are important

Figure 2.5: Causes of skill shortages and gaps

	Quantitative		Qualitative	
	Demand	Supply	Demand	Supply
Macro-level	• Growth economy/ industries/employment vs. labour force growth • Industrial restructuring & upgrading • Economic diversification • Competition	• Demography • Slow adjustment • Institutional barriers/hindrances • Lack of training • Leakages (Drain)	• Industrial restructuring & upgrading • Economic diversification • Incongruent supply graduates field of study • Competition	• Slow adjustment • Institutional barriers/hindrances • Lack of training
Meso- and micro-level	• Demands/preferences employers unrealistic (recruitment standards) • Recruitment methods • Search costs/ information • Training disincentives • Labour poaching	• Search/information deficiencies • Competitiveness • Remuneration too low • Fringe and other benefits insufficient	• Recruitment standards • Technology & work organization • Disincentives for labour training/upskilling • Under hiring • Field of study preferences students • Talent attitudes • Disincentives for upskilling	• Values/attitudes/ preferences • Commitment • Access to and use of information • Returns for training/ upskilling insufficient • Remuneration, benefits, and working conditions

Source: Compiled from various references

factors underlying quantitative shortage. This also defines the overall condition of the labour market. Irrespective of whether the labour market is constrained, remuneration levels, working conditions and reputation of industry/firms are factored in at meso- and micro levels, not to mention working hours, location and skill specificity. There is much debate about the standards requirement of firms adhere to in regard to the recruitment and skills.

The question of skill training by firms (individually or via collective institutional constructs) and upskilling by individual 'seller' of labour has provoked even more debate. While mostly there is no alternative, especially in constrained market conditions, firms are reluctant to invest heavily in skill training as they may quickly lose upskilled employees to other firms (that reap the returns without any investment). Likewise, sellers may consider investing in skill upgrade to earn a wage-premium in the prevailing market. On the other hand, they may also consider that as firms engage in under hiring, jobs will be offered at an attractive wage-level, regardless of investment in skills upgrading and/or career development. Opportunistic behaviours may prevail in the market.

An intangible cause of skill issues is related to the longer term systemic evolution of technological system and paradigm that significantly impact the nature of work (and skill requirements). Several systemic transitions have occurred in manufacturing in the past; it is generally held that we are at the verge of a new manufacturing transition – Industry 4.0. This transition revolves around the widespread application of automation and robotics, as well as a deepening of network organised production processes enabled by internet-/cloud-based communication technology. Some of the advanced economies are currently at the forefront of this transition, stemming from high innovation capability. While these are pioneers and frontrunners, others are followers or laggards. When the digitised factory of the future enters emerging economies (at national or regional level); it will soon impact the nature of jobs locally. Equipping labour with the requisite skills is one of the key challenges in the near future.

2.2.2 The secondary supply through labour mobility

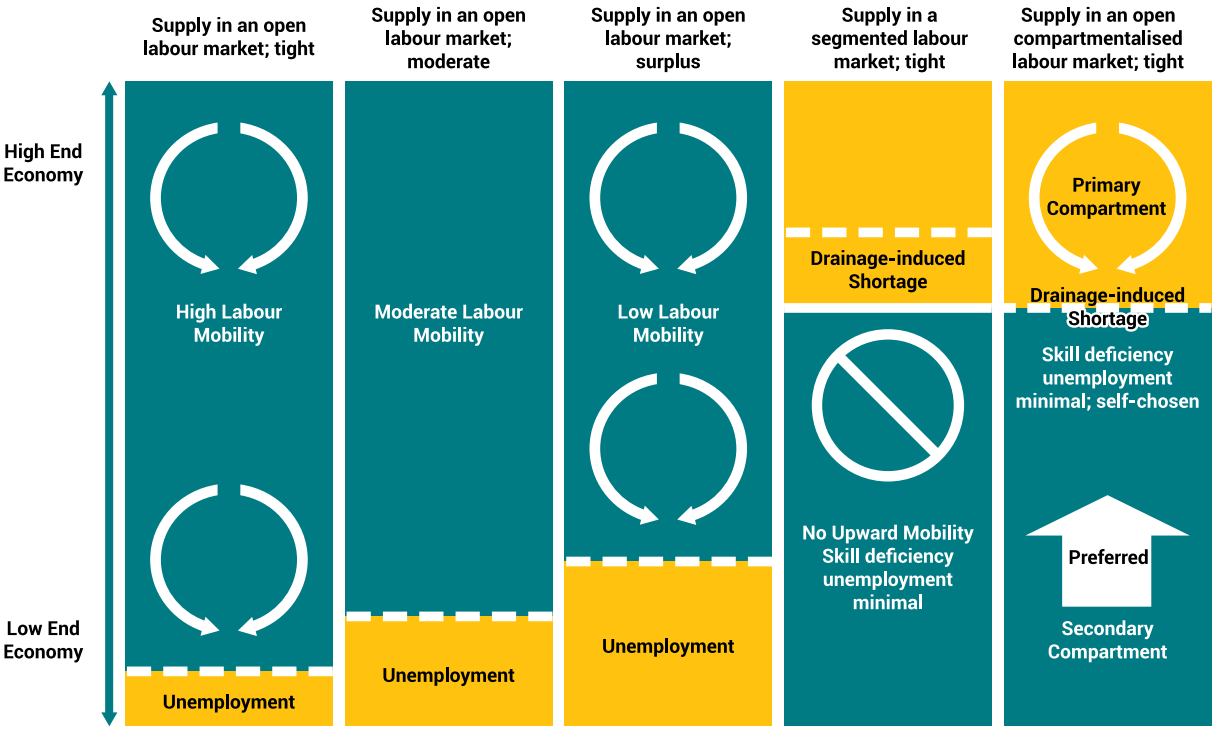
In relation to the above, some observations are useful to make. First, the meso- and/or micro-levels may show a different picture compared with the macro-level. In other words, what applies in the labour market as a whole does not necessarily apply in individual industries and firms. Quantitative and qualitative issues pertaining to the primary, tertiary, and quaternary labour supplies, leading to a constrained market and mismatches, can be overcome by individual industries and firms by turning to (tapping into) the secondary supply, self-induced (e.g. labour poaching). However, not all industries and firms have equal capacity to do so.

The playing field may be uneven with some industries/firms having a better competitive edge than others, derived from various factors: size and origin, reputation, operational and technological characteristics, employment conditions, entrepreneurial attitudes, flexibility in accommodating worker preferences and demands and so on. In general, however, attraction is contingent on skill-relatedness, or level of skill-specificity. It is also determined by information availability and recruitment practices. Retention is an equally important concept in regard to secondary supply and labour mobility. It is increasingly opined that 'engagement' is becoming a novel and increasingly necessary requirement.

This brings us to the other side of the equation: secondary supply hinges on the willingness of employees to move with incentives being an important factor. A labour market displaying sizeable surpluses at all levels tends to have low labour circulation as employees perceive the high risks involved with leaving the current position. On the other hand, substantial gains can be achieved in a constrained market, remuneration and otherwise, without many risks. In a highly segmented labour market, significant barriers exist for labour circulation. Figure 2.6 illustrates the implications of economic structure and labour market functions under alternative conditions.

Recently, substantial debate has surfaced on labour mobility inclination and employer commitment in relation to the new employee cohort, the Millennials or Generation-Y. Millennials have a drastically different outlook on what they expect from their employment experience, and employers will need to develop new engagement models and policies. Retaining employees in a competitive marketplace remains the biggest priority and concern. Compensation, flexibility and career mobility opportunities are treasured when it comes to recruiting and retention.

Figure 2.6: Economic structure and labour market function under different conditions



Source: Own work

2.2.3 Linkage perspectives

Figure 2.7 depicts how the three perspectives discussed are interlinked. The costs of skill gaps and shortages can be substantial.

Consequences can be assessed again from the macro and micro perspectives. A differentiation is needed between gaps and shortages. As for the micro-level, the focus is on firm's objectives, labour recruitment practices, wage clearing level, and development potential and strategy (see Figure 2.8). Some consequences at the micro level are manifested in the firm responses to gaps and shortages.

As noted above, the question on whether firms do or do not have sufficient incentives to engage in worker training/skilling programmes has been widely discussed. A paradox is manifested here, the more prevalent or widespread – and persistent – skill gaps and shortages are, less inclined firms are to engage in worker training. With respect to skills that are not firm-specific, there are indeed many arguments in favour of significant disincentives. Prime among these is the fear of losing trained workers through poaching. Labour poaching is among the causes/consequences of skill shortages (at the same time as constituting a firm level response).

Figure 2.7: Inter-linkage of the market, industry/firm and worker perspectives on skill issues in a local labour market

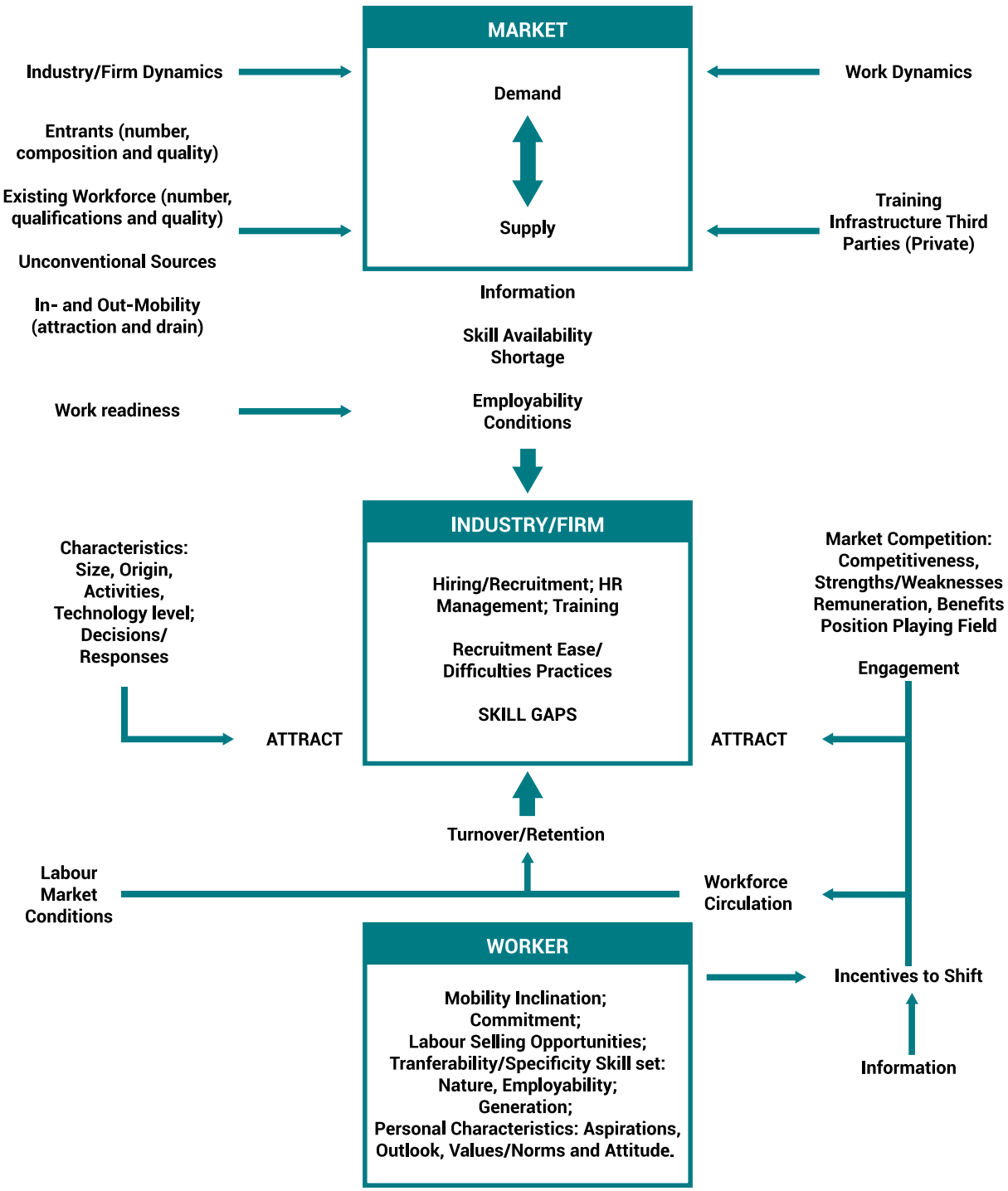


Figure 2.8: Consequences of skill gaps and shortages at economy and industry/firm levels

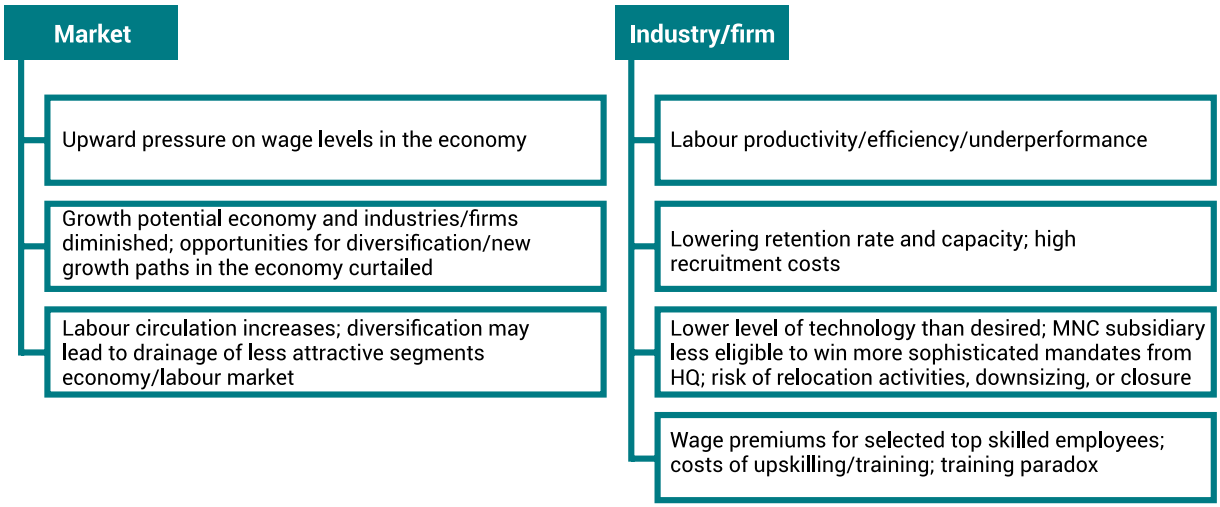
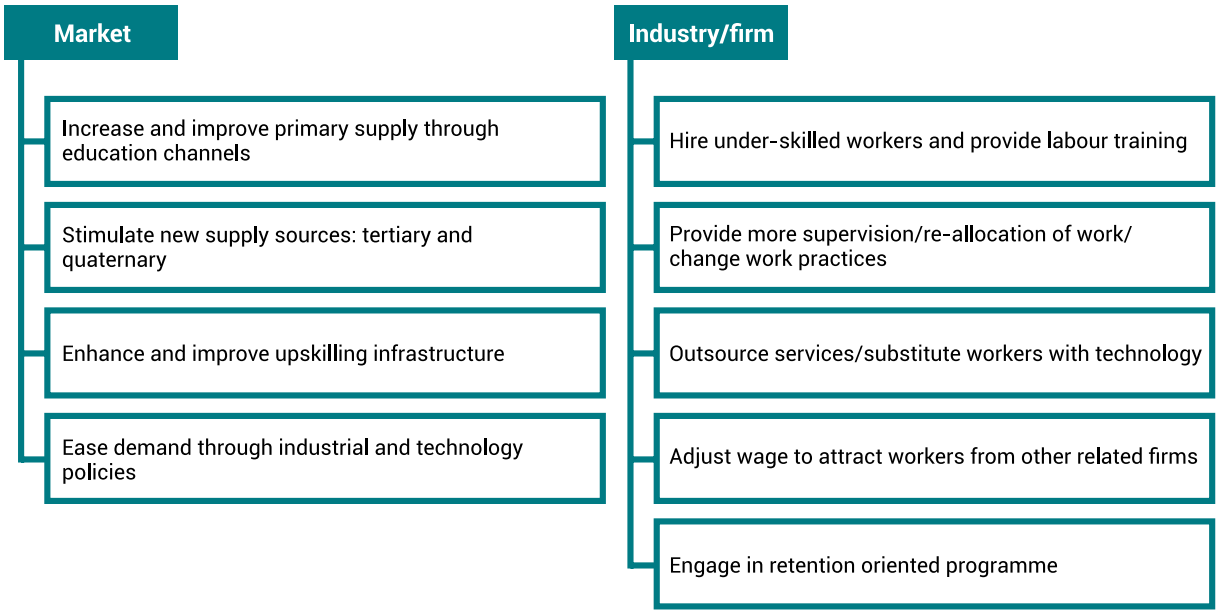


Figure 2.9: Selected strategies to address skill gaps and shortages



When the labour market is buoyant, competition for workers is high and poaching is expected. As noted, the returns of skill investment made by an employer are accrued in part to other firms. Contingent on the firm-specificity of knowledge and skills involved, the costs incurred by firms experiencing labour transfer through poaching could also involve other firms accessing competitors' knowledge base. Firms can reduce poaching by raising wages of trained workers, thus further increasing labour costs.

At the macro-level, consequences of skill shortages have been considered with respect to three aspects: the wage clearing levels in the overall labour market, the growth potential of individual industry branches, and opportunities for new growth paths in the economy. All three aspects are dependent on the overall labour market condition, constrained or labour abundance, and degrees of compartmentalisation with differential prevalence of buyer and seller market features.

Figure 2.9 shows strategies that can adopt to mitigate skill gaps and shortages. These can be adopted by actors and stakeholders at several levels: the economy (macro) and at the level of industries and firms (meso-/micro-).

2.3 Identifying and measuring skill gaps and shortages: Indicators

Identifying and measuring – quantitatively and qualitatively – of skill gaps and shortages hinge on indicators of labour market. A general distinction is made between macro-, meso- and micro-levels. Each level has its own set of indicators, which are depicted in Table 2.1

At the macro-level, unemployment rate (among specific categories of labour) is an indicator that measures skill shortages – skill deficiencies in persons contributing to the market – will be reflected in higher than 'normal' unemployment as deficiencies impact employability. However, this does not take into account the overall labour market situation. This seems to constitute an important contingency factor. In a constrained market, low employability and unemployment may well go hand in hand as employers see no other choice than to hire under-skilled workers to fill the resulting gap through training. Following up on the latter aspect, the extent and form of a 'third party' training/upskilling infrastructure may well be a suitable indicator. However, for economies that are in a transitional stage of development, its usefulness is more limited than others.

Table 2.1: Indicators of skill shortages and gaps from macro, meso and micro (firms and workers) perspectives

Macro (market)	Supply side	1.	Employed persons
		2.	Unemployment rate
		3.	Entrant into labour market (graduates): by field of study vs. needs
		4.	Extensiveness of labour training/skilling infrastructure
	Demand side	5.	Vacancies
		6.	Vacancy fill rates and hard-to-fill vacancies
		7.	Number of vacancies
		8.	Wage structure
Meso (industries)	Skill shortages	1.	Hard-to-fill vacancies; vacancy/search duration
		2.	Most frequently advertised job titles
		3.	Wage offered
	Skill deficiencies and gaps	4.	Training
		5.	Skills that need the most improvement
Micro (firms)	Skill shortages	1.	Hard-to-fill vacancies; vacancy/search duration
		2.	Positions not filled up
		3.	Rate of filling up vacancies
		4.	% of applicants fully meet requirements
		5.	Labour poaching
		6.	Firms' recruitment standards
		7.	Labour turnover
		8.	Under hiring
		9.	Wages offered
	Skill gaps	1.	Skill proficiency level
		2.	% of employees fully skilled
		3.	Skills that need the most improvement
		4.	Preparedness of employees' new tasks
		5.	Labour turnover
		6.	Training
Micro (workers)	Skill suitability/ proficiency	1.	Employability/ease of hiring
		2.	Job-readiness
		3.	Job search duration
		4.	Skill transferability

Variables related to vacancies and wages are probably the most frequently used indicators. These have the advantage of being applicable to all levels. Skill shortages have a depressing effect on overall or average wage levels. On the other side, substantial remuneration premiums may prevail for specific skills in high demand in an industry, or a set of firms, but short in market supply. Such premiums result in inter-firm competition due to the limited supply. Hard-to-fill vacancies is an indicator employed in many studies, as it directly pertains to 'hard to get' in relation to stipulated requirements. Such vacancies can be defined in terms of occupations, positions, or profiles. Therefore, it requires a yardstick to determine skills that are 'high in demand but short in supply' at qualitative level (including specific combinations of competences). Vacancy duration is one possible indicator.

In a number of countries, *a critical occupation list* (COL) is developed, which sets forth the jobs most in demand, and for which industries may be facing shortages or difficulties in hiring. The COL identifies occupations that are sought-after by key economic sectors by providing information on the type of specialisations and competencies that the industry demands from employees. Besides listing critical occupations demanded by the industry, the COL also provides insights into graduate employability programmes and facilitates the return of Malaysian professionals from abroad.

In practice, hard-to-fill vacancies or hiring difficulties can also be assessed through gathering information from recruitment agencies. These agencies provide useful input pertaining to employers' expectations and labour market dynamics, which provide a guide to identifying shortages and mismatches. However, in assessing information from recruitment agencies, one has to take into account the role of skill-specificity or specialisation that serves as channels for employers engaging recruitment agencies for such recruitment.

Considering workers at an individual level, job-readiness is an important indicator signifying employability or the ease with which a specific worker will be hired (and by whom) and the length of period needed to fill a suitable job. Skills that are highly transferable in relation to demand from different industries and firms in the market make an individual marketable for a range of vacancies in different industries and firms. While promoting mobility, there can be disadvantage of low level of skill-specificity or specialisation, hindering employment. A high level of skill-specificity in terms of specialised positions or occupations with specialised tasks, though limiting opportunities for mobility to similar firms in the same industries, can command a high remuneration.

2.4 Setting the scene: Key observations on Penang

This section provides general observations with regard to the findings that have emerged from our scrutiny of the Penang study, pursuing the perspectives framework as laid down in Figure 2.7. The observations 'set the scene' for the detailing and elaborate discussion in the remainder of this report. After a macro-view of labour market and skill issues in Penang, we will look at the industry and firm-levels. The worker perspective will be discussed in the final section. Peculiar features of labour market processes in Penang – pertaining to high-qualified labour – will be linked to the apparent structure of the Penang economy. These appear to contribute to skill shortages and gaps at meso- and micro- (firm) levels, and to a significant extent, underlie heterogeneity observed at these levels.

2.4.1 Macro view of labour market and skill issues

Observation 1
Vacancies occur in a constrained market as far as high-qualified labour is concerned.

High-qualified labour demand has expanded and changed as manifested through vacancies throughout the economy by any measure of time, on a monthly or annual basis. Tracking job portals such as JobsMalaysia and Jobstreet reveal a continuous high number of job advertisements and vacancies on a monthly basis (Chapters 4 and 5). Vacancy density only in part is determined by new jobs created as a result of approved and implemented manufacturing and services investments, be it domestic or foreign. For another part, vacancies concern existing jobs.

Observation 2
In this constrained market, high-qualified labour shows substantial mobility.

A constrained market for higher-qualified labour: evidence – Going by applications for specialised fields of work as defined by e.g. JobStreet, one tends to conclude that there is ample supply of labour in most fields and at most skill levels/types of skill. A multiplier of 100 or more is quite common (Box 2.2). Each vacancy receives a large number of applications. As illustrated in Box 2.2, the number of unique applicants is much lower. Applicants cast their net wide across profiles (titles and functions). Ample supply is inconsistent with the labour force – employment trends depicted in the next chapters, as well as the fact that unemployment rate has been markedly low for some time (hovering around 2%, below average). Also, unemployment to job vacancy ratio overall has declined. The multiplier is much higher than one would expect in a situation of low mobility and job applicants, mainly involving new entrants/job seekers. Even the **higher unemployment rate among youth** (including educational institutions leavers) does not necessarily **indicate** oversupply of workers. Rather, **undersupply of skills** as we will conclude later from the data.

Observation 3
Mobility indicates the role of the secondary supply, adding to primary supply.

High mobility is inconsistent with ample labour and skill supply – Communication with representatives from job portals confirm the patterns and indicate the cause for the high multiplier to be *high mobility* among those who are already employed. This is inconsistent with ample labour supply. As noted in Box 2.3, job shift is rather risky in such conditions while most employees would be expected to be risk-averse. Furthermore, an ample labour supply would depress wages and/or fringe benefits, discouraging change of employment. Job change is far less risky in a situation of labour competition because of limited supply (and can produce substantial gains). This is especially so for those with some degree of skill-specificity. Mobility incentives are consistent with a constrained market.

Observation 4
Vacancies, while indicating labour need, may not be a perfect indicator for actual or net demand because of chain effects of job shifts and labour mobility (behaviour of secondary supply).

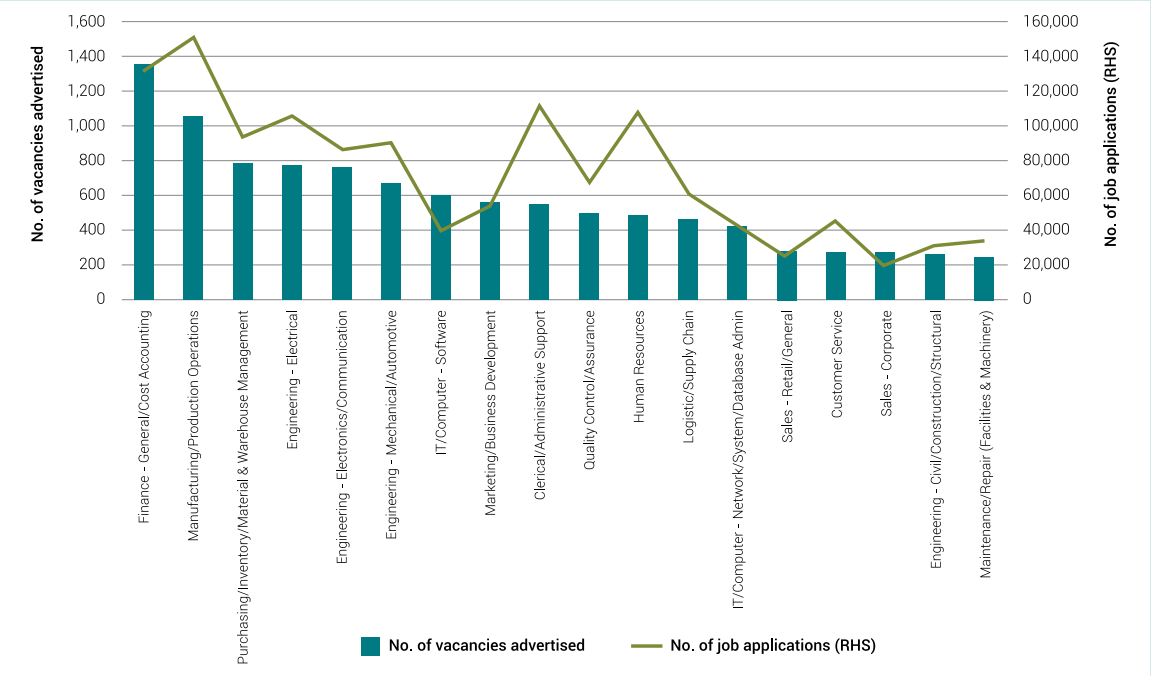
Analysis reveals scarcity with respect to high-qualified labour. This category is equally marked by high mobility, *which is probably one of the most significant market processes in Penang*. Later an interpretation of mobility is offered, related to the structure of the Penang economy and labour market functioning.

A better measure would be the number of vacancies from new job creation. Unfortunately, figures on this are not available.

Box 2.2: Anomalies in the Penang labour market

According to JobStreet, for the top 20 specialisations, the number of applications is over a hundred times higher than the number of vacancies advertised (Figure 2.10). This multiplier shows little variation between different specialisations. It should, however, be noted that the unique number of applicants is substantially less since they often apply to more than one vacancy. Still, it cannot be concluded that an overall shortage of applicants exists.

Figure 2.10: Vacancies and applications received in the top 20 specialisations in the first half of 2015



Source: JobStreet (2015)

It seems that despite growing demand combined with low unemployment, which indicate a tightening labour market characterised by quantitative shortages of labour, the supply of labour remains abundant. This paradox can be explained by labour mobility. Due to a tightening labour market, demand for workers starts to exceed supply, which gives employees the (perception of the) opportunity to switch to 'better jobs' and move up within the labour market. This tendency towards high labour mobility is confirmed by recruitment firms, which justify that job-hopping is very common: *"As there is high demand, workers change job frequently, employees work only 1–2 years for one company, especially the young people."* Another participant stated, *"Nowadays, if people work three years for the same company, it is considered as a stable candidate. This used to be 5–10 years."*

The apparent high labour mobility within the market is less likely to occur in a labour market characterised by a surplus. In this case, as set out in the framework of this study, people rather hold their positions due to fierce competition for jobs available.

Skill supply – Characterisation of the Penang labour market as constrained implies that a mismatch exists between demand and supply (shortages). However, there still seems to be an abundance of workers available in the market, looking at the number of applications in JobStreet. It points towards a pattern of substantial dispersion with regard to skill profiles among those who suggest a skewed or distorted supply of skills with relative 'ample' availability of rather unspecific skill profiles. But skills that do not match demand will result in mismatch between supply and demand. Having generic skills can command better remuneration packages.

It is contended below that Penang's economy indeed is compartmentalised, contributing to labour circulation. Those with specific skill sets that are in demand are in short supply and are able to earn significant premiums in the market. This leads to the next observation.

Observation 5
Apart from new jobs, vacancies result from high labour circulation.

Observation 6
Frequent job shift as indicated by the application patterns of vacancies pointing towards the supply characterised by a prevalence of generic transferable skills. Conversely, demand may show a significant degree of skill relevance, allowing workers to 'exploit' transferability.

Observation 7
As against prevalence of generic transferable skills, within the constrained market there is genuine shortage in the fields of high skill-specificity/ skill shortage in the area of professional (job-) specific skills.

Indicator evidence – Skill mismatch or skill deficiencies of entrants and those in the secondary supply (versus demand) is revealed through several indicators. These concern: concern 1) Professional occupational groups that are in demand but are insufficiently available; 2) Vacancies that are hard to fill; and 3) Infrastructure for professional skill augmentation training or upskilling.

Interviews with recruitment companies and querying these – as well as other agencies and persons – over a listing of critical occupations, revealed shortages in terms of professional positions, fields, and occupations. Critical occupations or positions are not necessarily in short supply. Firms seek recruiters for niche positions. Shortages are indicated in the fields of research and development/design in different industries (IC, electronics, life science, medical devices and pharmaceuticals), IT programming, due diligence/ compliance and financial control/accountancy. Engineers (software, mechanical, process, production, quality and test), are by far ranked as the most demanded and filled position/occupation, but also with the most acute shortage.

Closure of several multinational firms recently and currently does little to alleviate the supply constraints. Most of the retrenched workers have skills that are gradually obsolete with further upgrading of the economy. To the extent this concerns foreign labour; they are likely retracted from the market; for the other part they would need retraining. On the other hand, retrenched workers with suitable skills becoming available through the secondary market are insufficient in number.

Persistent vacancies – Our analysis reveals a moderate occurrence of persistent vacancies (the idea of persistent is defined in Chapter 5 in relation to hard-to-fill). These are found in fields and positions that are congruent with the ones indicated above. Persistent vacancies have different characteristics in different segments of the economy (see later discussion of compartmentalisation). While its prevalence appears relatively modest, vacancy advertisements appear to point towards employer branding and the perception of a preferred employer. This is known to attract qualified and best skill-equipped applicants. As the 'less-preferred' employers appear under-represented, our finding probably underestimates persistency. The fact that even stronger companies experience recruitment difficulties (vacancies that are difficult to fill within a reasonable time frame) is quite telling.

Causes of shortages – One is brain drain, driven by remuneration differences and lucrative job opportunities for highly demand skilled workers and a volatile market due to closures. Another cause is the commonly felt limited output from educational institutions of entrants, in occupations and functions that are in demand. This is in part related to study preferences of students, impacting employability of graduates. It is substantiated by the composition of graduates from public and private institutes of higher learning for each field of study. It is reflected in and has led to initiatives such as Penang Science Cluster, an endeavour of Mr. Yoon Chon Leong, an inspiring propagator of the relevance of science to the job market. This cluster has set up programmes to address this issue, such as exhibitions, workshops, café talks and support to local tech start-ups. A third cause – pertaining to skill level rather than qualification or occupation – concerns the discrepancies in terms of competency between the knowledge gained from qualifications and actual skill depth. Applying equally to those with the 'right' fields of study, this again affects employability. Other causes include overly high wage demands, level of experience required, length of working hours, location and transport constraints (mainland).

Upskilling infrastructure – Further indicating professional skill deficiencies (shortages and gaps), we find the presence of a substantial infrastructure for knowledge enhancement and upskilling. While PSDC

Observation 8
We find the presence of a substantial skill training infrastructure, in part geared towards higher-qualified labour and specific hard and soft skills (examples: Chapter 6).

[7] See chapter 4

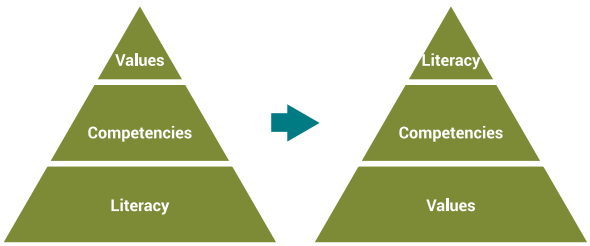
is diversifying into higher-level technical upskilling and is a collective effort of member companies, there is a range of private and semi-private set-ups that cater to a market emanating from the private sector for higher-level skill enhancement. Geared in large part to specific hard skills for specific industries, they offer employability enhancing programmes in a range of fields, filling the gap where skills do not meet expectations on the basis of educational qualifications. This is a case of dual significance: on the one hand revealing and addressing a gap in skill formation of tech start-ups and, on the other hand, filling this gap through bottom-up action (see Figure 2.8 and Figure 2.9).

Observation 9
While skill demand is changing towards a greater importance of language proficiency (English and foreign) and soft skills, competency does not quite follow.

Work-readiness – Many stakeholders (agencies, firms and experts) have a negative perception of work-readiness of entrants, related to hard skills and soft skills. As the latter gains more importance, the roles of education and upskilling infrastructures are emphasised.

With respect to the change in demand many experts and stakeholders refer to a gradual reversal of the skill pyramid that can be observed in Penang, in line with Figure 2.11. While literacy skills such as English and foreign language proficiency are becoming more pressing hard skills, a range of soft skills are moving towards the forefront: communication skills, ability to exhibit teamwork, problem-solving skills and out-of-the-box thinking (creativity).

Figure 2.11: Reversal of a skills pyramid



It is recognised that such skills are underdeveloped and thus insufficiently available in the market, not auguring well for Penang's upgrading pathway. As yet though, soft skills appear to be at a level that currently, is acceptable to many employers. As for causes, there is a tendency pointing towards underperformance of educational institutions. In turn, these reject claims of their direct responsibility and point towards institutional limitations in regard to their scope of activities, the possibility of giving quick responses to labour demand issues, incorporating '21st century' skills into their programming, including teaching and learning methods and partnership engagement.

Observation 10
Lack of soft skills is in part a consequence of constraints faced by educational institutions as far as primary supply is concerned; as for secondary supply, upskilling is insufficient; corporate practices should also be held responsible in part.

The existence of a substantial privately organised training/ upskilling infrastructure in part can be seen as testifying to these constraints and issues. It should be noted that part of this infrastructure is directed to firms/ firm management rather than school leavers and workers. This suggests that corporate practices, appear to contribute to skill issues. The industry and firm levels will be considered next.

2.4.2 Industry and firm-level skill issues

Observation 11
Economic structure has significant implications on the Penang labour market structure and functioning.

Observation 12
The economic structure implies that industries and companies are not on a level-playing field, with significant differences in the capacity to compete for labour skills in a competitive market.

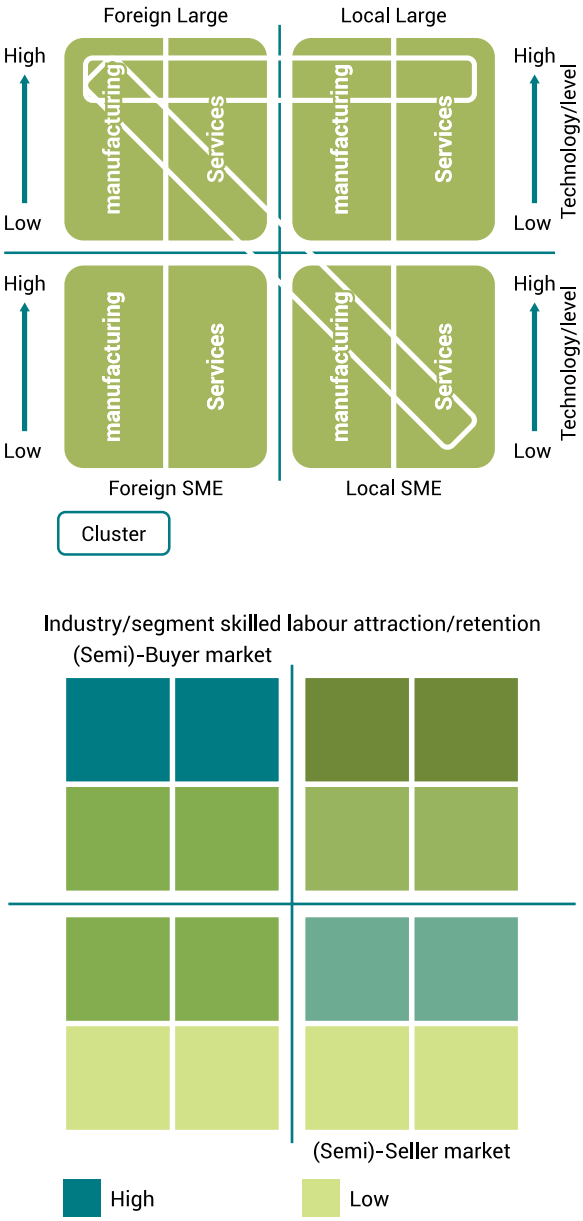
Economic structure and functioning of labour market – It is postulated that the skill situation in industries and firms relate to structural features of the economy and how these influence the functioning of the labour market. In tandem, we suggest that these contribute to high labour circulation and a differential picture with regard to skill situation (associated with high-qualified labour) in industries and firms. It is thus imperative to outline these features here. First, referring to Figure 2.6, when it comes to high-qualified labour, we find the Penang labour market to be similar to the extreme right condition. From the structure of the economy from an industry and firm perspective, the labour market is compartmentalised, with many inducements to move resulting from inter alia differential job satisfaction levels and employment conditions.

Penang's economy is characterised by a high level of diversity. The inflow of foreign investment (initially in manufacturing, more recently in other activities as well) has resulted in a sizeable base of MNC branch plants in a range of industries. Over time, the composition of these industries has changed due to changes in labour costs and state industrial policies. The role of higher tech manufacturing has increased significantly; in addition – although still classified as manufacturing – the activities carried out in a significant number of branch plants in several industries have shifted and/or diversified towards non-production parts of the value chain. Knowledge-driven manufacturing and services activities have gained importance. Complementing MNC branch plants is a sizeable local support industry, mainly consisting of SMEs. This industry has evolved to some extent with the development of MNCs requirements; engineering, automation and service branches, which have developed into a higher level of class over time.

Similar to the manufacturing sector, services have diversified with foreign direct investment (FDI) increasingly directed to this sector and strong encouragement by local policy. Next to traditional services such as the finance and the hospitality industries, the sector has branched out in new directions, such as ICT (represented by substantial MSC-status companies), software, medical services, GBS and others.

The core of the Penang's economy can be deconstructed into a number of clusters, some homogeneous, and others more heterogeneous in regard to firm composition. These clusters may span the entire production chains. The economy is also 'down-breakable' into compartments according to dominant characteristics of groups of firms. It is apparent that the following characteristics produce demarcations: origin – foreign/local; company size – large/small; sector – manufacturing/services; technological level or sophistication of activity/operations – ranging from high to low. On the basis of this in Figure 2.12, four major quadrants are defined in which diverse groups of firms can be situated, e.g. high-tech large foreign transplants in e.g. opto-semiconductor or LED industry can be situated at the top of the left upper quadrant, while technology start-up firms can be situated at the top of the right lower quadrant. The industry groups and clusters of varying technological sophistication are situated across the quadrants, with MNC relocations often dominating eco-systems.

Figure 2.12: Compartmentalisation of the Penang economy and skilled labour attraction/retention



Non-level playing field – Anecdotal evidence as well as previous research indicate that – rather than Penang's labour market being homogeneous – parallel to the compartmentalisation of the economy, divides occur with sub-markets evident in differential levels of skilled labour attraction and retention. Figure 2.12 also suggests a pattern of this skilled labour attraction and retention, ranging from high to low. This is assumedly influenced by preferences of labour for industries and groups of firms in the different quadrants (market preferences ranging from high to low, correlating with wage level, terms of employment, working conditions and fringe benefits). But there are also other factors at play such as firm's attractiveness – especially higher-skilled – as well as firm's labour preferences (e.g. gender or age), competitiveness in the labour market with respect to categories of labour (in terms of qualifications and skills), labour poaching practices and firm responses to exaggerated labour expectations.

A check on "Malaysia's 100 Leading Graduate Employers", covering some 14,000 graduates from Malaysian universities, was done to detect further evidence on whether there is a preference of graduates towards local companies or MNCs. The top four sectors most favoured by graduates are banking/financial services, FMCG retail, energy/O&G and high-tech industry. Of the top 100 companies preferred by graduates, a clear majority – 60% – are MNCs. In the banking/financial services industry, the majority of graduates prefer local firms. In the ICT sector, a clear majority prefer MNCs. Although the picture is mixed, these findings generally support the above observations.

Buyer-seller characteristics – The functioning of labour markets and the 'power' of employers versus labour (and vice versa) are often discussed in terms of buyer and seller market. In a buyer market, employers are supposedly able to obtain sufficient labour that meets the requirements from primary and secondary supply and/or are able to dictate the conditions of employment, the latter especially if labour supply does not fully meet the requirements. In a seller market, conditions are set by labour; hiring depends on the extent to which employers are able or willing to meet its conditions. Notwithstanding the supply situation as indicated by vacancy data, buyer/seller labeling of the Penang's labour (sub-)market(s) as well as actual 'distribution' of skills is far from straightforward. The combination of compartmentalisation of the economy, behaviour of labour and firms, as well as institutional factors render it opportune to identify buyer and seller submarkets (Figure 2.12). The pattern should not be taken as purely 'black and white' though: there are many mixes of buyer or seller characteristics, more so in a constrained labour market, as depicted at the top left quadrant of Figure 2.12 in the case of severe shortage, an experienced worker with a full set of required skills can behave like a seller and bargain for a high wage and other premiums.

Skill distribution – The structure depicted in Figure 2.6 as an approximation of Penang's economic structure and labour market functioning was corroborated and validated by many recruitment agencies and experts. It is postulated that such structure and functioning of the labour market highly *influence skill distribution* (as noted above) and *contribute to labour circulation*, in view of the incentives. Also, in conjunction with mobility, the behaviour of labour and firms with respect to sub-markets may be expected to impinge significantly on patterns and features of skill shortages. As noted in the framework of the study, patterns and features are contingent on overall skill availability and deficiencies; thus on employability characteristics. In addition, patterns are impacted by institutional regulations in hiring labour and – levels of – compliance with these.

In regard to high-qualified labour, the Penang's labour market appears to resemble the structure depicted in the extreme right column in Figure 2.6, a non-level playing field results where skill distribution is skewed. From Figure 2.12 and the mechanisms outlined, it is suggested that there is labour market heterogeneity where some segments of the economy, industries, and firms have much easier and better access to occupational groups in demand, and require skills more than others. These are industries and firms in the upper left part of the diagram, as opposed to those in the lower right part being in a disadvantaged position. Skill shortages and gaps experienced by selected industries and firms (rather than across the board) can be seen as a 'some winners take all' phenomenon (in the primary and secondary supply). Although this appears exaggerated, however, it can be established that there are winners that take much.

Observation 13
What goes for the market as a whole, may not necessarily be the case for individual industries (meso) and/or firms (micro): skill issues tend to occur more in some industries and firms than in others.

Observation 14
Due to better remuneration packages and other conditions, reputable industries and firms are able to appropriate high-demand skills available in the market – from primary and secondary supply – as these are 'preferred' employers; less reputable local firms in general, experience to a larger extent not necessarily recruitment difficulties of skilled labour but rather competency shortages and gaps.

Secondary market a major source – Another empirical finding is linked to this. Taking into account of a prevailing tight labour market, the secondary market is a major source of experienced workers with sufficient skill depth in relation to job requirements. This may go at the expense of less favoured segments where firms experience retention difficulties as they are unable to offer similar perks because of stiff competition; they may have to adjust their requirements downward to engage workers.

Observation 15
Even reputable preferred companies face skill deficiencies of local labour supply, necessitating underhiring, upskilling and/or importing skills from abroad.

Business practices – Competitiveness should not be only seen in terms of remuneration and other elements of reward package. It is stated that local firms community are still traditional in their business practices (including expectations, recruitment and HR management), putting them at a disadvantage. While the often-held view that local SMEs attract less skill-equipped labour and function as training houses for MNCs (so they are bound to lose labour once better-skilled) may be valid in a number of cases, again this should not be generalised. We find that some local firms progress through favourable HR strategies (but then change quadrant); also, some workers prefer to stay in SMEs.

Specific skills – This pertains especially to positions with high skill-specificity or specialised skills that are either scarce in the market (quantitative supply) or of insufficient level (qualitative supply). Industries and firms that are in the upper left corner of the schemes in Figure 2.12 are not completely immune to recruitment difficulties and do experience skill challenges as well. A case in point are semiconductor firms that have switched from an exclusive focus on manufacturing to a diverse portfolio of activities, including R&D, design and global business services. These indicate the shortages and deficiencies of product development engineers, local IC designers, and the like, necessitating an international recruitment field, extension of recruitment time and substantial upskilling. One negative consequence for MNC establishments is the possibility of losing out on technology development projects within the company.

Observation 16
Skill deficiences of employees in MNC companies may cause them to lose out in technology development projects in the company, hindering Penang establishment upgrading.

It is observed that in a tight market with specialised skills, commitment of those who avail of these skills suffers from competitor firm recruitment practices such as pinching. Several anomalies emerge here. While in principle, it is in the interest of firms to equip high-qualified workers with the requisite skills, it comes at a substantial cost (not only upskilling as such but also wage premium for retention). Pinching involves such premiums as well. On the other side, it is not always in the interest of an employee to upskill in a specialised field. High skill-specificity also limits opportunities in the labour market.

Observation 17
While there are retention difficulties across the board, these are also experienced by attractive industries and firms due to labour pinching by competing firms in the same industry.

Employer preferences – Employers' preferences (e.g. sufficient experience) lead to reliance on the secondary market, and at times get in the way of effective recruitment as they are incongruent with preferences of job seekers in Penang. Recruiters also signal several issues with regard to recruitment difficulties in terms of skills: firms are too demanding, or are not 'up-to-date' pertaining to recruitment channels and methods (e.g. use of social media). However, in some segments of the economy, preferences of workers may interfere with effective recruitment.

Observation 18
Some firms – not linked to any specific industry or other characteristics – are responsible for skill shortages as they tend to be picky in the recruitment process.

Observation 19
Different segments of the economy require varying skill sets; stated otherwise: not all segments require the same skills in terms of proficiency/ competency level and experience. In principle, available skills (level) may fit some segments of the economy. But recruitment is constrained by preferences and attitudes of workers.

Observation 20
For skill gaps, firms on average rate the current skill proficiency of employees as satisfactory to fair; however, for none of the skills measured the rating is clearly indicated as proficient or highly proficient. This indicates skill gaps.

Observation 21
For skill proficiency and gaps, there is little difference between generic hard skills, specific hard skills and soft skills on average.

Observation 22
Firms' view in regard to skills that need the most improvement lean towards specific hard and soft skills rather than generic hard skills; however, this differs by type of firm.

Skill gaps – Skill gaps do exist, the details will be discussed in Chapter 6 and subsequent chapters. However, it is unsound to generalise this across skills, industries and firms. In the general picture, a hard skill, namely foreign language competency scores the lowest. The non-deviating score of soft skills is due in part to upskilling within firms. On the other hand, soft skills are indicated most frequently as requiring the most improvement. This is indicated more often by large, local firms rather than MNC establishments or SMEs. This might be explained from MNC establishments cultivating these more while they are less relevant to locally operating SMEs. While even within the categories of preferred industries and firms the picture is not homogenous, as it is influenced by required skill sets.

2.4.3 Labour mobility of high-qualified employees

Escalator? – The Penang labour market is related to a high level of worker mobility. Mobility and job-hopping can be considered from two angles: First, workers and their behaviour; Second, firms and their perception of workers' conduct. Employees themselves have the perception that in a constrained market, the 'escalator' effect (improvement by changing employer) is strong despite employability deficits. Labour mobility may come from multiple and diverse sources, including firms offering incentives in competition for labour. The often strong appeal of new 'variety' in the economy (e.g. global business services in the Penang case) is reinforced by skill requirements that are based on a significant degree of transferability and presence in the secondary market.

Mobility and transferable or specific skills – A few notes are in order here. It appears that a substantial diversity of sources linked to a single destination (in terms of industries, occupations and functions) and vice versa, a substantial diversity of destinations from a single source indicates a relative importance of generic transferable skills. This makes for complex mobility patterns. Furthermore, mobility at the same time is heterogeneous: Against those with generic skills, there are also workers with high skill-specificity that have limited transferability. Workers with high skill specificity moves when there is a high demand in earning premiums.

Observation 23
Skill gaps are associated in part with labour turnover, revealing a connection with labour mobility at individual level and firms' commitment to employees.

Observation 24
Mobility reflects the degree of skill relatedness in industries and firms; high-skill relatedness of segments of the economy is expected to contribute to high levels of mobility.

Observation 25
Skill-relatedness is an important determinant of mobility patterns in terms of links between sources and destinations; through skill-relatedness, chain effects (may) occur that lead to skill shortages and gaps at some 'distance' from the initial source of skills demand.

From the perspective of firms mobility, this can be functional as it creates the possibility of shedding less suitable workers and recruiting those with the right skills through secondary supply. This is more important in a tight labour market situation. Of course the downside for firms may be the loss of high-skilled workers, resulting in skill gaps and/or more investment in retention.

Negative perception – Yet another side of the mobility

coin is the workers' perception of high mobility (or job-hopping) that engenders in employers. While mobility is a positive phenomenon, high mobility runs the risk of becoming a game where many participate in without serious intentions and/or turning the labour market into a carousel (another metaphor), where the intention is to obtain a better 'seat' by frequently jumping on and off. Negative perceptions of workers are instilled as such practice confronts employers with significant burdens, such as large numbers of unsuitable applicants that HR departments have to deal with. It is postulated that such situation is starting to arise in Penang.

Observation 26
Mobility dynamics in the secondary labour market presents significant burdens to employers and generates negative perceptions of mobile workers.

Observation 27
There is a concern among agencies, firms, experts, stakeholders of declining loyalty and commitment among younger workers.

Contradictions – Mobility is driven by opportunities and employability within the context of a constrained market, both *real and perceived*. Other factors go into the equation too: in discussions on Penang labour, attitude and commitment of workers were often mentioned. For firms, employment conditions and work environment are highlighted. This is also an area where contradictions are apparent.

While there are concerns about loyalty and commitment, there is much more reference to the younger generation than the 'older' one. Thus, there are generational differences.

Mobility drivers – A major concern expressed by firms are worker expectations and demands with reference to salary package, compensation for travel, fringe benefits and other employment conditions. Considered to be misplaced, firms see this as diminishing employability. Seen as closely associated, not surprisingly, issues regarding attitude are frequently raised in interviews and focus groups when it concerns recruitment difficulties (besides wrong fields of study and lack of skills). A number of firms are inclined to refrain from hiring workers they perceive as having a negative attitude. This adds to perceived skill shortages and actual gaps as they do with existing personnel.

The insights obtained about mobility patterns and drivers indicate that high-qualified workers use mobility as an instrument to improve their employability. From an employee's perspective, this has logic given the fact that the market is replete with generic skills. From this personal view, it can be seen as positive. On the other side, recruitment firms often highlight the complaints concerning the undesirable attitudes of (fresh) graduates. This may be linked to behavioural patterns of millennials or Gen-Y. According to different recruitment agencies, millennials or Gen-Y workers demand high wages and fringe benefits, despite meeting requirements or knowing the job (descriptions). Many fresh graduates apply for jobs without knowing the requirements or job content. This is also suggested by the high average number of applicants for vacancy advertisements. When their skills match the requirements, they often have high demands and unrealistic expectations in terms of fringe benefits, flexibility, and working conditions. This behaviour can also be typical in a constrained labour market since there is an abundance of job opportunities. Thus, Gen-Y characteristics can be a cause for high unemployment rates among fresh graduates, but also a consequence of the tight labour market situation in Penang. The other side of this coin of course, is that employers are not obliging, contributing to the labour market tightness. As noted above, the problem is further compounded by employers being at times considered 'too choosy'.

Observation 28
On one side, mobility appears in part driven by skills advancement to improve employability, on the other side, perceived 'bad' attitude of workers and unrealistic expectations (promoted by economic structure and differences) has a negative impact on employability of the labour force, and augment recruitment difficulties.

Millennials, Gen-Y views –Millennials or Gen-Y raise the counter-argument that their generation is different, with behaviour stemming from different values and priorities. From the millennials' perspective, (un)employment can be seen in a different light. While a higher unemployment rate among youth, including graduates, no doubt reflects deficiencies in the quality of supply, many fresh graduates tend to play a waiting game. This is for reasons of not only what has been mentioned above,

Observation 29
Many firms are 'dual' in their attitude: on the one hand they frown upon job-hopping (negative recruitment factor) but at the same time engage in labour pinching.

leading millennials to over-rate their 'selling' capacity. It is also for reasons of their different values and priorities that lead them to cast the net wide in search while accepting only the job that offers the 'right' conditions with little regard to competition. All this adds to the market anomalies that are observed.

Observation 30
On the other side, younger workers also perceive unrealistic and outdated expectations from the part of firms impinging on their 'selling' capacity.

New HRM approaches – A debate has emerged about resolution of resulting market anomalies and paradoxes. One view accepts the millennials' different values and priorities, thus higher-qualified labour having fundamentally changed their outlook. It also argues that it is more productive for the market to adjust rather than the workers. It advocates that firms should accommodate the new reality. From consultancy circles, a range of new approaches in HR management have emanated, which gradually have been popularised. Worker engagement is a core concept in an approach that targets worker retention. In our experience, such new concepts have already entered HR management practices.

2.4.4 Responses and strategies of Penang's actors and stakeholders

Following Observation 31, we now briefly offer further observations on responses and strategies concerning professional skill shortages and gaps. We consider current practices and thinking at the macro-level as well as the level(s) of industries and firms. Responses and strategies with respect to skill shortages and gaps show an inter-relationship between causes and consequences. There is a broad awareness on a huge challenge that has to be taken up.

Observation 31
Firms in Penang are showing a range of responses to skill shortages and gaps. Besides underhiring, there is an increasing need for retention, concretised through programmes that are concerned with worker engagement.

Web of actors – The web has become more crowded as more actors have entered the domain. From two core actors, the educational field and firms in the private sphere, their numbers have expanded in the public and private arenas. An overview will be given in Chapter 6 where we discuss human capital (re)formation. The ones in the public arena are linked to diverse levels: state, regional (corridor) and national (federal). Those in the private arena operate individually, or collectively (consortium), or in public-private partnerships. These include centres, recruiters/headhunters, consultancy firms, training/upskilling providers and industry associations. Interventions, programmes and schemes are macro, meso and micro level-oriented and by now have a wide coverage of the supply and the demand side.

Observation 32
As for shortages, we observe that issues and challenges are already taken up through interventions by an expanding web of actors/stakeholders, each running and exercising control over their own programmes and schemes, addressing all levels from macro to micro.

Objectives – At macro-level, the main target is improvement of quantitative supply, by not only enlarging primary supply, but also tapping on tertiary and quaternary supplies. Thus, the production of talent and skills-in-demand are the objectives. Second, improvement of qualitative supply, directed to primary and secondary supply to entrants into the labour market and existing workers through training/upskilling. Much is expected of the supply-effect of technology development awareness and familiarisation initiatives (such as Penang science cluster). Third, still on the supply side, actors are concerned with workers, targeting their job skills, attitudes and behaviour.

Observation 33
The impression is that many programmes, schemes, and interventions developed and implemented in/through the web require more time and evidence to see the effectiveness.

At micro-level on the supply and demand sides, the targets are – updating – labour recruitment practices and routines of firms, creating awareness of lock-in and lock-out, assisting in addressing skill gaps through (re)training/upskilling, introducing new human resources management philosophies and practices; a new focus on worker retention, and adopting new approaches in this aspect (such as the much propagated engagement).

Premature – We need more time and evidence to create effective programmes. Meanwhile, firms that

experience skill shortages and gaps continue to practise existing responses/strategies.

The latter by now have been adopted by most firms and are obviously relevant to skill gaps. Combined with retraining and upskilling they can target internal mobility as a means to fill critical vacancies.

Observation 34
Firms attempt to overcome skill gaps through multi-pronged response that includes changing work hours, re-allocation of tasks, more supervision by experienced employees and labour training. Upskilling is practised by most firms, and is done internally and by external providers.

Observation 35
Firms attempt to overcome skill shortages through multi-pronged response that include underhiring, labour pinching and – increasingly – retaining schemes.

Fragmented – In conclusion, a few general observations can be made concerning the web and its functioning in the Penang study. We have the impression that the web has grown in a fashion that has led to a fragmented structure with each fragment doing 'its own thing' without much account of the roles and activities of other actors in the web. Not only does this lead to the risk of unnecessary and unproductive duplication, but it also raises the issue of overall coordination and monitoring.

We see little communication between agencies or parts of the web concerning their programmes, schemes and interventions. In practice, this contributes to little coordination, which in first instance is a function of the absence of a central agency – at the heart of the web – that takes responsibility for overseeing what is happening 'on the ground'. As it is, the multi-pronged avenues are individual efforts that appear to be lacking a common basis in shared agency policy in relevant human capital fields. The absence of a common vision and shared principles of strategy raises questions about the effectiveness of interventions. The question of effectiveness is a difficult one as information on the results of interventions is not widely available. In addition, information that is available is fragmented.

Observation 36
Given an expanding and more crowded web with a multitude of actors, coordination and monitoring are becoming an issue.

Observation 37
An expanding and more crowded web with a multitude of actors add complexity to the task of information-gathering, processing, and use by relevant agencies on skill issues and responses/strategies.

Observation 38
Given the fragmented nature of information, little can be said about the effectiveness of interventions (programmes and schemes, activities of the range of actors) that are in place.

Thus, in order to have an effective roadmap on human capital development, the following is crucial. First, a general consensus between actors on approach; second, a body of relevant information gathered through appropriate channels; third, a central agency tasked with coordination, monitoring and information procurement, processing and dissemination. This point will be discussed further in the last chapter.

3

APPROACH AND METHODOLOGICAL NOTES

3.1 Exploration: Desk research and discussions with industry experts[7]

The first step in conducting the study was an observation of the field and issues departing from the terms of reference. The idea was to first obtain (preliminary) insight into research of skill issues, labour market development in Malaysia at large and Penang specifically, and existing studies carried out earlier in Malaysia and Penang. Next, we gain understanding from stakeholders on issues related to labour market situation, which helps to fine-tune the focus of this study. An extensive desk research was carried out, followed by meetings and discussions with stakeholders, resource persons, and industry experts. These revolved around Penang skill situation, trends, and labour market processes, as well as issues concerning the target group (higher-qualified or professional workers). Also, expectations with regard to future industry trends and their implications were gauged. Table 3.1 details tasks carried out in the preliminary phase.

Table 3.1: Detailed description of tasks in preliminary phase

Step	Task	Description
1	Perform desk research trends	Provided useful insights into current issues and likely major trends in industries relevant to Penang as well as into ensuing current (and future) skilled labour needs in Penang.
2	Perform desk research	Existing studies of skill gaps and shortages, international; existing reports of skill gaps and shortages in Malaysia.
3	Perform desk research: Study demand and supply framework	The framework of labour demand and supply was studied to understand the labour market theory, and to segment Penang labour force into different compartments based on firm size and origin of a firm.
4	Define target agencies & individuals for initial interviews with resources persons	Experts include industry leaders, industry consultants, policy makers, and academics who are continuously involved in the planning and analysis of human capital development in Penang in relation to desired/targeted evolution of sectors/ industries/branches. Targeted persons were well-informed representatives of agencies and associations including the Department of Skills Development (Northern region), Penang Career Assistance and Talent Centre (Penang CAT Centre), TalentCorp Malaysia, Labour Recruitment and Employment Agencies, Federation of Malaysian Manufacturers (FMM Northern Branch), Northern Corridor Implementation Authority (NCIA) and others. In part, experts and stakeholders are identified on the basis of researchers' past experiences and consultations with resource persons. A number of criteria are used to shortlist experts. These include working experiences; knowledge; his or her contributions towards a specific industry group; seniority of position or rank in industry associations.
5	Conduct interviews with resource persons	Information gathering was conducted through personal interviews held with a select number of local experts and agencies. Information gathered was primarily qualitative. Insights from individual experts were anonymously shared in the focus group discussions to collect responses from industry players.

[7] This chapter builds on the Interim Report of this study, July 2016; and on Terhorst, J. & T. Verbraeken (2016). *Making the Transition into a High-Income Economy: the Penang Case*. Master Thesis Economic Geography, Utrecht University, The Netherlands.

Based on (the results of) the observation, the research design, topics, and knowledge aspects were defined. These are outlined in the remainder of this chapter. We end the discussion by outlining some major obstacles that surface in the course of implementation of the study and the limitations following from these.

3.2 Selection of priority industries

The priority industry is defined based on its economic importance to the growth of Penang, and the industry focus is presented in Figure 3.1. The guiding principles further impinge on industry upgrading and diversification shaping Penang's Next Economy (that is, transition from a near exclusive manufacturing to a manufacturing and services economy).

3.3 Approach to the study and information gathering methods

The identification of indicators at macro and micro (meaning firms and workers) levels for defining and measuring skill shortages and gaps, has led to the study being divided into three components. Figure 3.2 depicts these three components that are distinct, and therefore have been carried out independently. The first component deals with the demand and supply side characteristics of the relevant part of the labour market, as indicated by relevant vacancies and output from educational institutions. At meso- and micro-levels, the second component examines the skill needs and skill gaps of firms and their industries, while the third component scrutinises the characteristics and drivers of high-skilled labour mobility. The first component also entails the identification of future trends in the Penang economy, and ensuing skill requirements through information gathering from experts and relevant individuals/agencies.

The approach is novel in three ways: first, research in the Penang context has focused on a single component rather than all three simultaneously in an integrated manner. Second, this is the first study to explicitly consider worker mobility in the context of skill shortages.

Figure 3.1: Industry focus of this study

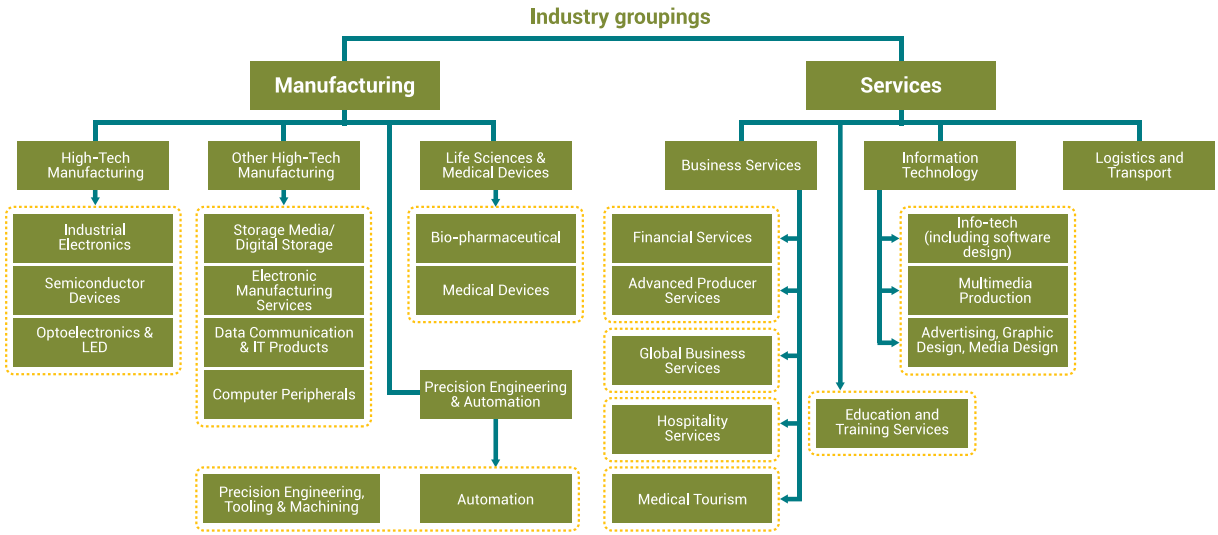
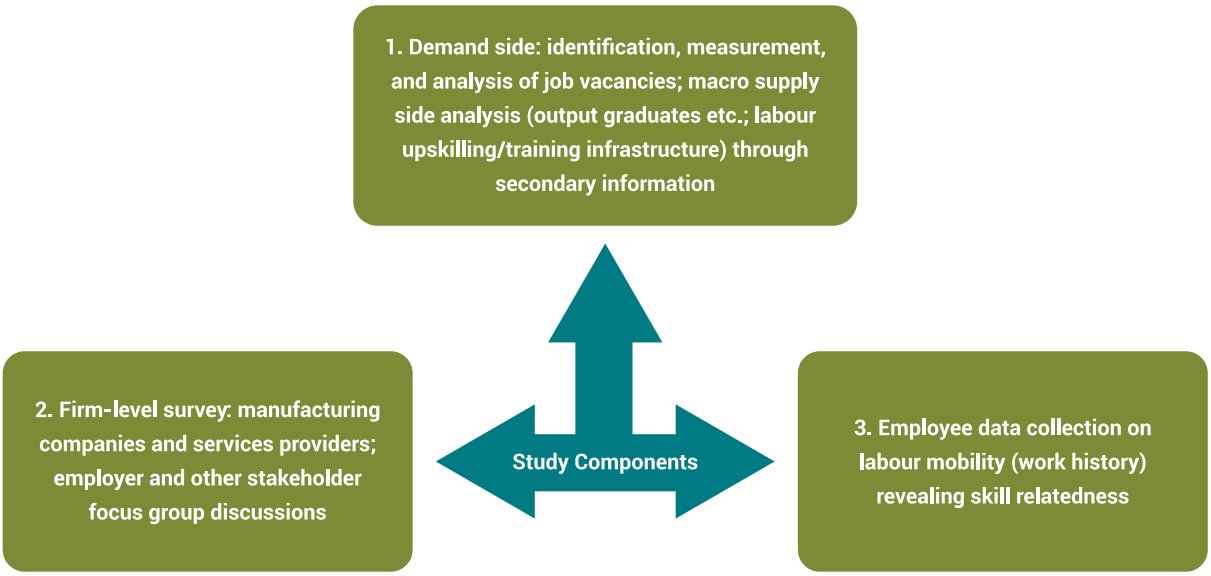


Figure 3.2: Set-up of the study



Third, besides the emulation of common information gathering methods employed in studies in this field, digital information sources that are still in the category of unconventional or experimental have been tapped. These will be explained as we discuss the work flow. The collection and analysis of data have proven to be particularly challenging as far as data processing and information analysis are concerned.

3.4 Methodological steps

The three components use mixed – both quantitative- and qualitative-oriented methods. Multiple research design is a means for understanding skill shortages from diverse viewpoints. The mixed method research design with respect to each component is explained in Figure 3.3, which depicts the elaboration of each component in methodological steps.

3.4.1 Component 1: Job vacancies, demand- and supply-side analysis

Component 1 identifies hard-to-fill vacancies and examines graduate output to meet the skill needs. Figure 3.3 illustrates the steps to administering this component, which includes defining indicators and information sources, mining job vacancy data and validating data through focus group discussions and conducting survey among companies with multiple vacancies. The specific methodological tasks of this component are detailed in Table 3.2.

Figure 3.3: Components of the study and elaboration in steps

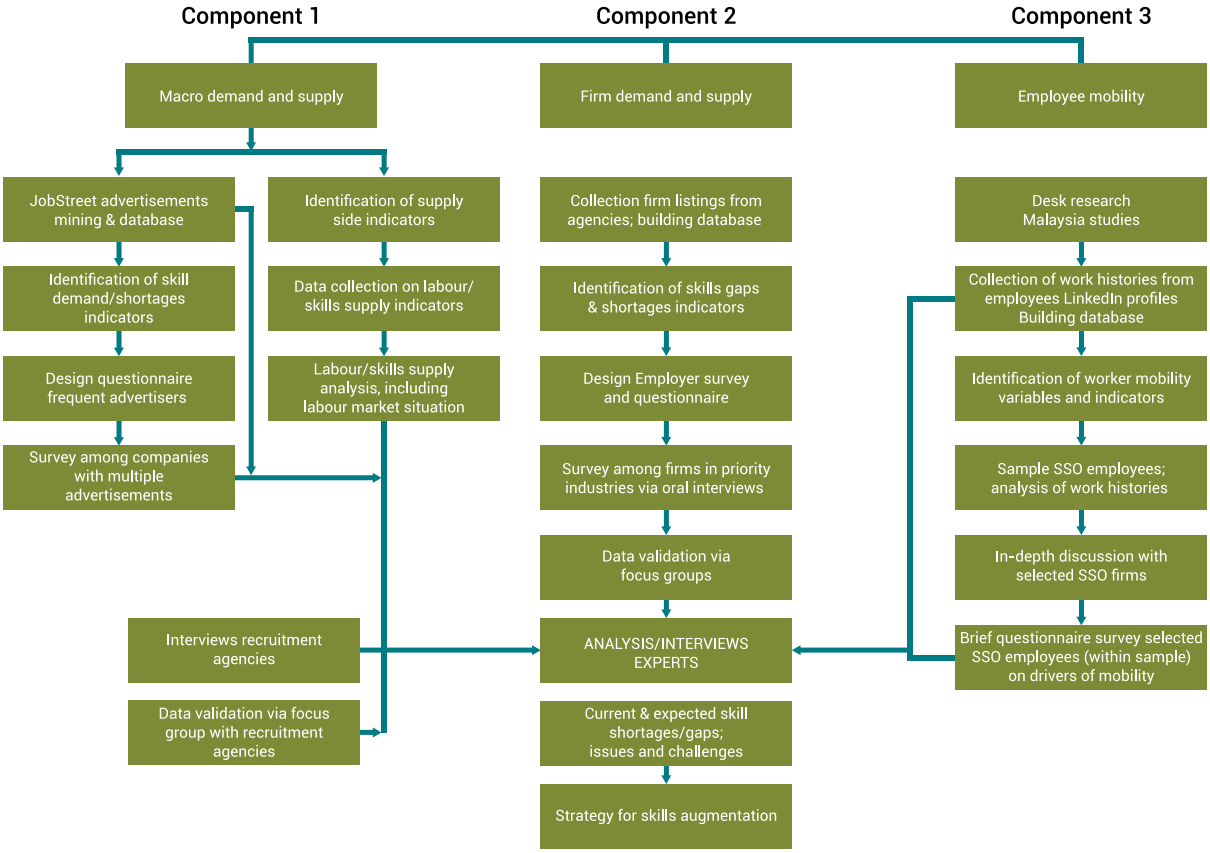


Table 3.2: Detailed description of tasks in Component 1

Step	Task	Description
1	Identification of demand and supply side indicators	See Section (a).
2	Gather secondary data on supply side	As part of this component of demand and supply side, information has been assembled from a range of sources that include the Department of Statistics (DOSM), Ministry of Higher Education (MOHE), training centres, and others. Data were also gathered on the existing upskilling infrastructure (especially private training providers) in Penang. See Section (a) for further details.
3	Define information sources on vacancies	Making an inventory of job vacancies and tracking them over a span of six months enable analysis of vacancy characteristics, including when and how they are filled. A number of criteria have been applied to assemble job vacancy listings. While the primary criterion is target-industry, vacancies in the high-skilled category weigh strong in the analysis. See Section (b).

Table 3.2: Detailed description of tasks in Component 1

4	Mine job vacancies	The main channels used to mine job vacancies are job portals and employment/ recruitment agencies such as Jobstreet.com, Kelly Services, and Penang CAT Centre. However, Jobstreet.com is the largest online job portal in the region and in Malaysia. Therefore, these vacancies have been mined over a span of about six months from the last week of December 2015 to June 2016.
5	Build a database of vacancies and skill requirements	A substantial number of (new) job advertisements appear online every month in our target industries. Within Penang region, approximately 2,000 advertisements are placed on a fortnightly basis (including new and re-postings vacancies). The nature of job postings has been observed, which consist of vacancies outlining job descriptions and skill requirements. These are posted online for a month, after which will be renewed by the advertising company (if the vacancies have not been filled yet); while some companies continuously advertise for the same position(s).
6	Conduct survey among companies with multiple vacancies	To gauge responses on advertised vacancies, selected employers have been approached to provide information on the success rate of filling the vacancies. Of particular interest were companies that frequently advertised through job portal. See Section (c).
7	Interview recruitment agencies	Insights from professional recruitment agencies have been obtained from face-to-face interviews. The recruitment agencies serve several roles in the labour market, and they have the best knowledge about the demand and supply of high-qualified skilled labour and the range of skills. Interviews have been conducted with selected recruitment agencies that provide job placement services for executive positions and higher, including expatriate staffing.
8	Validate data via focus group discussion with recruitment agencies	To validate analysis of demand and supply information, a focus group discussion with professional recruitment agencies has been organised and conducted. For the purpose of this discussion, as well as focus group meetings with other groups in other study components, a protocol has been developed. Such focus group discussion has given the opportunity to discuss: a) the relevance and comprehensiveness of the Critical Occupation List (COL) approach employed by TalentCorp[8], and the relevance of COL or Critical Skills List (CSL) pertaining to labour and skill needs of the industry; b) the contents of a Penang-specific COL/CSL; and c) the correspondence of critical occupations and hard-to-fill positions.
9	Cleaning and analysis of job vacancy database	See Section (d) below and Technical Report: Annex 7
10	Labour/skills supply analysis, including labour market situation	A major focus here is – the patterns of – recruitment difficulties, through the identification and skill characteristics of 'persistent' vacancies, and the occurrence of such vacancies in the industries and firms.

a) Macro demand and supply side indicators

In general, macroeconomic indicators for labour and skill shortages mainly consist of quantitative data provided by national agencies. These are to identify employment situation and assess labour market conditions from demand and supply perspectives. Table 3.3 provides an overview of all indicators used to measure the variables of labour and skill shortages at macro level. (See also Chapter 2, Tables 2.1; Technical Report: Annex 4)

The following section will briefly outline how the different indicators have been used to measure the variables. The first two indicators are combined under

[8] See TalentCorp (2015); Ilmia and TalentCorp (2016)

the heading *'(un)Employment'*, indicators three and four are captured by the heading *'Qualifications of output (supply) of educational institutions vs. demand, upskilling infrastructure and retention'*. Finally, the demand side indicators five and six have been amalgamated under the heading of 'vacancies'.

(un)Employment

The employment and unemployment rates are often used as indicators for labour and skill shortages. Unemployment can be an indication of qualitative imbalances in supply and demand, which could either be oversupply, undersupply, or mismatch[9]. A high unemployment rate could indicate excess supply of high-, intermediate or low-qualified labour. It can merely signify the presence of additional stock of labour. However, as noted in Chapter 2, an unusually high unemployment rate can result from employability issues associated with skill deficiencies, rather than indicating labour surplus[10]. Thus, Migration Advisory Committee (MAC, 2008b) considers unemployment rate also as an indirect indicator for skill shortages[11]. One has to note, however, that this appears contingent on overall labour market conditions. It may be less suitable in case of a tight labour market.

Unemployment could occur in certain occupations where specific educational qualifications are required. When actual skill sets are not in line with these required qualifications, employability issues occur. As a result of changes in firms' production technology, demand for workers, particularly occupations associated with high levels of education (e.g. professionals and managers) increases. When supply primarily consists of people with low levels of education, a demand-supply mismatch of skills at different educational levels will occur. Eventually, this leads to redundancy and high unemployment among low- and intermediate-educated workers. At the same time, the overall economy experiences shortages of highly educated/ skilled workers[12].

Table 3.3: Macro level variables, indicators and sources

Scale	Variable(s)	Indicators	Sources
Macro	Labour and skill shortages	**Supply side indicators**	
		1. Employed persons	• Department of Statistics Malaysia
		2. Unemployment rate	• Department of Statistics Malaysia
		3. Entrant into labour market (graduates): by field of study	• Ministry of Higher Education • Interviews/focus groups
		4. Extensiveness of labour Training/skilling infrastructure	• Interviews/focus groups • Inventory institutions/agencies • Employer survey
		Demand side indicators	
		5. Vacancies	• Department of Statistics Malaysia
		6. Vacancy fill rates and hard-to-fill vacancies	• Vacancy data and analysis, obtained from agencies and employer survey

9 See European Centre for the Development of Vocational Training (Cedefop, 2012a and 2012b)
10 See Shah and Burke (2003)
11 See Migration Advisory Committee (MAC, 2008a and 2008b)
12 See Kahn (2015)

The downside of using unemployment rate as an indicator for skill shortages is that unemployed persons could be voluntarily out of work (which is not due to unavailability of jobs in the economy). This leads to an overestimation of supply[13]. Also, while looking for a (new) job, a qualified person may temporarily be employed in lower-qualified jobs. This in contrast leads to underestimation of supply of labour that possesses a specific skill-set. However, this indicator is relevant to assess potentially existing skill shortages[14].

Qualifications of labour supply vs. demand, upskilling infrastructure and retraining

Supply of labour with specific educational attainment is often related to skill shortages. Educational attainment indicates employability of graduates in the labour market. If graduates meet the required skills and qualifications from employers, firms are more likely to fill the vacancies. Furthermore, many studies have highlighted discrepancies between the curriculum in tertiary education institutions and the competences required by employers. Also, competences expected on the basis of educational qualification and the skills job seekers can offer are largely lacking[15].

Although the balance between working skills and formal education must be timely mitigated, the education industry is often slow in responding to observed skill shortages. This is exacerbated by the different levels of specialisation and the rapidly changing skill-sets required by employers (MAC, 2008b). Even if educational institutions respond quickly, there always remains a time lag before the changes have impact.

An efficient approach is to detect demand for new qualifications early. The slow response from actors and educational institutions may amplify skill shortages and increase graduate unemployment. A better co-operation and interaction between corporate and educational/training institutions is crucial to alleviate these concerns.[16]

Vacancies

Another indicator that detects imbalances in the labour market is the number of vacancies[17]. When the number of vacancies increases, demand outstrips supply indicating an increase in the number of unfilled vacancies. This is more likely to happen to job positions and/or occupations in a particular industry or range of industries than within the same or other industries. Therefore, the breakdown of job vacancies into functional and/or occupational and/or different industries is necessary to estimate skill shortages.

The number of job vacancies is equivalent to the number of employees that make jobs vacant and the number of jobs created. In general, expansion of firms leads to new jobs. Also, when a new company decides to establish in a region, new jobs will be created. The expansion and set-up of new firms may cause skill shortages when the supply of skills in that particular region does not match the requirements of new and existing firms.

When both unemployment and vacancy numbers are available the ratio (V/U) can be used to study the relationship between employment and vacancies at the aggregate level.

Aside from the growing number of vacancies and vacancy ratios, qualitative aspects of vacancies are more of interest and relevance to address skill shortages. The average duration or search time of vacancies relate to the length of period taken for a job vacancy to be filled. Many studies make use of hard-to-fill vacancies as an indicator of skill shortages. When the duration of vacancies increases, they are referred as hard-to-fill vacancies (HTFVs), which implies that it takes a longer duration (than usual) to hire a suitable worker[18]. HTFVs or recruitment difficulties can, however, occur for several other reasons than skill shortages, such as the conditions of work offered (e.g. wages or work hours) and employers' reputation[19]. Furthermore, instead of indicating a skill shortage that needs to be addressed through market intervention, hard-to-fill vacancies may simply indicate a high turnover within the particular occupation[20]. In addition, in the case of vacancies for non-manual labour such as healthcare workers, sales workers and others, search time is longer as suitable candidates are more frequently drawn from existing market pool[21].

13 See Shah and Burke (2003)
14 See Veneri (1999)
15 See Teijeiro et al. (2013); Froy (2013)
16 See Rahman et al. (2010); JPMorgan Chase & Co. (2014); Pauw et al. (2008)
17 See MAC (2008b); Shah & Burke (2003)
18 See Haskel & Martin (1993, 2001)
19 See MAC (2008b)
20 See MAC (2008b)
21 See Andrews et al. (2008)

b) Information and data sources

General labour market information

The secondary data on macro level was obtained from the following sources: Department of Statistics Malaysia (DOSM), Ministry of Human Resources Malaysia (MOHR) and Ministry of Higher Education Malaysia (MOHE). These sources were used to obtain demand and supply side statistics of the labour market. Statistics on demand in the labour market include vacancies to assess labour and skill needs. On the other side, supply statistics consistof (un)employment numbers, share of graduates by field of study, and the extensiveness of labour training and skilling infrastructure. The Social Statistical Bulletin published by DOSM records the number of new job seekers for males and females.

We collected the number of new job seekers over the past ten years (2005–2014) so that the trend over time is studied. This was then compared with the number of entrants into the labour market. The best proxy for entrants is the number of fresh graduates in a range of study fields. These data have been obtained from various publications by MOHE, including the Graduate Tracer Study Report. Second, ILMIA (Institute for Labour Market Information and Analysis; part of the MOHR) provides information on the number of employed persons by industry and occupation, and labour force statistics (including labour force participation rate and unemployment rate). Such data are also made available by DOSM on special request. The data are, whenever possible, gathered on state-level, otherwise national data are used as a proxy. These statistics offer a picture of the current trends and conditions in the Penang's labour market. It involves statistics on labour force characteristics (such as participation rate), (un) employment numbers and characteristics), vacancies and graduates by field of study.

Digital Portal Vacancies

Besides statistical sources, data on vacancies were obtained from JobStreet. This portal is commonly used by companies to advertise vacancies. For the Penang region, approximately 2,000 positions are advertised every two weeks (both new and repostings). In Annexes 5–7 of Technical Report, collection of advertisements, relevant criteria and the building of a database are explained.

It should be noted that vacancies for higher-qualified positions are not fully captured by the vacancy advertisements. For strategic or key positions, employers prefer to engage employment/recruitment agencies rather than placing an advertisement.

All advertisements have been mined bi-weekly for a period of six months, from 30 December 2015 to 30 June 2016. Since complete datasets could not be made available by recruitment firms, job advertisements have been manually mined from JobStreet.com using sectors and job specialisations corresponding to target-industry branches. The job portal covers most industries and occupational categories in the labour market. Available search engine and classification by online job portal have been used for initial filtration. However, we have devised our own scheme to reclassify. Following initial mining, the 'behaviour' of postings has been monitored. Box 3.1 explains some observations on vacancies mining.

Box 3.1: General observations on vacancies mining

A number of scenarios are possible with respect to online advertising for vacancies. First, the vacancy is filled within the month, thus it will not be re-advertised. Second, the vacancy is not filled within the advertising period, and the company renews the posting, hence the job is advertised again in the following month.

In principle, mining every two weeks allows – through comparative analysis – identification of not only vacancies that remain open for a substantial period, but also those that are filled rather fast. However, through special accounts companies can continue advertising positions for an extended (even indefinite) period, as demand and supply dictate (e.g. advertisement results in successful recruitment but the advertisement stays open as a number of identical positions are available). It could also be the case that the vacancy is no longer advertised at the portal because it is withdrawn or has been filled internally. Such and other company behaviours limit the usefulness of length of advertising period as an indicator of hard-to-fill vacancies. Some additional caveats should be noted. Some companies engage in the practice of posting 'false' job vacancies to test/assess the current market condition. Also, employers may advertise multiple vacancies without having a certain number of positions in mind. The job portal does not trace whether and when a vacancy is being filled, or practices such as those described above.

Special software has been used to directly create Excel

files from vacancy information. This substantially helped in building a database of advertisements/ vacancies. The database comprised over 20,000 entries. Skill requirements are among the variables recorded for each advertised position (see Technical Report: Annex 7).

Interviews/focus groups recruitment agencies and educational institutions

Various primary and secondary sources have been used to obtain macro level information and data. Primary sources included semi-structured interviews and focus group discussions with recruitment agencies and educational institutions (see Technical Report: Annex 14 for topic lists for recruitment firms, life sciences and educational institutions). Additionally, semi-structured interviews with recruitment firms, training institutions and industry stakeholders were used as primary source of data (see Appendix L).

To obtain more in-depth qualitative information and insights into issues at hand, focus group discussions have been held with selected recruitment agencies and educational institutions. Focus group meetings also presented an opportunity to compile a Penang-specific Critical Occupation List (COL)/Critical Skills List (CSL), covering the demand side. This COL/CSL can be validated with the vacancies database compiled. A recruitment survey was also carried out to gather participants' opinions on skill demand, skill shortage, and challenges in recruitment of high-qualified employees. It is worth noting that most of the small recruitment firms did not attend the meeting. Attempts have been made to approach all firms who were absent from the focus group meeting, with a request to fill out the Penang-specific COL/CSL. This was done via email and by visiting the office. Only two firms responded positively.

c) Survey companies with multiple advertisements

To find out what happened to the different vacancies that were advertised, a survey was conducted by sending out a brief online questionnaire to selected advertising firms. In view of the large number of vacancies posted, it was decided against following-up a broad selection of postings every 14 days. Instead, to analyse the skills required by companies, responses, and filling of vacancies, as well as to trail repeat job postings, it was decided that focus would be made on companies that regularly post a substantial number of vacancies. An online survey method was opted because it was less time consuming than sending out letters and mailing questionnaires. Furthermore, it is more convenient for firms, likely producing a higher response rate. The questionnaire contained questions about the causes of vacant positions, how they were filled (by (un) qualified workers), and whether companies experience recruitment difficulties (see Technical Report: Annex 12, Section C). The survey schedule was incorporated into the employer survey as many firms in the database concern companies that advertise for vacancies.

Firms that were approached for this survey were selected on the basis of the number of vacancy advertisements in the given time period. A high threshold was used since a majority (about 70%) of companies had advertised between one to five vacancies. For these companies, hardly any useful results were obtained. On the other hand, the companies posting a large number of job advertisements at the same time 'took' the large majority of advertisements/vacancies. All firms selected had been posting above the average number of 11 job advertisements. This resulted in the inclusion of 100 firms that were not listed in the company database.

A major obstacle to administering the vacancy survey schedule was the lack of company (specifically HR manager) contact information as this is not included in online job advertisements. Contact information had to be obtained from various sources and/or by making phone calls. This proved to be a tedious and slow process. For this particular survey, contacts of 130 firms were collected out of the 195 firms selected. The online survey was sent to these 130 firms, and 33 firms returned the survey schedule, producing a response rate of about 25%.

d) Cleaning, organising and analysing data

Primary data

Interviews with resource persons and focus group

discussions have been recorded (subject to approval) and notes taken. The needed information has been extracted from these.

Secondary statistical data

All statistics obtained from institutions have been transferred to Microsoft Excel. This software allows conversion of data into charts and tables.

Vacancy advertisements database

A range of procedures have been employed in regard to processing and analysis of the vacancy database. An elaborate outline of these procedures is given in the Technical Report: Annex 7, and they are summarised as follows.

1. A filter was applied to extract advertisements/ vacancies by/in companies/industries within the scope of this study (see selected key industries).
2. Next, job titles that recurred across multiple subsequent mining were deleted, as these are assumed to be equivalent to unique job openings.
3. The number of unique vacancies was estimated by filtering all identical combinations of company names, job positions, and job titles. Using these criteria, there are 4,455 unique vacancies, with an average of 2.58 advertisements per vacancy and most unique vacancies are being advertised thrice.
4. By applying mining thresholds and order, high-demand positions and 'persistent' vacancies have been determined among all unique vacancies. Persistent in many cases is considered to be hard-to-fill.
5. To reduce job titles and functions of high-demand positions and persistent vacancies to a manageable number (range), classification was applied.
6. Assigning key words was also applied to arrive at a manageable listing of most frequently asked job titles and functions. In addition, to keep the number of vacancies manageable, a selection procedure was applied to companies advertising multiple vacancies.

3.4.2 Component 2: Industry and firm-level analysis

Component 2 consists of an industry- and firm-level analysis of the skill situation in Penang. For each priority industry branch, information on skill shortages and skill gaps is obtained from local and foreign firms; large, medium and small firms respectively. Figure 3.3 shows a number of steps to accomplish the objective of this component. These include building a firm database, identifying skill gaps and shortages indicators, survey and questionnaire design, up to validating data through focus groups discussion and data analysis. Methodologically, each step is further described in Table 3.4.

Table 3.4: Detailed description of tasks in Component 2

Step	Task	Description
1	Build firm database	With the use of sources from state and federal government agencies, industry associations and resource persons, a database of companies in our priority industries has been compiled. This database has a total of about 1,200 firms. See Section (a) below.
2	Identify skill gap/shortage indicators	Skill gap/shortage indicators have been obtained from literature and studies carried out elsewhere. Indicators have been adapted to the local context. Skill issues may vary among firms according to origin (local or foreign), size, and industry branch. See Section (b) below.
3	Develop survey design	As part of this study, an employer survey has been conducted to collect firm-level data pertaining to demand and supply of skills, and skill utilisation. Decisions in regard to actually conducting the survey were taken and revised as this component evolved. See Section (c) below.

Table 3.4: Detailed description of tasks in Component 2

4	Develop questionnaire	A questionnaire has been developed for the employer survey. It follows questionnaires designed for similar surveys conducted in UK by the United Kingdom Commission for Employment and Skills (UKCES, 2013), in European countries by the European Centre for the Development of Vocational Training (Cedefop, 2013), and by World Bank[22]. Also, questionnaires employed in consultant studies carried out earlier in Malaysia have been considered[23]. For questionnaire: Refer to Technical Report: Annex12, and Section (c) below.
5	Select firms	Firms whose businesses belong to the priority industry branches constitute the population of the company survey. Criteria for firm selection for participation in the survey were devised as this component evolved. See Section (c) below.
6	Administer questionnaire	The questionnaire has been administered among selected firms from the company database. Due to poor response to the online survey, face-to-face interviews have been conducted with selected firms. In the end, interviewed firms were representative of the population in terms of numbers, industry, and firm distributions. See Section (c) below.
7	Validate data via focus group discussion for respective industries	Focus group discussions were envisaged with groups of employers representing the key industries. Focus group discussions with specific industries were meant to validate the survey information gathered. For the purpose of this discussion, a protocol similar to the one used for the employment/recruitment agencies has been employed. These focus group discussions also gave the opportunity to discuss: a) The relevance and comprehensiveness of the Critical Occupation List (COL) approach employed by TalentCorp, and the relevance of COL or CSL to express skilled labour requirements of and availability to industry; b) The contents of a Penang-specific COL/CSL; and c) The correspondence of critical occupations and hard-to-fill positions.
8	Collect upskilling/ training infrastructure	As the company survey also covers human capital training, an inventory of the current training infrastructure in Penang has been made. A range of sources have been used for this purpose.
9	Data analysis	See below

[22] United Kingdom Commission for Employment and Skills (UKCES, 2013); Employer Skills Survey 2013. Technical Report. London: UKCES; European Centre for the Development of Vocational Training (Cedefop) (2013). User guide to developing an employer survey on skill needs. Publication Office of the European Union, Luxembourg; Gaëlle et al. (2014)

[23] ILMIA/UPM (2016); IPSOS (2012, 2014a, 2014b); PwC (2013a, 2013b); World Bank and ILMIA (2014)

a) Building a company database

An attempt is made to compile a relevant/valid company database through company listings acquired from local authorities and federal government agencies. These include MBPP, MPSP, SSM and MIDA. MPSP and MBPP provide lists of firms, which have applied for licenses to operate businesses in Seberang Perai and Penang Island. There prove to be significant drawbacks and deficiencies in the listings provided by individual agencies.

Despite the fact that the lists provided by both local councils could be complete, MBPP's list was of little use due to lack of convertibility in a format necessary for compiling our targeted database. The main drawback of the firm listing furnished by MPSP pertained to the business activity not being classified according to the standard schema. However, it was still used as a reference in developing our company database, and some reclassification was done using the Malaysian Standard Industrial Classification (MSIC) 2008. General issues are the incongruities of industry coding between the listings obtained from the various agencies, as well as apparent lack of comprehensiveness.

SSM's firm listing appears to have a suitable coverage: it captures existing companies – incorporated in Penang – registered with the Registrar of Companies (ROC). SSM uses MSIC (2008) to classify company's business activity. A major issue that surfaces when we go through this firm listing is the manifold mismatches between industry coding and actual nature of business. Due to errors and inconsistencies in allocation of industry code, individual codes produce a heterogeneous set of firms, many of which are actually not part of the target industry. Also, firms in a target industry are found under non-expected and multiple industry codes but it is not possible to immediately detect which ones. A fuzzy coding implies the risk of missing a substantial number of firms in a target industry.

We manage to develop a procedure to resolve this issue, and establish the codes set for our target industries[24]. Although this procedure is feasible, we decide to employ a more direct approach by approaching specific industry associations and consulting websites such as booking.com, agoda.com and so on. Table 3.5 lists agencies that provide company lists.

b) Meso- and micro-level skill shortage and gap indicators

At the meso-level, the indicators shown in Table 3.6 have been used.

At the micro-level, the indicators shown in Table 3.7 have been used.

Table 3.5: Institutions that provide company lists

Industry organisations	Local authorities	Recruitment agencies
• Federation of Malaysian Manufactures (FMM) • Malaysia Biotech Corp • Penang Foundry & Engineering Industries Association (PENFEIA) • Association of private hospitals of Malaysia (APHA) • Malaysia International Chamber of Commerce and Industry (MICCI)	• InvestPenang • TalentCorp • Malaysia Investment Development Authority (MIDA)	• Kelly Services • EPS Consultancy

[24] This procedure involved using the MIDA database as entry, additional collection of firm listings from associations, clubs, consortia, and so on (FMM, Chambers of Commerce, Penang Industrial Clusters and resource persons), for codes identification, cross-checking, and validation purposes.

Table 3.6: Meso-level variables, indicators and sources

Scale	Variable(s)	Indicators	Sources
Sectors/industries	Skill shortagess	1. Hard-to-fill-vacancies 2. Most frequently asked job titles	• Vacancy data analysis • Focus groups • Employer survey
	Skill deficiencies and gaps	3. Training 4. Skills that need the most improvement	• Focus groups • Employer survey

Table 3.7: Micro-level variables, indicators and sources[25]

Micro	Variables	Indicators	Sources
Firms	Skill shortages	1. Hard-to-fill vacancies 2. Positions not filled 3. Length of time to fill vacancies 4. % of applicants fully meet requirements 5. Labour poaching 6. Firms' recruitment standards 7. Labour turnover 8. Under hiring	• Employer survey • Focus groups
	Skill gaps	1. Skill proficiency level 2. % of fully skilled employees 3. Skills that need the most improvement 4. Preparedness of employees' new tasks 5. Labour turnover 6. Training	• Employer survey • Focus groups

Recruitment standards include educational qualifications, wage limits, fringe benefits and language level, to name a few. In the search for skills, employers will mostly recruit internally before they outsource in the external labour market. In a tight labour market characterised by high levels of demand, firms' recruitment standards might decrease compared with markets with high levels of supply. In order to find a suitable candidate who possesses the right skills (language proficiency and educational qualifications), employers might oblige by offering higher wages (premium), interesting fringe benefits, or lower qualification requirements. Firms that are willing to lower standards are expected to face skill gaps rather than shortages. Employers offering high(er) wages within firms can be an indication of skill gaps[26]. To gauge firm recruitment standards, employers have been asked if they provide special incentives to hire a candidate who possesses all the required skills and is able to choose among offers from different employers.

[25] See Andrews et al. (2008); Combes & Duranton (2003); Sheldon & Li (2013); Stevens (1996)
[26] See Schlicht (2002)

c) Survey design, questionnaire, company selection and administering questionnaires

An *online survey was* originally envisaged. However, given the limited information available on individual companies, additional information has to be collected for such a method to be employed. Companies were contacted by phone to verify their existence, their industry branch, persons-in-charge of personnel matters, and their email addresses and contact numbers.

An introduction letter explaining the motivation of this study was mailed to all firms in the database. This is to ensure that the target companies are aware of this study; the letter also emphasised the benefits of participating in the survey. Unfortunately, a number of letters were returned because of incorrect address, relocation and company closure.

Subsequently, after verifying the telephone numbers, companies were contacted to collect the required information. It is important to note that a substantial number of telephone numbers were either not in service or incorrect; also, when contacted, a number of respondents (16% of companies, including Financial Services companies where all HR operations are headquartered in Kuala Lumpur) declined to provide information as they were unwilling to participate in the survey.

The questionnaire consists of seven sections[27]. The first section has questions on company particulars such as name, business activity and origin. The second section has questions pertaining to current employment in the firm. The third section covers questions on skill requirements of current workers and skill gaps. This is followed by the fourth section with questions on the impact of and remedial measures to skill gaps. Questions on labour recruitment, skill needs and shortages constitute the fifth section. Questions on the consequences and responses to skill shortage and firm's views about the local labour market, skill situation, and the way skill issues should be addressed are covered in the last two sections of the questionnaire. Naturally, question-and-answer categories (closed questions) are adjusted to the Penang context.

The earlier interviews with recruitment companies and agencies also served the purpose of allowing validation of the questionnaire in regard to operationalisation and measurement of variables, indicators, and set-up. To test the schedule, a pilot survey among a small number of companies from different industry branches was carried out. Three companies from Medical Devices, Hospitality Services and Professional Services participated in the oral pilot interviews.

The questionnaire was then adapted based on the feedback and responses from the pilot survey. As the length of questionnaire can be a factor influencing survey participation, care was taken to limit the length of the survey to reduce non-responsive outcome due to the amount of information asked.

Out of the 1,200 companies in the database, less than half of the attempt to obtain contact information was successful. All companies with contact information were initially included in online surveying.

These companies were sent a second letter reiterating the nature and importance of the study, the importance of participation and the benefits for the company. This was followed up with information on the link to access the online survey.

After the initial limited response to the online survey, many calls were made to these companies, specifically the persons-in-charge of HR to explain the objectives of the online survey, the importance of participation, and the deadline for submission.

As response remained poor, several strategic changes have been undertaken to increase the responses. These include:-

1. The survey schedule was shortened, making it less time consuming.
2. The shorter survey schedule was emailed to all companies for which email address was available. In an accompanying letter, companies were again

[27] See Schwalje (2012)

invited to participate.

3. Selected companies were approached directly with a request for an oral interview with the top management through contacts shared by industry associations. Some recruitment firms have also been helpful in providing contact information of human resources managers in relevant companies.
4. Due to the low rate of responses, additional assistance from a number of industry associations was sought for distribution of the questionnaire among their member companies. Leaders of various industry associations have been contacted to urge members in their regular committee meetings to return the questionnaire. Associations that have assisted in this are FMM, PSDC and InvestPenang.
5. In addition, calls were constantly made to remind invited companies to return the questionnaire and to make appointment for oral interviews.

Finally, a satisfactory response rate was achieved with a total of 92 responses in about six months of data collection.

d) Focus group discussions

Unfortunately, a number of envisaged focus group discussions, it proved rather impossible to bring together sufficient participants, as a result of which a number actually could not proceed.

3.4.3 Component 3: Employee analysis on mobility behaviour

The third component examines labour mobility at employee level. From this, patterns of skill-relatedness can be deduced[28]. For a number of reasons to be clarified below, research was exploratory and experimental rather than encompassing comprehensive analysis. Figure 3.3 demonstrates six of the steps comprising this study component. The detailed description of each step is given in Table 3.8.

Table 3.8: Detailed description of tasks in Component 3

Step	Task	Description
1	Desk research	Through various channels, studies on mobility of higher-qualified labour were searched. The focus was on Malaysia. Beyond the aspect of brain drain, little studies can be found. While several were obtained, it is clear that labour mobility is still an under-researched area in Malaysia.
2	Collect employee work histories Define information source	To examine labour mobility across industry branches and occupations in Penang, as well as skill-relatedness, data have been collected on work/job history of individual employees. LinkedIn profiles constitute the main source of information. A database of work histories have been constructed by extraction and downloading LinkedIn profiles supplemented by information from other sources, and translating these into a MS Excel file. See Section (a) below.
3	Identify drivers, variables and indicators for mobility	Based on the drivers, relevant variables and operational indicators concerning labour mobility have been determined.
4.	Sample selected employees for analysis	For practical reasons, a subset of employee work histories was sampled from the LinkedIn profiles for one single destination industry.

[28] See Otto & Weyh (2014)

5	In-depth discussions firms	In-depth interviews were conducted with selected firms to uncover more about their labour recruitment strategies and sources (specifically the role of the secondary supply), preferences as to background of workers, labour turnover and HR management practices, and other mobility aspects.
6	Develop and administer a brief questionnaire among a selection of employees in the earlier sample	A brief online questionnaire was implemented to gather additional information on employees' work histories and their behaviours in job change. The questionnaire has been developed using Google Form. As to selection of employees, persons in the earlier LinkedIn profiles sample were contacted for whom a contact email address was available. Thus, the main method used to administer the questionnaire was dissemination by email.
7	Build a questionnaire data file	Completed questionnaires provide the input for a data file of individuals. See Section (b) below.
8	Data analysis and presentation	See Section (c) below.

a) Database of work histories

Jobs Malaysia was approached to obtain CVs of job seekers as it is a public domain kept by the Ministry of Human Resources. It holds open access CVs of job seekers. However, it was decided not to use this source. It proved to be hard to access; furthermore, all information is administered by the headquarters situated in Kuala Lumpur, rendering compilation of CVs difficult. While a search made at the portal of Jobs Malaysia revealed nearly 9,000 CVs stating Penang as the (preferred) place of work, compilation of CVs would be much simpler if Jobs Malaysia is able to provide a database in a ready-to-process format. Thus, LinkedIn was the most feasible source to collect CVs or work history records of employees in Penang. Similar to JobStreet, LinkedIn has its own industry classification, which does not fully match our priority industry branches. Yet, using a LinkedIn sales tool profiles have been mined within our scope of interest including higher-level qualifications and job function, position level, current location, industry type and seniority.

More than 20,000 profiles have been mined of persons who met the selection criteria. Of these, only a small percentage (15%) contained a verified email address. One important caveat to note is that LinkedIn does not trace the latest status of a LinkedIn account. A LinkedIn profile can be changed in real time where the employee profile registered in the database is assumed to be the most updated at the time of mining. Any revision made after the time of mining would not be registered in our database. The profiles collected resulted in a raw database in excel format, rows constituting work histories and other characteristics of individuals.

After some time, a number of significant drawbacks of the database became clear. Foremost, these involved the use by LinkedIn for classifications and categorisations of important variables that were inconsistent with either Malaysian classifications and/or categorisations that were deemed most useful for the study. Also, some necessary variables would have to be inserted manually, derived for other information in the profile. Cleaning and reworking the entire database will be tedious and time consuming, and we will not be able to complete this within the time frame given for this study.

It was therefore decided to consider only part of the database for processing and analysis. We decided to focus on only one destination industry, which is global business services (GBS) – or shared services. This was based on several reasons. First, it is a rather 'young' industry in Penang that is growing fast and that the state government is seeking to develop further. Second, part of this industry offers highly skilled jobs in a market that is already tight. At the same time,

sought-after in the market. Third, chain mobility effects in the labour market can be expected of growth of such a new industry; it will be interesting to consider the implications. After proper classification of industry of current job[29] to fit our own classification, employees currently in GBS can be extracted and further sampled. The final sample comprises some 300 individuals.

b) Questionnaire

A brief employee questionnaire has been developed consisting of several sections. The first section specifies the respondents' current employment status. The second section comprises questions pertaining to respondents' previous employment characteristics, including the commencement and end of each job, as well as its locations. It covers the respondents' last three jobs. This is followed by a third section with questions on drivers of job change and job satisfaction. Finally, personal particulars of the respondent covers the last section. A copy of the questionnaire is presented in Technical Report: Annex 13.

A digital form of this questionnaire has been made using Google Form. With a view to response, care was taken to ensure that completing the questionnaire would not take more than 20 minutes. For practical reasons, cases were selected from the sample that contained a verified email address. An invitation to fill the online questionnaire was sent to these persons by email. Of the approximately 100 persons invited, about half responded positively and returned the questionnaire.

c) Data analysis and presentation

This concerns the work histories and other characteristics of employees in the Global Business Services (GBS) sample of profiles and information obtained through the returned questionnaires.

3.5 Templates for discussion of (industry) results

To properly structure the presentation and discussion of our study findings, templates have been developed for Chapters 4–9 of this report. The templates for the macro-analysis, for individual industries within the scope of the study, and for mobility analysis are included in the Technical Report: Annex 11. We have opted to include recommendations following the findings into each of these templates, covering a skills strategy on issues raised in each perspective, which are macro-, meso- and micro-levels. Recommendations – general part and industry-specific parts – follow from analysis of issues, nature, and causes of skill shortages and gaps. We also highlight the roles of institutional framework.

3.6 Implementation obstacles and methodological limitations

This report is prepared based on information obtained from secondary research and information supplied to us by key stakeholders via interviews, surveys (questionnaires) and other means as highlighted in this chapter. Due to obstacles met during implementation, there are some limitations in regard to the findings presented in this study. The major limitations are as follows.

Component 1

The macro-level (statistical) data, obtained from secondary sources, should be handled with caution since there are several possible shortcomings. As it turns out, data are often incomplete, unavailable and/or inaccessible, which limit the possibility of analysing. Sometimes data are only available on national level and cannot be disaggregated to state-level. Besides that, multiple measures from different data sets were used, which can lead to different conclusions. Therefore, secondary data should be used and interpreted carefully (Veneri, 1999). Furthermore, it is important to note what some measures can and cannot explain. For example, when employers advertise a lot of vacancies, it does not necessarily mean they experience shortages (the company might be growing). Trends in vacancy data should therefore be evaluated together with other labour market indicators to understand the labour market

[29] GBS being a value chain activity in larger firms, in a number of cases GBS activities had been added to the portfolio of activities in already existing establishments in Penang, in the form of a new department (e.g. Intel's Shared Services Centre). This was taken into account in classification and labelling of current industry and the extraction/sampling procedures.

conditions and dynamics. Lastly, the vacancy data is a new way of obtaining information on the demand side of the labour market. Although JobStreet is the biggest job portal in Malaysia, it cannot be confirmed that it is representative of the entire labour market. Therefore, findings should be interpreted with caution and cannot be generalised. Besides that, this medium has not been used before, so procedures of filtering and analysing data are totally new. No reference projects or examples could be used in the approach, therefore the full process and steps taken in the analysis procedure are rather subjective. We have made sure to carefully explain each step in the analysis so that transparency is assured. In an environment where evidence for improving procedures is held in high esteem, drawing broad inferences from this observation merits careful interpretation.

Component 2

It has been noted that the validity, comprehensiveness, and information included in existing company databases in the state leave much to be desired. This should be given attention by authorities as updated and good quality databases are prerequisites for good research. Contact details of relevant firms derived from available company lists were often outdated, rendering the collection of current contact details of relevant firms difficult. Also, it was hard to obtain valid email addresses of human resource managers and directors. General email addresses of firms were of less value because they often get ignored. As a consequence, a thorough review of contact details has to been done by telephone or internet. This review was only partly successful. Many valid email addresses of HR managers were gathered through networking.

The employer survey used in this study to map out the skill situation of firms within industries also had its challenges. In the above, we have already discussed the limited response rate to the employer survey in the original and online formats. This can be ascribed to several reasons that negatively influenced the willingness of firms to participate. Various firms declined to participate in our study because they had participated in similar studies without much success. Next to that, they might assume that these types of studies are politically coloured to a certain extent. Also, employers exercise restraint in revealing recruitment strategies since they are all competing for the same pool of talented labour. No organisation wants to be open about the issues at hand. They indicate confidentiality of information and sensitivity of the topic as obstacles in participation. Furthermore, firms are still not entirely used to online surveys. Finally, questionnaires may have been considered lengthy and tedious to fill out. In this respect, the dilemma of the research team was the proper trade-off between information needed and time consumption of respondents. While survey is time consuming, oral interviews appear to be the best option. However, it remains difficult to set appointments with relevant firms as they are reserved in their availability and responses.

In the above, we have already explained how for the same reasons, participation in focus group discussions was rather meagre. This has implications for the depth of the qualitative information that could be collected and used.

Component 3

One major obstacle in labour mobility study is the difficulty of reaching employees (and the correct group). Companies often do not approve of their employees being approached, while employees do not want to be inconvenienced after work hours. We have already explained the issues surrounding the use of LinkedIn profiles to study mobility flows. These issues concern foremost classification/categorisation inconsistencies and incompleteness in regard to variables. Both issues are tedious and time consuming to resolve, especially if an initial database consists of thousands of cases. For all these reasons, a more limited set-up of the study of labour mobility gradually evolves. This is not necessarily a drawback as the component of mobility and skill-relatedness are meant to be exploratory and experimental, given the relative absence of labour mobility as a field of research in Malaysia. However, the set-up precludes a comprehensive picture of mobility patterns and skill relatedness, and what these do in the labour market. It is hoped that at some point,

a faster way of cleaning and reworking databases derived from LinkedIn becomes possible as LinkedIn starts to require members listing information in a way that it corresponds to international (classification and statistical) standards.

Although good quality and interesting software has become available to graphically depict mobility flows in novel ways, this software (Circos has been used for this purpose) is highly complex and difficult to operate.

4

HIGH-QUALIFIED LABOUR AND SKILLS: THE DEMAND SIDE

In this chapter, we analyse the demand side of Penang's labour market focusing on high-qualified employees in both quantitative and qualitative aspects. We discuss current drivers in the forms of upgrading and new directions in Penang's pathway to a higher-income economy. Next, we elaborate on current development of, and shifts in, demand for high-qualified labour in relation to investment trends, job vacancies, and firm recruitment patterns. The specifications of job vacancies and recruitment provide insight into the labour skill demand trend according to major occupations and industries in Penang. While the main emphasis of this study lies on the current situation and the immediate years ahead, it also prompts a brief consideration of debates on the future of work/jobs, and what that may imply for Penang[30].

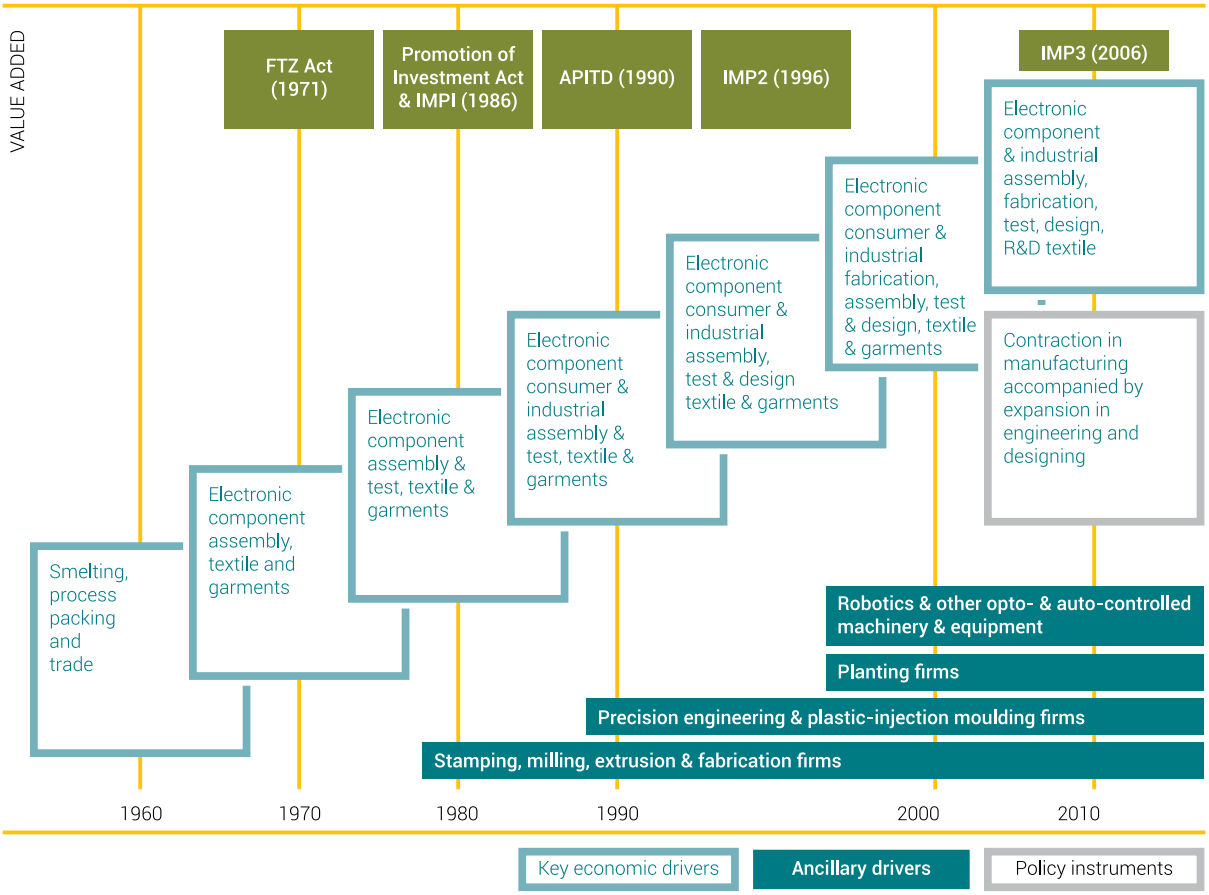
[30] Earlier versions of parts of this chapter are included in the project inception report, and Terhorst, J. and T. Verbraeken (2016). Making the Transition into a High-Income Economy: The Penang Case. Master Thesis, Department of Human Geography and Planning, Faculty of Geosciences, Utrecht University, The Netherlands.

4.1 Penang's next economy and skill demand

Penang's pathway of development into the 2000s has continued to privilege industrial development for some time. It is attributed to the gradual technological deepening of manufacturing in the MNC-led and SME-led segments. This is illustrated in change of the value-added profile (Figures 4.1 and 4.2).

In the process of upgrading – segments of – industries have started to dwindle as low-value assembly operations have moved out, substituted by higher value operations (e.g. semiconductor and computer storage), or have even ceased to exist (e.g. consumer electronics). At the same time, new industries have started to expand (e.g. medical devices).

Figure 4.1: Industrial development in Penang, 1960–2010



Source: Kharas et al. (2010) p. 34

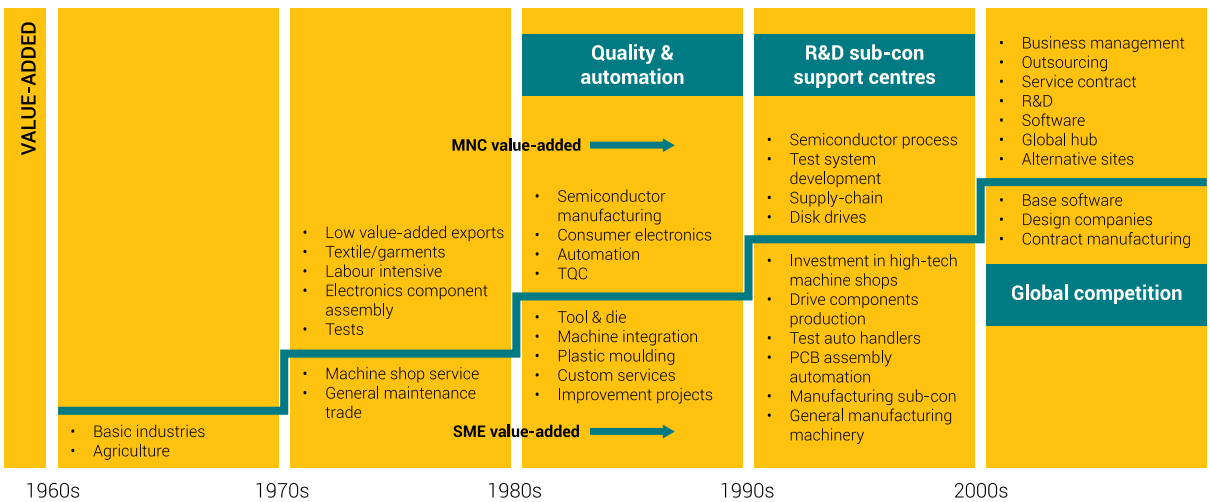
More recently, these trends have been reinforced with the following developments: first, a further maturing of Penang as a production platform offset by MNCs moving operations along the value chain, or selecting Penang as a location for non-production operations (e.g. research and development, design, shared services). Second, cluster development resulting in integrated chains in a number of industries. Clusters have also been labelled as eco-systems, by any considered a strategic advantage of Penang in the competition for investments. Third, there is a further industrial diversification within manufacturing. Fourth, eco-systems have been influenced as SME-dominated industries have begun to move from incipient stage of being linked to MNCs to gradual delinking and towards either more sophistication (e.g. successful firms in automation) or stagnation. Fifth, there is an emerging and deepening services sector.

Positive growth linked to some of these developments has resulted in part from active local government policy intervention to counteract the gradual stalling of other developments. The latter has not been unique to Penang as Malaysia as a whole has been confronted with the middle-income trap. Kharas et al. (2010) offered a useful discussion of the stalling trend[31]. To a certain extent, the national strategy to counter the middle-income trap – the Economic Transformation Programme (ETP), elaborated in the Key National Economic Areas (NKEAs) and the Northern Corridor Development Plan[32] are also in place to facilitate growth in the region.

MNCs in a number of industries have frequently integrated R&D, high technologies activities (application development and the design of electronics), and shared global business services into Penang-based business processes. As a case of diversification within manufacturing, the medical devices industry has grown rapidly; at the same time, new industries such as LED, Aerospace and Renewable energy have started to emerge by the mid-2010s at the incipient stage.

Meanwhile, the situation of local SMEs in some industry branches has become critical with low-tech manufacturing activities of MNCs moving to lower-cost locations such as China and Vietnam. With a decrease in demand, local SMEs started to sell their low-end products overseas to MNCs in China. However, due to strong competition from Chinese SMEs (costs and

Figure 4.2: Value-added roadmap – the Penang story



Source: Kharas et al. (2010) p.36

[31] Kharas et al. (2010)
[32] See the Economic Planning Unit (2010, 2015) and Koridor Utara (2007)

geographical proximity), it has become increasingly harder to continue business in China. Many local SMEs have been slow to invest in manufacturing upgrades. Overall, one can say that local SMEs have had difficulties adapting to structural market changes. Mismatch between MNCs and local SMEs today exists[33].

The strategy was to further diversify by expanding the services sector. Besides professional and business services, shared services has been targeted within the scope of this sector (although formally speaking, Global Business Services (GBS) operations are more appropriately designated as 'moving up' in terms of the value chain of both foreign and domestic companies).

In 2006, the manufacturing sector represented 56.3% of Gross Regional Product (GRP). This has dropped to 44.6% in 2016 (still substantially higher than in Malaysia as a whole). In contrast, the services sector has grown from 39.5% in the share of GRP in 2006 to 49.2% in 2016 (Table 4.1) with a slightly higher annual growth rate compared with manufacturing sector.

This trend will be reinforced as the next phase in economic strategy that commenced in 2013–2015 started to produce results. According to an unpublished internal study conducted by Penang Institute, the background and objective of the strategy is to provide a push to – some argue, or restore – dynamism to Penang's economy in addressing the middle-income trap. Since the global financial crisis, Penang's economic growth – while still comparable – has outpaced the national economic growth, while prior to the crisis, this was actually the case (see Figure 4.3). Paralleled with the 11th Malaysia Plan (2016–2020), and the still evolving 'Northern Corridor Development Strategy' (2007–2025), it is important to focus on continued restructuring, expanding new growth areas, and addressing constraints to these.

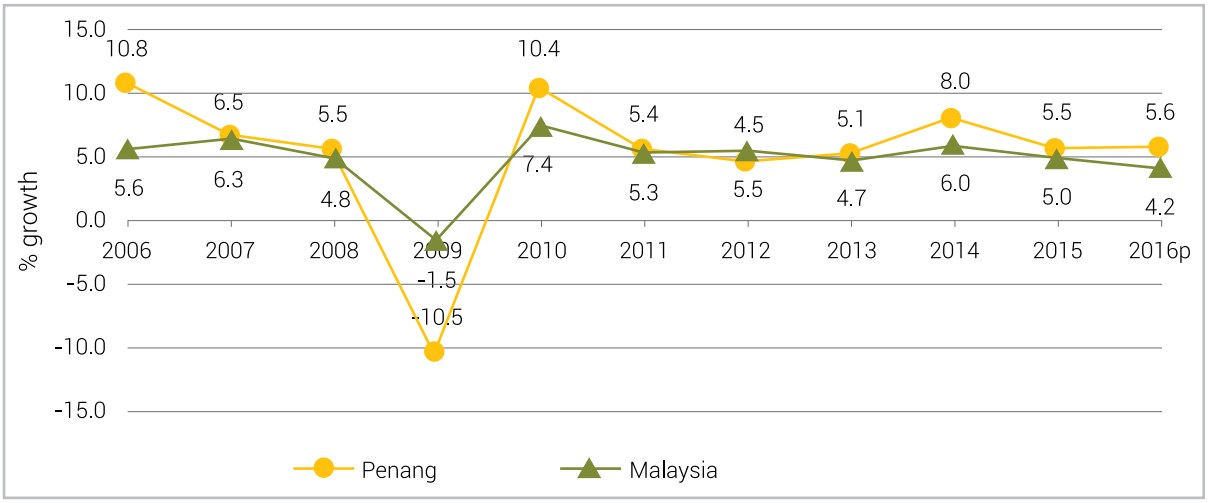
Table 4.1: Malaysia GDP and Penang's GRP growth and share percentage, 2006 and 2016

Economic activity	Malaysia				Penang			
	% growth		% share*		% growth		% share*	
	2006	2016	2006	2016	2006	2016	2006	2016
Agriculture	5.8	-5.1	8.3	8.1	10.4	-2.8	1.6	2.0
Mining	-1.2	2.2	12.4	8.8	0.0	8.7	0.0	0.1
Construction	-0.5	7.4	2.8	4.5	-3.7	10.4	1.9	3.1
Manufacturing	7.4	4.4	28.0	23.0	15.0	5.4	56.3	44.6
Services	7.2	5.6	47.5	54.3	6.3	5.6	39.5	49.2
GDP growth/share	5.6	4.2	99.0	98.6	10.8	5.6	99.3	99.0

* The share does not add to 100% due to import duties.
Source: Department of Statistics Malaysia (DOSM)

[33] See Hutchinson & Saravanamuttu (2012)

Figure 4.3: Growth rates of national GDP and Penang's GRP, 2006–2015*(%)



*Data from 2006–2010 are at constant 2005 prices while 2011-2016 are at 2010 constant prices.
p Preliminary
Source: Department of Statistics Malaysia (DOSM)

Positioning Penang

The 2010 Khazanah's 'Positioning Penang' report[34] provides not only an insightful overview of trends, opportunities, and constraints in the development of the Penang's economy, but also indicates areas that can drive growth in the decade(s) ahead. These concern three major areas and six focus areas. The main areas include MNCs further moving up the value chain, new variety in manufacturing and services industries, and growing SMEs. In terms of industries and level of sophistication, the six focus areas are: -

- Technology-based manufacturing including more sophisticated electrical and electronics manufacturing, medical devices and automation;
- Bio-technology and life sciences;
- Business Process Outsourcing (BPO);
- Logistics;
- Tourism (with niches in medical tourism and meetings, international conventions and exhibitions-MICE); and;
- Agribusiness.

These six branches share three characteristics that when combined, increase the likelihood of which can be successfully developed in Penang: scale economies, linkage with regional and global demand through cross-border supply chains, and the possibility to exploit Penang's existing strengths. The latter is a function of 'proximity' to existing products in the Penang product space; stated otherwise, it constitutes related variety.

An internal study from Penang Institute found that most of the focus areas listed above outlines a vision on, and a roadmap for, reinvigorating Penang's economy. Building on Penang's strengths and opportunities, the roadmap includes the following elements.

- Technological upgrading and moving up the value chain in manufacturing and services;
- Building modern services;
  - Tourism;
  - Medical Services/Healthcare;
  - Regional Education Hub;
  - Shared Services Outsourcing (SSO);
  - Creative Industry;
- Growing SMEs; and
- Innovation through Science and Technology.

[34] See Kharas et al. (2010)

Table 4.2 summarises Penang's strengths and opportunities with respect to the key economic areas. Many new skill requirements follow from these ideas and determine the possibility to further exploit and expand the existing innovation initiatives. Meanwhile, Tables 4.3 and 4.4 list the key industries, activities and initiatives constituting the core of the economy.

Table 4.2: Key economic areas

Economic area	Penang's strengths	Penang's opportunities/focus
Technological upgrading; further moving up the value chain	The presence of MNCs and their well-established eco-system; competent SMEs.	E&E industry (including automation/machinery/ precision tooling, fabricated metal products, plastics, transport equipment) readiness to move up the value chain by setting up R&D, service centres, and spur innovation. Further growth and diversification of high-tech manufacturing (such as life sciences, including medical devices and bio-pharmaceuticals) and high-tech bio-agro sector.
Modern Services		
Healthcare	High quality healthcare providers in public and private sectors and well-trained personnel.	Shifting demographic composition hence readiness for Remote Healthcare, existing regional demand and ageing population.
Tourism	UNESCO world heritage site, nature, well established hospitality industry, top medical tourism destination in the country, and world-class home-grown athletes.	Middle and high income groups, growth of international tourism, changing demography linkage tourism and heritage, medical services and eco-initiatives.
Business Services	Quality human capital and facilities.	Positioned to be the Northern hub with strong MNC presence and future well-built SSO/BPO hub. High-end SSO; linkage with ICT sector.
Education Hub	Well established tertiary institutions such as USM and supporting facilities.	Becoming an education hub, attracting foreign talents and opportunities to establish a research university.
Creative industry	Talent, technology, and tolerance	Visual arts, crafts, film and TV production, performing arts, human capital development, music, digital and multimedia content, as well as marketing, sales, and distribution.
SMEs	Niche competences; SMART centre, SME villages, SME centre.	Growing beyond supplier role into independent exporters.
Innovation	The presence of MNCs and their well-established eco-system.	Harnessing Penang Science Cluster and existing innovation initiatives.

Source: An unpublished internal document by Penang Institute

Table 4.3: Key industries for which Penang has the competencies to further develop

High value-added engineering		Modern services
High-tech manufacturing	**Life sciences & food processing**	
• Light Emitting Diodes (LED) • Radio Frequency Identification (RFID) • Integrated Circuits (IC) • Automation and precision machinery • Automotive • Broadband equipment • Renewable energy • Oil & Gas (O&G) facilities	• Medical devices • Bio-pharmaceuticals • Food processing • Halal industry • Agriculture & Agro Life Sciences • Aquaculture	• Tourism • Education • Shared Services Outsourcing (SSO) • Information Communications Technology (ICT) • Creative hub

Source: An unpublished internal document by Penang Institute

Table 4.4: Existing innovation initiatives in Penang (excluding corporate R&D)

Initiative name	Main stakeholders	Activities
Collaborative Research in Engineering, Science & Technology (CREST)	TalentCorp, Northern Corridor Implementation Authority (NCIA), Khazanah, MIDA, USM, MNCs such as Avago, Altera, AMD, Agilent, National Instruments, Motorola, Intel, Siltera, Osram, Western Digital, and Seagate	R&D, talent development & commercialisation on E&D, focus on: • Integrated Circuits (IC) & Embedded Systems • Optoelectronics • Radio Frequency (RF)
Centre of Excellence for Electrical & Electronics	Penang Tech-dome	Hub for technology learning and exchange of ideas. Vehicle for improving scientific literacy and technology ability in Penang.
PSDC Shared Services Centre	Penang Skills Development Centre (PSDC)	Laboratories for Design & Development (D&D) include: • Electromagnetic Compatibility Lab • RF Lab • Embedded Systems Lab
Techmentor programme	Penang Science Cluster (that runs the Penang Science Café)	1. Promoting Effective Schools through Enhanced Education Management (ESTEEM) teaching environment that includes: • Engagement • Science • Technology • English • Engineering • Mathematics 2. Conducting TechMentor to recruit and train engineers from the industries, undergraduates and parents of students to be mentors for the school. National Instruments, B. Braun, and Keysight are among the companies that have participated in the programme.
Karpal Singh Penang Learning Centre	Penang Youth Development Corporations (PYDC)	Teach Engagement, Science, Technology, Engineering, English and Mathematics (ESTEEM) by exposing children to real world lessons and hands-on experiences.

Source: An unpublished internal document by Penang Institute

To remain globally competitive, Penang seeks to continue diversifying into high value-added industries within the manufacturing and services sector by building on its niche strengths and opportunities. After four decades of industrialisation, the state government recognises that besides foreign direct investment-based (FDI-based) MNCs, SMEs are important key players in the economy. A significant share operates in automation, machinery & precision, tooling, plastic moulding and fabricated metal products. It has been noted that the suppliers' role in MNCs has been dwindling, growth and innovation of SMEs have been lagged in keeping a parallel pace with MNCs. The state government should encourage SMEs to invest in R&D and innovation to upgrade their activities, as well as knowledge spillovers through cluster effect. This has been one of the driving forces behind the establishment of the Penang SME centre, the SME Market Advisory and SME villages[35]. However, the effectiveness of these driving forces is very much contingent on the access to sufficient and suitable human capital.

4.2 Labour demand shifts

The shift in labour demand can be induced by internal and external drivers, which could fundamentally change the human capital landscape from both quantitative and qualitative aspects. The internal drivers include company expansion and replacement of employees who have left the positions. Hiring activity will be heightened, thus vertically expanding the recruitment of labour demand in the market. Meanwhile, the external factor takes into account of the new establishments, which spur hiring activities where employees are likely to move into the new establishments. This is especially evident when skill requirements involve those that are highly transferable between different industries. In essence, this phenomenon may predominate quantitative constraints with regard to the available supply of workers, and it also reflects qualitative constraints when most vacancies require certain types of skills.

4.2.1 Quantitative demand

Investment and employment creation

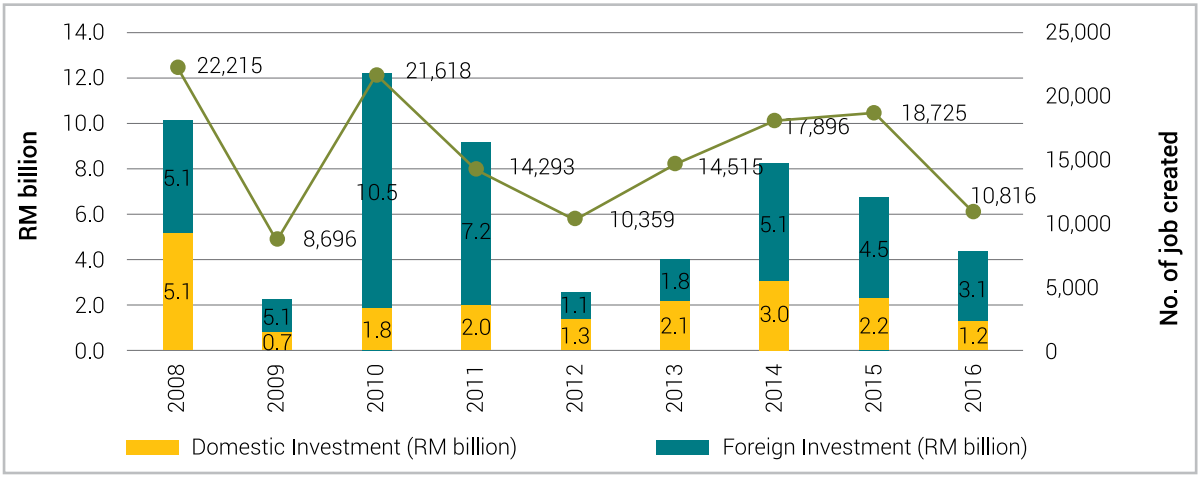
Investment is an indicator to measure the number of jobs to be created within a period, depending on the type of investments. Domestic and foreign investments, which are approved today, will take an average of about one to three years to complete their physical facilities regardless of the expansion of existing premises or the establishment of new premises and recruitment of employees. In Penang, the new development in Batu Kawan Industrial Park (BKIP) is projected to allure more investments into the state and hence creating more job opportunities, and attracting new workforce within the region. However, these job opportunities would be made available if investors identify the availibility of relevant types of skilled labour.

Penang has been considerably receiving steady investments in manufacturing and services sectors. Since Penang is an open economy where it is highly affected by the global economic events, investments would peak in some years, and lacklustre in other years. In the manufacturing sector, as can be seen in Figure 4.4, foreign investment has consistently made up the largest share of total investments in Penang. Although the investments recorded were low in 2009, 2012 and 2013, the number of jobs created remained relatively high.

In tandem with Malaysia's aspiration to achieve year-on-year growth of 5% towards 2020, jobs across all skills spectrum need to be created, as emphasised by The World Bank (2014). In this relation, capital investment per employee ratio (CIPE) is used to measure the level of capital intensity of investment along with the GDP growth rate in Penang. Figure 4.5 illustrates the amount of capital invested in each employment created. As can be seen, with the exception of year 2011, higher CIPE ratio was exhibited in years where higher GDP growth rate was recorded. It is interesting to note that while Penang saw a lower investment in 2011, the capital intensity was relatively higher in 2011 where it produced RM637,400 worth of capital investment for every job created. This means that more capital was invested in automating industry where more investment could probably be devoted on fixed assets such as physical machinery, land and buildings with the expectation of higher productivity and efficiency.

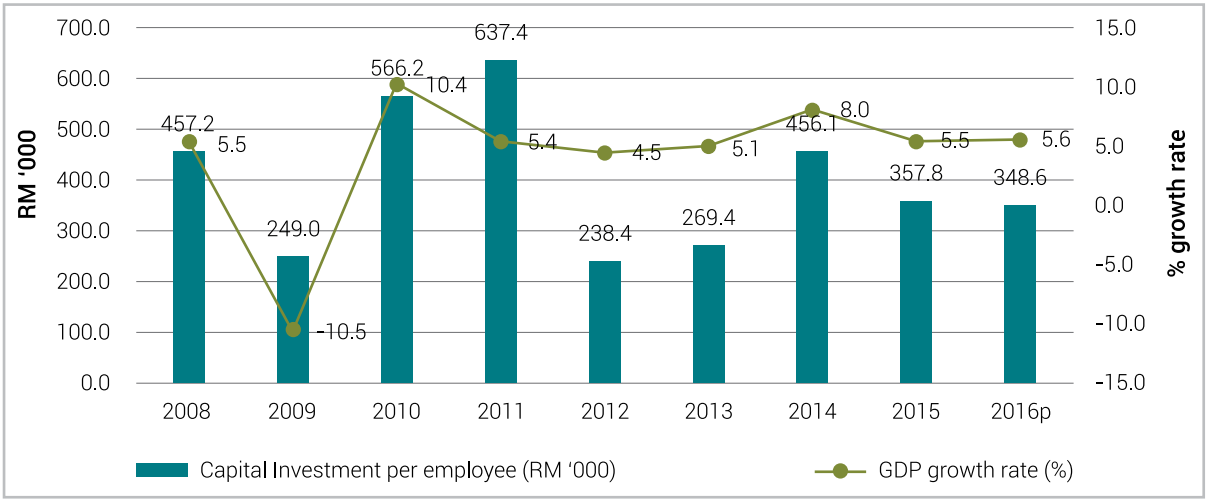
[35] See Tan (2016)

Figure 4.4: Approved manufacturing investments and employment created in Penang, 2008-2016



Source: Malaysia Investment Development Authority (MIDA), Penang

Figure 4.5: Capital investment per employee (ratio RM '000) and GDP growth rate (%) in Penang, 2008-2016



Source: Own calculations based on DoSM's and MIDA's Figures

The skills spectrum required by each investment project is not publicly made available at subnational level. According to MIDA's 2016 Malaysia Investment Performance Report, two investments in the form of expansion made by Keysight Technologies and Jinko Solar Technology highlighted the requirements of additional 400 to 2,552 employees to be hired respectively across all skills range, comprising engineers, professional personnel, management personnel, technicians, skilled workers and operators. This is further supported by the General Manager of Invest Penang, Loo Lee Lian, who opines that "the nature of the approved capital investment ranges from mid- to high-end manufacturing operations in which R&D will come hand in hand with the operation, especially in the new capital investment". Whether these investment projects are of high quality with focus on R&D, it is difficult to conclude specific skill profiles and skill characteristics needed by each investor. However, we can make an assertion that high-qualified workforce with at least a certificate in educational qualifications would be needed to support the mid- and high-level of manufacturing activities.

Looking at the capital investment by industry, it gives an overview of the broad skills demanded by investors. Over the past six years, Electronics & Electrical (E&E) products poised as the key investment sector, accounting for about 61% of the total approved manufacturing investment and 57.1% of the total job creation (Table 4.5). This investment has largely created employment opportunities in high-tech manufacturing industries, including industrial electronics, semiconductors and optoelectronics. This was followed by precision engineering, tooling, machining and automation clusters where over 20% of investment and jobs were collectively created from Machinery & Equipment, Basic Metal Products, Scientific & Measuring Equipment and Transport Equipment.

Every approved manufacturing investment project is estimated to take about three years to commence. The spillover benefit on employment creation will only be reflected in a later period. For the past two years, a number of local and MNC companies have started their operations in BKIP, namely Hewlett-Packard (HP), SanDisk, Haemonetics and Boon Siew Honda. Others such as Boston Scientific, Aemulus Holdings and Scandinavian Industrial Building Systems (IBS) are expected to be completely set up in the next three years. Presently, new investments are projected to generate a total of 4,815 jobs. Table 4.6 shows the number of jobs that will be created until year 2021. Over 12,000 new jobs are to be created by the existing companies and newly established companies. About 49.3% are to be offered by existing companies and the remaining 50.7% are to be created by new establishments. Industry-wise, semiconductors, medical devices, automation and renewable energy have been reported to record the top job creation industries in Penang. This coincides with MIDA's figures where majority of the capital investments are produced from E&E product-related companies.

Apart from employment requirements in the manufacturing sector, Penang's approved investment in services projects has tremendously increased in the past three years. The investment swelled by about 58% in 2015 to RM369 million, and it steeply escalated by more than ten-fold to RM4.1billion in 2016. Penang ranked 2nd in Malaysia's approved investment in the services sector in 2016. No specific information about the type of employment created is available. Nevertheless, many MNC manufacturing firms choose Penang as their preferred destination in setting up their global business operation hub owing to the fact that the English-speaking community is relatively large, with most of them able to converse in more than one languages. Global business establishments require a workforce that is relevant in skill-set and capable in performing the job scope, and also able to communicate in foreign languages.

It is worth mentioning that workforce has to be made sufficiently available to tailor to the talent pool required by companies. Skill requirements by new and existing investments have to be thoroughly understood by the investment promotion arm to support and facilitate the expansion or new investments planned by the companies. To some extent, the availability of workforce may be insufficient to meet the requirements of new investments. The rise of new jobs will moderately disrupt current employment landscape if the labour market consists of workforce with higher level of transferable skills, be it hard or soft skills. Indirect employee-poaching may be prevailing in industries

Table 4.5: Approved manufacturing investment by top five industry groups in Penang, 2011 – 2016

Industry	Total approved investment		Jobs created	
	RM million	% of total	No.	% of total
Electronics & Electrical Products	21,066.17	60.8	49,454	57.1
Machinery & Equipment	2,508.14	7.2	5,440	6.3
Basic Metal Products	2,003.59	5.8	2,479	2.9
Scientific & Measuring Equipment	2,282.14	6.6	8,420	9.7
Transport Equipment	1,910.01	5.5	3,422	4.0
Others	4,900.29	14.1	17,389	20.1
TOTAL	34,670.34	100.0	86,604	100.0

Source: Own calculation based on MIDA's Figures

with job positions that are in demand and easily replaceable. Additionally, this pool of workforce is more mobile compared with those with specific technical skill requirements.

Vacancies

Job vacancy is one of the core indicators for business performance. Job hiring activity increases to meet the increasing demand when business operation expands. Employers can utilise the platforms established by the government to post job vacancies at zero cost. These are JobsMalaysia under the Ministry of Human Resources[36] and Penang Career Assistance and Talent (CAT) Centre set up by the Penang government. Large firms with talent acquisition department recruit candidates through webpage, referrals and word-of-mouth advertising. If employers seek niche skills, they can engage employment or recruitment agencies to assist in searching candidates with the right skill specifications.

Table 4.6: Jobs created by new and existing companies in Penang from 2015–2021

Year of release	Year of completion	Type of investment	Company	Type of industry	Jobs created
2017	2018	New	Aemulus Holdings	Automation	-
2016	NA	New	Atotech	Chemical for semiconductor	35
2016	2017	New	Boston Scientific Corporation	Medical Devices	400
2016	2018	New	Celestica Inc	Global Business Services	200
2014	2016	New	HP Inc	Computer peripherals	1,000
2015	2016	New	JA Solar Holdings Co Ltd	Renewable energy	1,300
2016	NA	New	Jinko Solar Technology	Renewable energy	2,552
NA	2016	New	Kerry Logistics Network	Logistics Services	-
2017	2021	New	Luxoft	Information Technology	500
2017	2017	New	Scandinavian IBS	Automation	180
Total jobs created by new companies					6,167
2014	NA	Expansion	B Braun	Medical Devices	-
2016	2018	Expansion	Bosch Car Multimedia Penang	Automotive (multimedia)	70
2016	2017	Expansion	Broadcom Limited (formerly Avago Technologies)	Electronic Manufacturing Services	235
2015	2019	Expansion	Jabil Circuit Inc	Electronic Manufacturing Services	2,500
2016	NA	Expansion	Keysight Technologies Malaysia	Industrial Electronics	400
2016	2020	Expansion	KLS Martin	Medical Devices	500
2016	NA	Expansion	Linear Technology	Semiconductor	-
NA	NA	Expansion	OSRAM Opto Semiconductor	LED	300
2015	2016	Expansion	Paramit	Medical Devices	800
2016	2018	Expansion	SAM Engineering	Aerospace components	-
2015	NA	Expansion	Toshiba Medical Systems Manufacturing	Medical Devices	200
NA	2019	Expansion	ViTrox	Automation	1,000
Total jobs created by existing companies					*6,005*
Grand total jobs created.					12,172

Note: Only investment projects that appeared in newspaper reports are captured.
Source: Penang Institute's news collection as of March 2017

[36] JobsMalaysia is an automated online job matching system provided by the Ministry of Human Resources. It provides facilities for job seekers to search jobs and employers to recruit the right candidates. All facilities are accessible to all users at no charge.

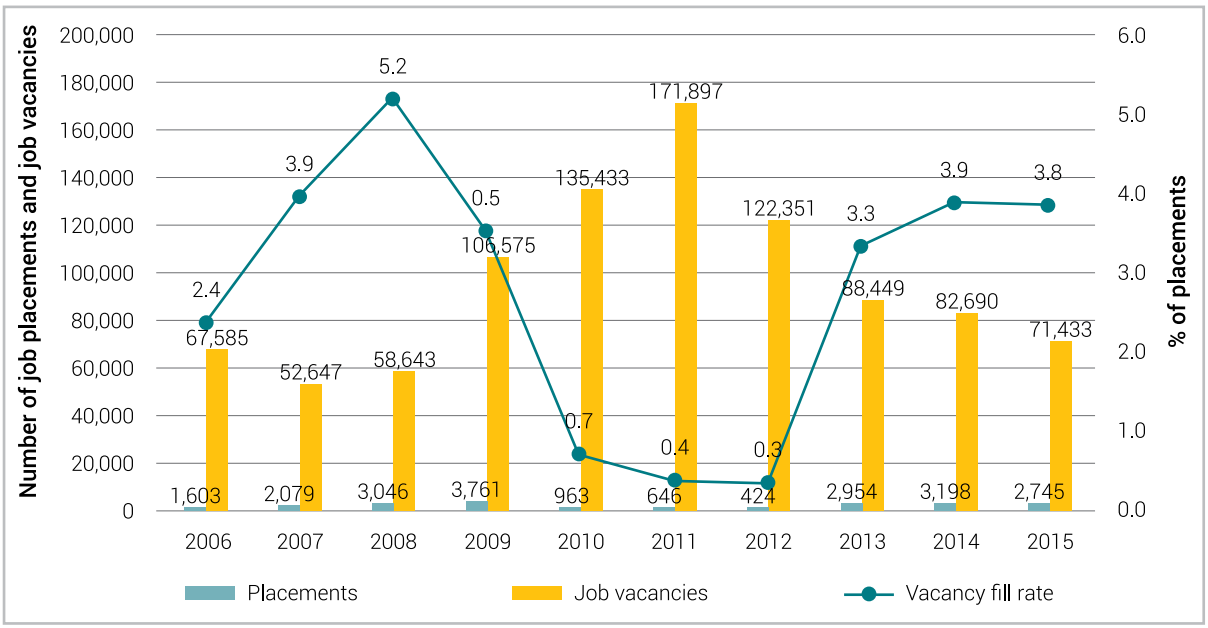
they can engage employment or recruitment agencies to assist in searching candidates with the right skill specifications.

The level of labour demand can measure through the examination of job vacancy posted by employers on the job searching platform. From the public employment agency, JobsMalaysia data show that despite the fact that job hiring activity has softened in the past few years, the number of jobs being filled remained languished. New job vacancies recorded an upward trend and peaked in 2011 (Figure 4.6). Since then, the number has been decreasing. It had gradually decreased from 2012 to 2015. The number of job vacancies, however, remained high. About 71,000 new job vacancies were reported in 2015. It was 6.6% of total job vacancies advertised across all states in Malaysia, equivalent to the share of Penang's total population in Malaysia.

In terms of job placements, it was surprisingly found that only 3.8% of the job vacancies were successfully filled in 2015 (Figure 4.6). Prior to this, the placement rate has been consistently weak. The numbers, however, may not necessarily reflect the real case. Some employers may not report back to JobsMalaysia when vacancies are filled. The likelihood of job placement opportunities could be high if each job vacancy is monitored regularly. Nevertheless, the World Bank (2009) asserted that Malaysian firms took about four weeks to fill a vacancy for mid- and high-skill positions. This duration is longer than those in India (within two weeks) and Indonesia (within one week).[37]

Out of more than 71,000 jobs, manufacturing sector made up the largest share of total jobs hiring, which was nearly 70% of total job vacancies in Penang, and it represented 15.7% of the national vacancies in the same sector. This was then followed by accommodation, food and beverage service activities (8.6%), and construction (7.2%) (Figure 4.7).

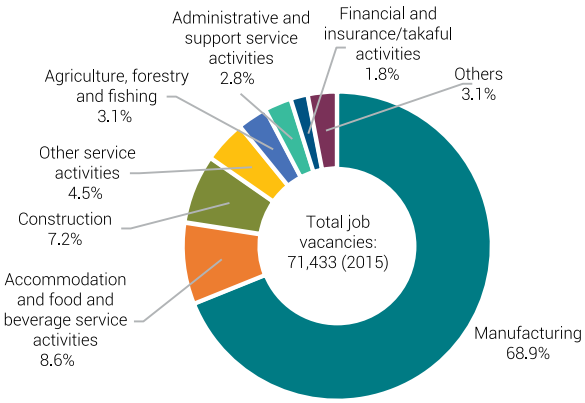
Figure 4.6: Job vacancies, job placements and vacancy fill rates in Penang, 2006–2015



Source: Ministry of Human Resources Malaysia via the DOSM's Social Statistical Bulletin

[37] Ushiyama (2013)

Figure 4.7: New job vacancies by major industries in Penang, 2015



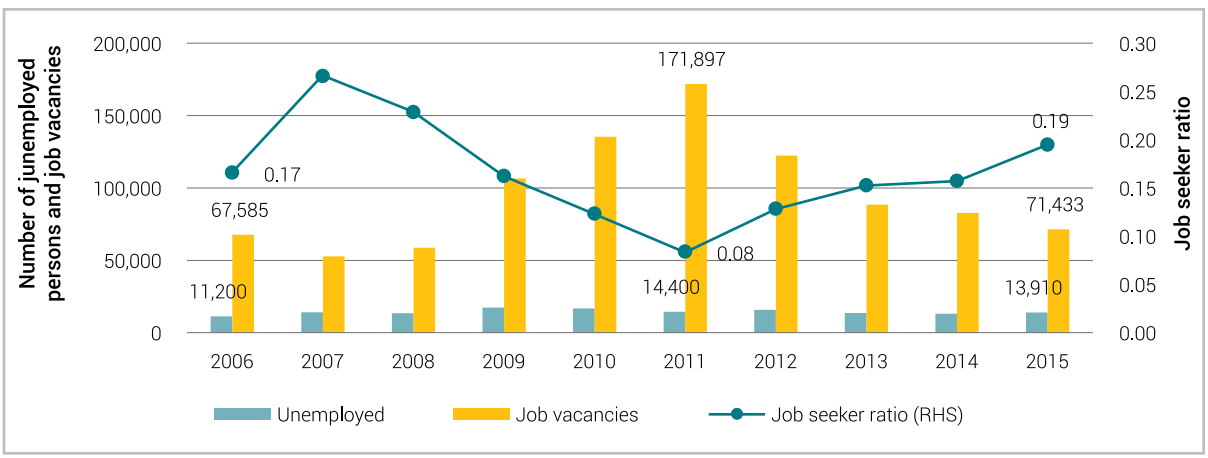
Source: Own calculations based on DOSM's Social Statistical Bulletin

It is very important to note that job openings in Penang reported by employers through JobsMalaysia portal in large majority are (still) in the manufacturing sector and require lower to mid-skilled workers (agricultural, forestry and fishery workers, craft and related trades workers, plant and machine-operators and assemblers, clerical – support – workers, and service and sales workers). This channel is not representative of the structure (and shifts therein) of overall labour demand. The low number of vacancies pertaining to high-skilled jobs requiring high-qualified workers is probably due to employers recruiting such workers through other channels, such as other online job portals, employment agencies, recruitment companies and informal methods. Meanwhile, some job portals cater to lower-skilled recruitment.

The number of job openings reported by employers through JobsMalaysia portal has substantially declined since 2011, as shown in Figure 4.8. This may be combined with the trend of an overall increase in demand for labour as is evident from the ratio of unemployed persons to job vacancies in Penang. Since 2007, this ratio fell from 0.7 to between 0.1 and 0.3, indicating that job openings have always been larger in number than jobseekers. It has been noted that vacancies, while indicating labour need, may not be a perfect yardstick for actual or net demand because of chain effects of job shifts and labour mobility (behaviour of secondary supply). A better indicator would be the number of vacancies resulting from new job creation. However, no data on this are available. The data suggest a clear shift of labour demand towards higher qualification and skill levels

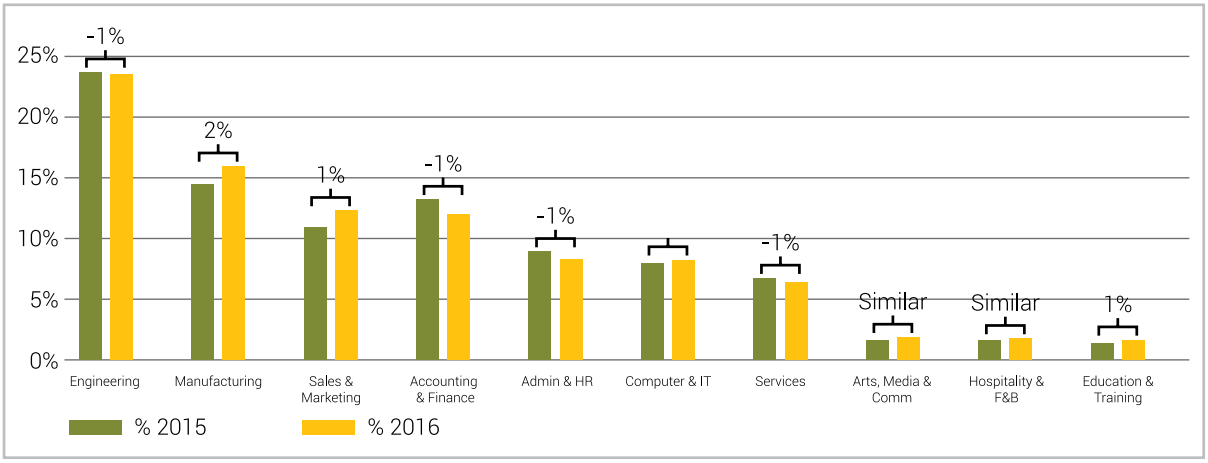
Online job portal is widely used by employers and job seekers to search for candidates with the right skills and curriculum vitae (CV) placements. While manufacturing or production still accounts for about one-quarter of the total job vacancies currently advertised, Figure 4.9 reveals an advanced profile of job specialisations, with engineering making up about a quarter of the total job vacancies advertised in the northern region. In addition, about 30% of the vacancies posted were collectively found in accounting & finance, administration & HR, and computer & IT specialisations. Interestingly, this could reflect the core functions of recently established Global Business Services (GBS) operations. This leads to some observations on shifts in regard to the qualitative side of demand.

Figure 4.8: The ratio of unemployment to job vacancy (job seeker) in Penang, 2006–2015



Source: Own calculation based on DOSM's Social Statistical Bulletin

Figure 4.9: Job vacancies posted in the top 10 job specialisations within the Northern Region in Malaysia, 2015 vs 2016



Source: Ministry of Human Resources Malaysia via the DOSM's Social Statistical Bulletin

4.2.2 Qualitative demand

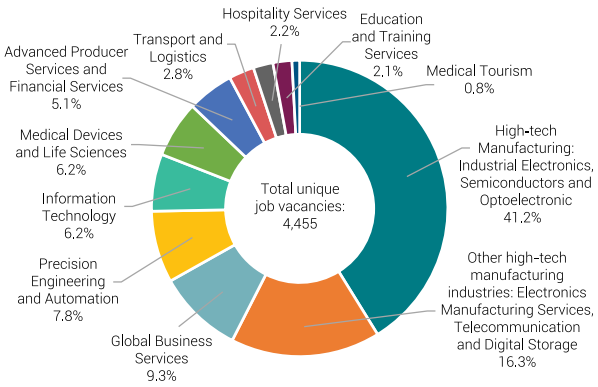
As the economy is restructured and upgraded with a larger focus on knowledge-intensive activities, labour demand in terms of qualifications and skills is evidently changing. MNCs and SMEs alike now need high(er)-skilled employees with competencies in areas such as engineering, design, finance, accounting, supply chain management and marketing. This is reflected in the demand structure in terms of not only educational qualifications and occupations, but also experience and a larger focus on soft skills next to hard skills. These demand changes are reflected in (skill) requirements as encountered in job vacancies. We have established this on the basis of an inventory and analysis of advertised vacancies in industries within the scope of this study and targeting higher-qualified workers. From our inventory, vacancies within these criteria are sizeable in number. Below we offer the findings.

a) Top recruiting industries and their firms

To assess the structure of labour and skill demand within the scope of the study, we gathered real-time job vacancies posted on JobStreet.com from 31 December 2015 to 30 June 2016 using a web-scrapping tool. We confine mining to include jobs advertised by companies based in Penang; with educational requirements of at least a certificate/diploma; and companies within the studied industry groups.

Over the first half of 2016, a total of 21,107 job advertisements were collected on a fortnightly basis. Of these, 41.3% or 8,714 job advertisements met the above selection criteria. After taking repeat advertisement of the same vacancy into account, 4,455 unique vacancies are used in this study (Figure 4.10). Over half of these are in high-tech manufacturing industries, which consist of industrial electronics, semiconductors, optoelectronics, electronics manufacturing services (EMS), telecommunication and digital storage. This is followed by Global Business Services (GBS) (9.3%), precision engineering and automation (7.8%), information technology (IT) (6.2%) and medical devices and life sciences (6.2%). This result corroborates with the development focus of the Penang state government whereby high-tech manufacturing and GBS – business process outsourcing (BPO), information technology outsourcing (ITO) and knowledge process outsourcing (KPO) – are targeted in the next economy.

Figure 4.10: Unique job vacancies by industry type in Penang, 31 December 2015–30 June 2016



Source: Vacancy database

Table 4.7 shows the top 10 companies posting vacancies in Penang. Within the six months, the top 10 recruiting companies constitute a share of about 30% of the total vacancies. All of them come from high-tech manufacturing industries, and are large MNC establishments. Flextronics – a Singapore electronics manufacturing services (EMS) company – advertised the highest number of job openings via the web portal, constituting 5.6% of all vacancies. A number of these establishments have a long presence, either replacing outgoing staff or expanding and upgrading operations. Compare this with the results in Table 4.6, five out of 10 companies announced expansion activities. These companies are B. Braun, Robert Bosch, Jabil Circuit, Keysight Technologies and OSRAM Opto Semiconductors.

Many of the vacancies are posted by large companies in high-tech manufacturing industries with employment headcounts of more than 5,000 employees. They need manpower to improve the business operations, including human resource management, information technology, maintenance, supply and distribution, health and safety, product development and logistics. This involves positions of senior executives, managers and senior managers. Also, more than half of such vacancies require candidates with five or more years of work experience across these job positions. This certainly implies the high demand of skilled and experienced labour in high-tech manufacturing industry.

Table 4.7: Top recruiting companies in Penang, 31 December 2015–30 June 2016

No.	Company name	No. of job vacancies	% of total job vacancies
1	Flextronics	248	5.6%
2	OSRAM Opto Semiconductors (Malaysia) Sdn Bhd	217	4.9%
3	Keysight Technologies Malaysia Sdn Bhd	152	3.4%
4	Plexus Manufacturing Sdn Bhd	137	3.1%
5	Robert Bosch (M) Sdn Bhd	115	2.6%
6	Lumileds Malaysia Sdn Bhd	109	2.4%
7	Dell Global Business Center Sdn Bhd	100	2.2%
8	Motorola Solutions Malaysia Sdn Bhd	91	2.0%
9	Jabil Circuit Sdn Bhd	90	2.0%
10	B. Braun Medical Industries	88	2.0%
Total		1,347	30.2%

Source: Vacancy database

b) Positions and skills most prevalent/targeted in recruitment

For each vacancy posted, we can obtain the characteristics such as tasks, educational background, skill requirements, terms of employment and basic company background. Apart from examining the overall unique vacancies, Table 4.8 compares the characteristics of unique vacancies across high demand positions[38]. The number of vacancies in high demand category forms 13.2% or 590 positions.

From the overall perspective, three-quarter of the total vacancies are filled by senior and junior executive positions in Penang. As mentioned, most companies use web-based engine to search for lower level jobs while higher level jobs are commonly matched by engaging employment firms or recruitment consultants. For example, some companies engage recruitment consultants to search for suitable candidates to fill managerial positions such as directors, senior managers and chief officers. Furthermore, the majority of the job openings are found to be persistent and high in demand especially senior executive positions. This suggests that senior executive positions may be more mobile than other position levels owing to the fact that they are high in demand, and staff turnover is predicted to be high as most senior executive positions are hypothetically persistent. This also implies the lack of high-qualified labour in the senior executive segment of Penang's labour market.

The above findings also coincide with the length of work experience required. In regard to higher level positions requiring a high-qualified person, companies seek workers with sufficient experience (more than two years). While about 74% of firms state both options, 15% of them recruit sufficient experienced workers (Table 4.9). The former is likely to be seen in new establishments that hire workers with diverse skill sets and experience, while experience carries more weight for longer established firms. Furthermore, firms in high-tech manufacturing industries more often seek experienced workers. Overall, more than one-third of the total vacancies require candidates with over five years of relevant work experience. Among senior executive positions, approximately half requires candidates with more than five years of work experience. Similar results can be observed in high-demand positions; about 56% of job vacancies seek employees with over five years of work experience. Within the high-demand positions, the majority of vacancies for junior executives require less than two years of work experience. Those with relevant work experience between two and five years can, however, apply for junior and senior executive positions. Meanwhile, almost all the high-demand job vacancies require five or more years of work experience.

In terms of skill classes, soft skills are most widely required among companies in Penang. The proportions are particularly higher in persistent and high-demand vacancies than those in overall vacancies. Compared with generic hard skills, most vacancies emphasise the importance of specific hard skills. Nonetheless, most vacancies also require competencies in English and foreign languages, namely Mandarin, Japanese and Thai, which are important hard generic skills compared with other hard generic skills such as ICT skills, legislative and regulatory awareness.

[38] A vacancy can be posted multiple times across the 14 mining periods. A unique job position is defined as high demand if the total occurrence frequency of vacancies falls within the top 10% of the total mining periods – the number of "hits" a vacancy obtains throughout the mining periods.

Table 4.8: Summary statistics of the characteristics of job positions

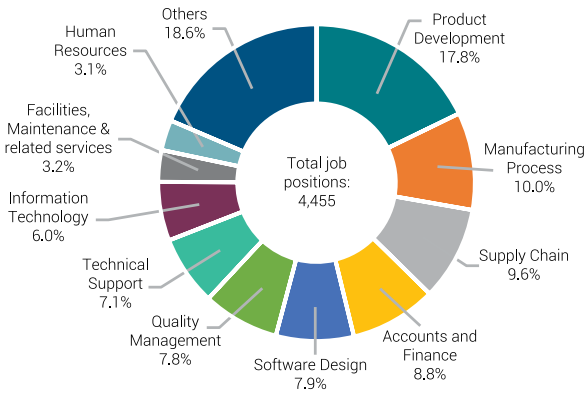
Characteristics	All		High demand*	
	Sum	%	Sum	%
Unique job positions	4,455	-	485	10.9
Job position level				
Entry-level	471	10.6	50	10.3
Junior executives	1,639	36.8	188	38.8
Senior executives	1,718	38.6	199	41.0
Managers	459	10.3	38	7.8
Senior managers	84	1.9	10	2.1
No. job positions available	84	1.9	0	0.0
Company size				
1–50 employees	461	10.3	29	6.0
51–200 employees	633	14.2	50	10.3
201–500 employees	563	12.6	43	8.9
501–1,000 employees	473	10.6	41	8.5
1,001–2,000 employees	551	12.4	89	18.4
2,001–5,000 employees	626	14.1	64	13.2
More than 5,000 employees	1,096	24.6	167	34.4
Year of work experience				
Below 2 years	1,419	31.9	160	33.0
2–5 years	1,002	22.5	121	24.9
5 years and above	1,561	35.0	175	36.1
Broad skill classes				
Hard generic skills	2,363	53.0	237	48.9
Specific hard skills	3,314	74.4	369	76.1
Soft skills	3,396	76.2	403	83.1
Hard generic skills				
Environmental awareness	249	5.6	21	4.3
Legislative and regulatory awareness	720	16.2	64	13.2
ICT skills/E-skills	658	14.8	64	13.2
English language	1,132	25.4	109	22.5
Foreign languages	1,172	26.3	105	21.6
Soft skills				
Personal effectiveness	807	18.1	94	19.4
Relationship and services	2,144	48.1	276	56.9
Impact and influence	908	20.4	93	19.2
Achievement skills	2,272	51.0	283	58.4
Cognitive skills	910	20.4	110	22.7
Measure of high demand				
Number of periods for which each unique job position appears	11,499	19.5	3,185	6.6

* Top 10% by frequency of occurrence of a unique job position.
Note: Summation for each characteristic is not necessarily equivalent to the total job vacancies.
Source: Vacancy database

The requirements of soft skills, on the other hand, indicate that over half the jobs require achievement skills[39], and relationship and service skills[40]. The importance of devising these soft skills is more evident in vacancies that are in high demand and persistent. Meanwhile, personal effectiveness skills[41] appear to be the least requested skills. The findings coincide with the assertion made by the employment agencies whereby current graduates lack communication skills and the ability to articulate technical knowledge.

The specification of job positions can also indicate the quality of jobs – in terms of manpower requirements – advertised by companies in Penang. Figure 4.11 shows that out of 4,455 unique vacancies, nearly half of them are related to product development (17.8%), manufacturing process (10%), supply chain (9.6%), quality management (7.8%), and facility, maintenance & related services (3.2%). Engineering positions dominate vacancies that consistently characterise the economic structure of Penang, requiring higher level of knowledge and solutions in manufacturing activities. These positions include application engineers, product development engineers, automation engineers, R&D engineers, mechanical design engineers and many other positions.

Figure 4.11: Job positions by major job titles advertised in Penang



Source: Vacancy database

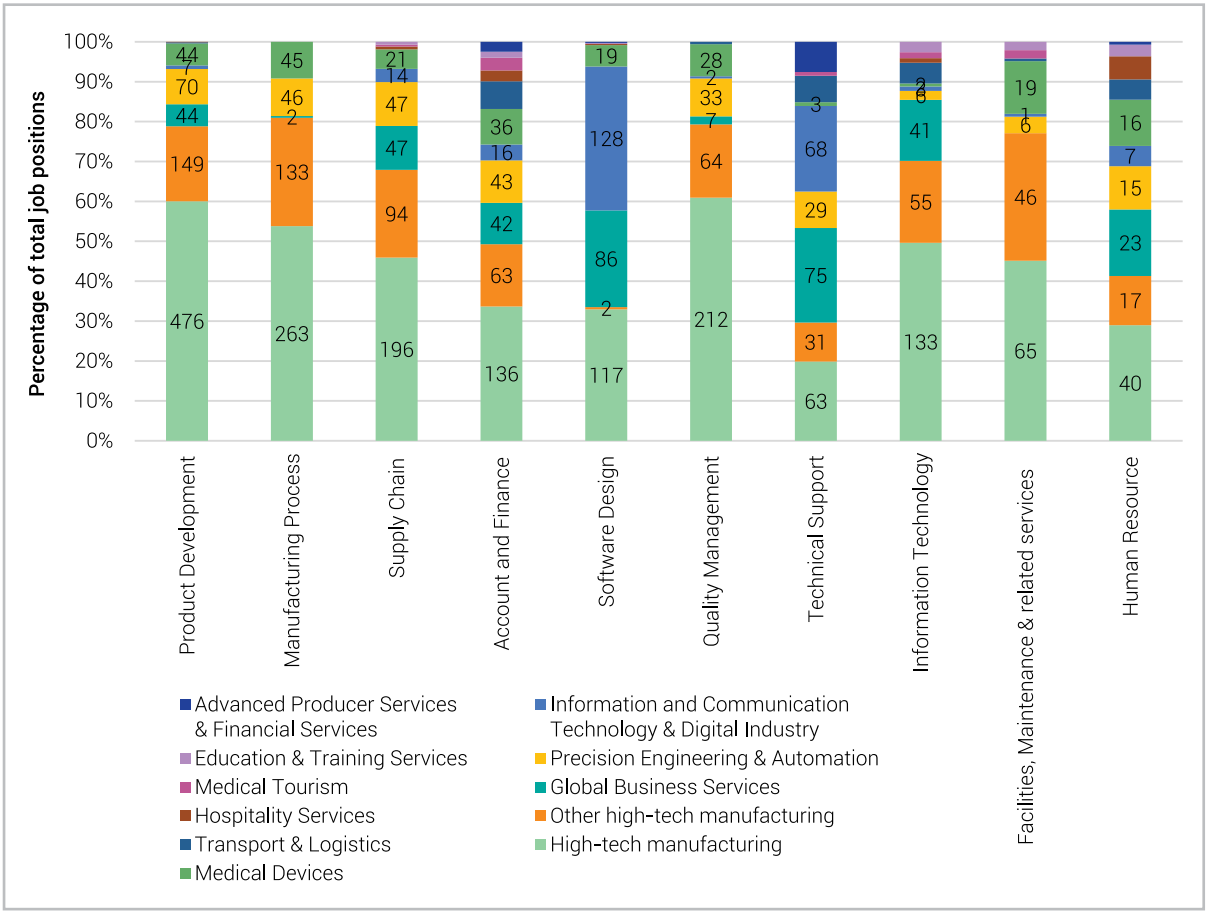
Table 4.9: Type of candidates targeted for hiring by firms

Type of industry	Applicants							
	Fresh graduates/ school-leavers		Sufficient experience (> two years)		Both		No response	Total
	No.	%	No.	%	No.	%		
High-tech manufacturing	1	9.1	4	36.4	6	54.5	0	11
Other high-tech manufacturing	0	0.0	3	30.0	7	70.0	0	10
Precision Engineering & Automation	0	0.0	0	0.0	4	80.0	1	5
Medical Devices & Life Sciences	0	0.0	0	0.0	3	100.0	0	3
Advanced Producer Services & Financial Services	3	15.8	3	15.8	13	68.4	0	19
Global Business Services	0	0.0	2	18.2	8	72.7	1	11
Hospitality Services	0	0.0	1	11.1	8	88.9	0	9
Information Technology	0	0.0	0	0.0	11	91.7	1	12
Transport & Logistics	1	25.0	0	0.0	2	50.0	1	4
Education & Training Services	0	0.0	1	25.0	2	50.0	1	4
Medical Tourism	0	0.0	0	0.0	4	100.0	0	4
Total	**5**	**5.4**	**14**	**15.2**	**68**	**73.9**	**5**	**92**

Source: Employer survey

[39] Achievement skills include problem-solving skills, being proactive, result-oriented, and self-motivated.
[40] Relationship and service skills comprise communication skills, interpersonal skills, team building spirit, team player and customer-oriented.
[41] Personal effectiveness skills are attributes such as ability to work independently, ability to handle stress, and self-control management.

Figure 4.12: Job positions and industry type by major job titles in Penang (in number and %)



Note: The data labelled in the bar chart refer to the number of unique job positions advertised by specific industry.
Source: Vacancy database

In terms of industry distribution, both high-tech manufacturing and other high-tech manufacturing companies (excluding medical devices companies) advertised the most across all job positions except human resources, software design and technical support. Figure 4.12 illustrates that high-tech manufacturing companies essentially lead in positions such as manufacturing process, quality management, product development and facilities, maintenance & related services, accounting for nearly 80% of the total vacancies in each major job title respectively.

All vacancies are grouped based on common titles of positions advertised by companies. Out of 4,455 job openings, 82.7% or 3,683 job positions can be categorised into 10 major job positions as discussed earlier. Table 4.10 shows the characteristics of advertised vacancies by 10 major job positions, while Table 4.11 summarises the profiles of advertised vacancies for each corresponding major job position.

Interestingly, about 60% of software design positions such as software developers/engineers, system engineers, SAP functional consultants and other IT-related job titles are largely needed in Information Technology (IT) and Global Business Services (GBS) firms. Similar observation is found in technical support positions such as IT technicians and technical customer support. The vacancies in the IT fields seem to reveal a new growth engine within the region. Some manufacturing companies unify the functions of IT technical support, human resources, and accounts and finance in their shared services hubs in Penang.

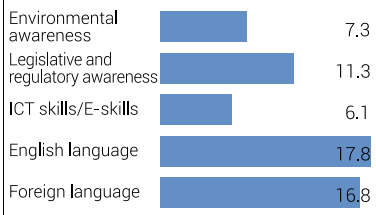
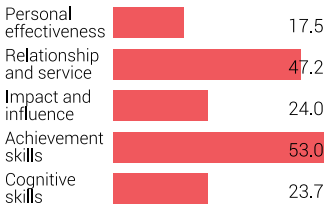
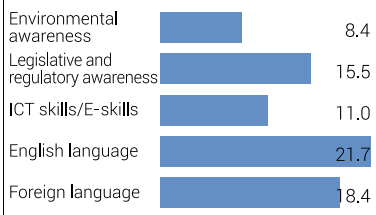
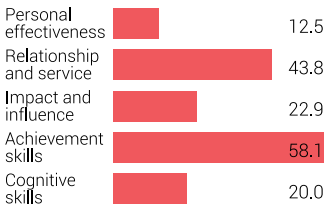
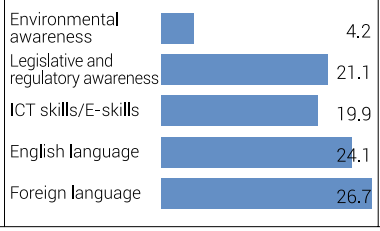
Table 4.10: Vacancy characteristics of major job positions in Penang

Job title	Job position (%)	Related experience required (%)	Characteristic of an average job vacancy	
			Education level	Field of Study
1. Product development 793 unique positions Average # periods: 2.7 Persistent: 14.1 Hard Generic Skills: 40.5% Specific Skills: 79.7% Soft Skills: 77.3%	Entry-level 11.6 Junior executive 29.6 Senior executive 49.1 Manager 7.8 Senior manager 0.8 No job position 1.3	Fresh graduate 22.8 2-5 years 23.8 5 years 41.5	Diploma; Bachelor Degree; Master's Degree	Electrical/ Electronic; Mechanical; Mechatronic; Electrome-chanical; Computer Science
2. Manufacturing Process 489 unique positions Average # periods: 2.8 Persistent: 14.9 Hard Generic Skills: 47.4% Specific Skills: 73.0% Soft Skills: 77.9%	Entry-level 9.0 Junior executive 34.6 Senior executive 42.9 Manager 9.6 Senior manager 1.4 No job position 2.5	Fresh graduate 29.0 2-5 years 24.9 5 years 38.2	Diploma; Bachelor Degree; Master's Degree	Industrial Engineering; Electrical/ Electronic; Mechanical; Mechatronics; Engineering
3. Supply Chain 427 unique positions Average # periods: 2.6 Persistent: 9.4 Hard Generic Skills: 59.5% Specific Skils: 79.4% Soft Skills: 78.5%	Entry-level 6.3 Junior executive 42.2 Senior executive 34.7 Manager 12.9 Senior manager 3.3 No job position 0.7	Fresh graduate 32.6 2-5 years 19.7 5 years 36.1	Diploma; Bachelor Degree; Master's Degree	Business Studies; Economics; Management; Administration; Logistic; Commerce
4. Account and Finance 404 unique positions Average # periods: 2.3 Persistent: 8.9 Hard Generic Skills: 63.6% Specific Skils: 82.7% Soft Skills: 76.7%	Entry-level 10.4 Junior executive 42.6 Senior executive 33.4 Manager 10.9 Senior manager 0.5 No job position 2.2	Fresh graduate 34.7 2-5 years 23.3 5 years 33.4	Professional Certificate; Diploma; Bachelor Degree; Master's Degree	Accounting; Finance; Accountancy; Banking; ACCA; CPA
5. Software Design 355 unique positions Average # periods: 2.8 Persistent: 23.1 Hard Generic Skills: 40.6% Specific Skils: 95.5% Soft Skills: 76.3%	Entry-level 11.5 Junior executive 31.8 Senior executive 52.4 Manager 2.5 Senior manager 0.6 No job position 1.1	Fresh graduate 34.4 2-5 years 22.0 5 years 34.4	Diploma; Bachelor Degree	Computer Science; Information Technology; Computer/ Telecommu-nication Engineering

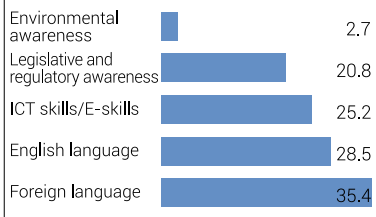
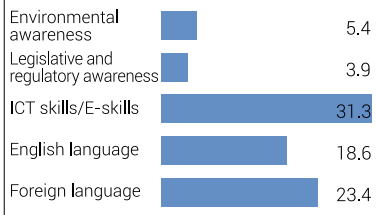
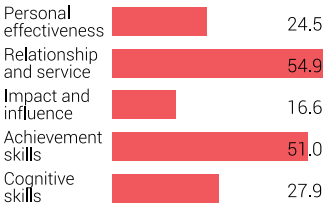
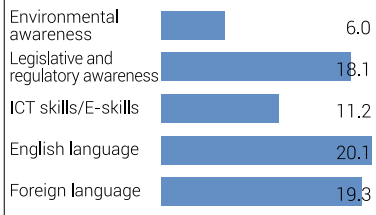
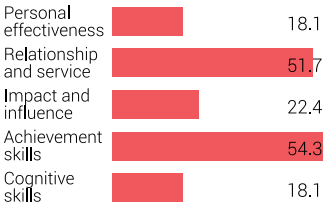
Vacancy characteristics of major job titles in Penang (continued)

Job title	Job position (%)	Related experience required (%)	Characteristic of an average job vacancy	
			Education level	Field of Study
6. Quality Management 348 unique positions Average # periods: 2.8 Persistent: 17.0 Hard Generic Skills: 46.6% Specific Skils: 77.0% Soft Skills: 77.9%	Entry-level 11.5 Junior executive 37.1 Senior executive 38.5 Manager 10.6 Senior manager 0.9 No job position 1.4	Fresh graduate 27.9 2-5 years 26.4 5 years 38.2	Diploma; Bachelor Degree	Electronics & Electrical; Mechanical; Materials; Applied Sciences; Physics; Chemistry
7. Technical/Customer Support/Services 317 unique positions Average # periods: 2.4 Persistent: 11.4 Hard Generic Skills: 70.0% Specific Skils: 60.6% Soft Skills: 71.3%	Entry-level 19.2 Junior executive 52.1 Senior executive 18.3 Manager 6.9 Senior manager 0.0 No job position 3.5	Fresh graduate 51.7 2-5 years 22.4 5 years 13.9	Diploma; Bachelor Degree	Computer Science; Computer Engineering; Telecommu-nication; Information Technology
8. Information Technology 268 unique positions Average # periods: 2.5 Persistent: 11.6 Hard Generic Skills: 41.8% Specific Skils: 78.4% Soft Skills: 83.2%	Entry-level 6.7 Junior executive 33.2 Senior executive 42.5 Manager 11.6 Senior manager 5.2 No job position 0.4	Fresh graduate 26.9 2-5 years 16.4 5 years 44.8	Diploma; Bachelor Degree	MCSE and CCNA Certification; Computer Science; Information Systems; Information Technology
9. Facilities, Maintenance & Related Services 144 unique positions Average # periods: 2.3 Persistent: 9.0 Hard Generic Skills: 64.6% Specific Skils: 70.1% Soft Skills: 63.9%	Entry-level 6.9 Junior executive 43.1 Senior executive 40.3 Manager 6.9 Senior manager 1.4 No job position 1.4	Fresh graduate 29.2 2-5 years 29.9 5 years 33.3	Professional Certificate; Diploma; Bachelor Degree	Electrical & Electronic; Mechanical; Mechatronic; Electromec-hanical; Chargeman certificate by Suruhanjaya Tenaga
10. Human Resource 138 unique positions Average # periods: 2.2 Persistent: 5.8 Hard Generic Skills: 70.3% Specific Skils: 55.1% Soft Skills: 79.0%	Entry-level 5.8 Junior executive 37.7 Senior executive 34.1 Manager 17.4 Senior manager 2.9 No job position 2.2	Fresh graduate 22.5 2-5 years 23.2 5 years 43.5	Diploma; Bachelor Degree	Human Resource Management; Business Studies/ Management; Management

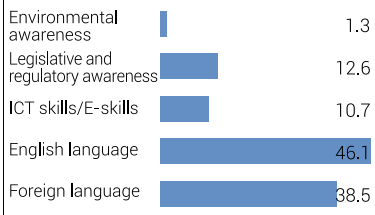
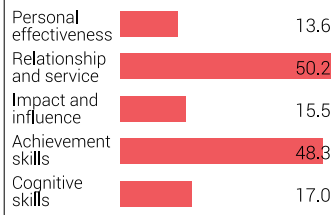
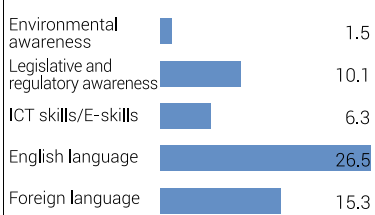
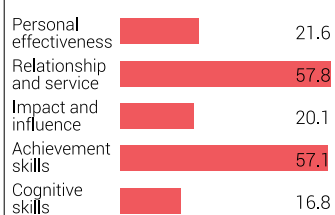
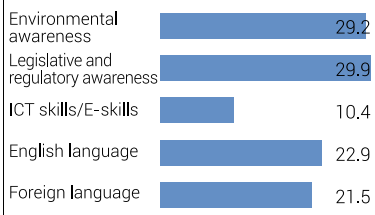
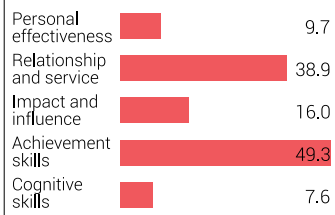
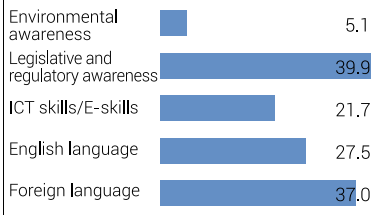
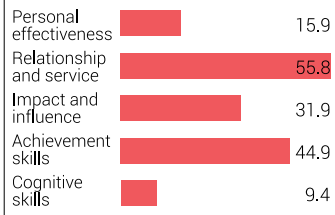
Table 4.11: Skill profiles of major job titles in Penang

Job title	Hard Generic Skills	Soft Skills	Specific skills
1. Product development 793 unique positions Average # periods: 2.7 Persistent: 14.1 Hard Generic Skills: 40.5% Specific Skills: 79.7% Soft Skills: 77.3%			Experience in automated vision with Solidwork, system design, FPGA code, firmware programming, avalon switch fabric, electrical design, troubleshooting, electronics board designs and full product life cycle development; Familiar with Agile BOM structure and Agile updating activities; understand mechanical drawing; skills in ASIC Desigh or PCB Design, Package Electrical Design, Hspice, APD or simulation tools; strong command in Solidworks; knowledge in SAP and AutoCad; experience in Engineering Change Notice (ECN)
2. Manufacturing Process 489 unique positions Average # periods: 2.8 Persistent: 14.9 Hard Generic Skills: 47.4% Specific Skills: 73.0% Soft Skills: 77.9%			Skills in MS Office and AutoCad; ability to define problems, collect data, establish facts and draw valid conclusions; knowledge in Trim and Form/Singulation, computer skills, vision system, X-ray system, FMEA and Microsoft Office Suite; expertise with embedded systems programming, signal processing, cost efficient electronic design; proficient in PCB design software (e.g. CadSoft EAGLE, Altium Designer, Mentor Graphics, CADSTAR and OrCAD PCB Designer, PSpice); experience in mechanical design using Solidwork and AutoCAD; familiar in applying SPC, MSA, DOE, CP in production environment; experience implementing CI/Lean methodologies such as Kanban, VSM & A3
3. Supply Chain 427 unique positions Average # periods: 2.6 Persistent: 9.4 Hard Generic Skills: 59.5% Specific Skills: 79.4% Soft Skills: 78.5%			Knowledge in cost analysis, MS Excel/Access and ERP; experience in supply chain, purchasing, inventory, material and warehouse management; experience in cost accounting or cost estimation; knowledge of forecasting methodologies such as Oracle or SAP

Skill profiles of major job titles in Penang (continued)

Job title	Hard Generic Skills	Soft Skills	Specific skills
4. Account and Finance 404 unique positions Average # periods: 2.3 Persistent: 8.9 Hard Generic Skills: 63.6% Specific Skils: 82.7% Soft Skills: 76.7%			Experience as General Ledger (GL) accountant; payrooll accounting, Account Receivable and Collections experience; cost accounting; SOP 81-1 accounting; audit; knowledge in public listed requirements; SAP FI/CO modules, cash flow, taxation, costing and budgeting; financial analysis
5. Software Design 355 unique positions Average # periods: 2.8 Persistent: 23.1 Hard Generic Skills: 40.6% Specific Skils: 95.5% Soft Skills: 76.3%			Experience in Java Web Application development Solid server-side JAVA/JEE, JSP, Servlets, JDBC, SQL, EJB, Spring, Structs, JavaScript, HTML, DOM, AJAX, JavaScript, CSS, Android Studio, eclipse and XML; knowledge of Oracle Identity Manager (OIM) 11g R2, Oracle BI Publisher, complex SQL query, Java programming, Visual Basic, C#, C#.Net, Single-Sign-On (SSO), LDAP and Active Directory (AD), WebLogic Application Server and Oracle Database; possess programming skills, database skills and Operating Systems; strong interest in software R&D; passport scanner and authentication knowledge; Microsoft Certification MCSE, CCNA; skills in Server installation, MS Server and MS SQL setup, Backup software (Symantec, Acronis or others) setup PC setup; knowledge of PHP web framework such as CodeIgnitor, Yii, Laravel
6. Quality Management 348 unique positions Average # periods: 2.8 Persistent: 17.0 Hard Generic Skills: 46.6% Specific Skils: 77.0% Soft Skills: 77.9%			Knowledge in ISO 13485 FDA 21, ISO 9001/13485, TS 16949/AS9100, AutoCAD, Microsoft Office Application and Reliability Statistics; experience in reliability test, design experience, statistical analysis, failure analysis and reliability analysis; knowledge in JEDEC, AEC-100 and relevant reliability standards

Skill profiles of major job titles in Penang (continued)

Job title	Hard Generic Skills	Soft Skills	Specific skills
7. Technical/Customer Support/Services 317 unique positions Average # periods: 2.4 Persistent: 11.4 Hard Generic Skills: 70.0% Specific Skils: 60.6% Soft Skills: 71.3%			Skills in Microsoft Operating Systems, Test Engineering, Documentation, technical and helpdesk support; experience in managing office IT, network infrastructure and security administration for LAN, router and server; experience in customer service and support for machine vision inspection; knowledge of techniques in system set-up, buy-off, principles, tools and instruments involved in the production and use of precision technical plans, drawings and models
8. Information Technology 268 unique positions Average # periods: 2.5 Persistent: 11.6 Hard Generic Skills: 41.8% Specific Skils: 78.4% Soft Skills: 83.2%			Experience in Citrix XenApp, Citrix XenDesktop, Citrix Receiver, VMWare, ESX, Windows 2008 & 2012; Experience in Manufacturing Execution Systems (MES) & Manufacturing Automation; Proficient in Web & Database Technology (Oracle); strong programming knowledge (Java, PL/SQL/C#); scripting knowledge (Perl, VB/VBS, Powershell); experience in designing and developing Tableau Dashboards; knowledge in LAN, & WAN, IP address, network cabling, IBM Lotus notes, Entity Framework Bootstrap CSS3, HTML 5 etc.
9. Facilities, Maintenance & Related Services 144 unique positions Average # periods: 2.3 Persistent: 9.0 Hard Generic Skills: 64.6% Specific Skils: 70.1% Soft Skills: 63.9%			Experience in performing maintenance on test machine; knowledge of service, checking and repairing of building facilities and equipments such as chillers, air compressors, vacuum pumps, PCW system, water pumps, fire protection system; knowledge in electrical system; able to troubleshoot minor electrical breakdown; good understanding about mechanical drawing.
10. Human Resource 138 unique positions Average # periods: 2.2 Persistent: 5.8 Hard Generic Skills: 70.3% Specific Skils: 55.1% Soft Skills: 79.0%			Knowledge in HR related systems, databases, processes and procedures; in-depth knowledge of local, federal and state laws, and HR best practices; strong understanding of employment law, industrial relations acts and practices; knowledge and experience in manageing employee relation and industrial relation issues;

With reference to skill profile, the analysis of vacancy found that specific hard skills are more important than generic hard skills with the exception of positions in technical/customer support/services and human resources. Openings in software design indicate nearly 96% (355 positions) requiring specific hard skills, representing the highest proportion of specific skills among all major job positions. Specific hard skills required include Java Web Application, Oracle database system and server installation. Likewise, specific hard skills are greatly in demand in product development and manufacturing process compared with hard generic skills. Nevertheless, English language is identified as the most sought-after competency among other hard generic skills in product development, manufacturing process, quality management, technical/customer support/services and information technology. Albeit lesser in demand, foreign languages comprising Bahasa Malaysia and Mandarin come next. Meanwhile, foreign languages rank at the top for supply chain and accounts and finance positions.

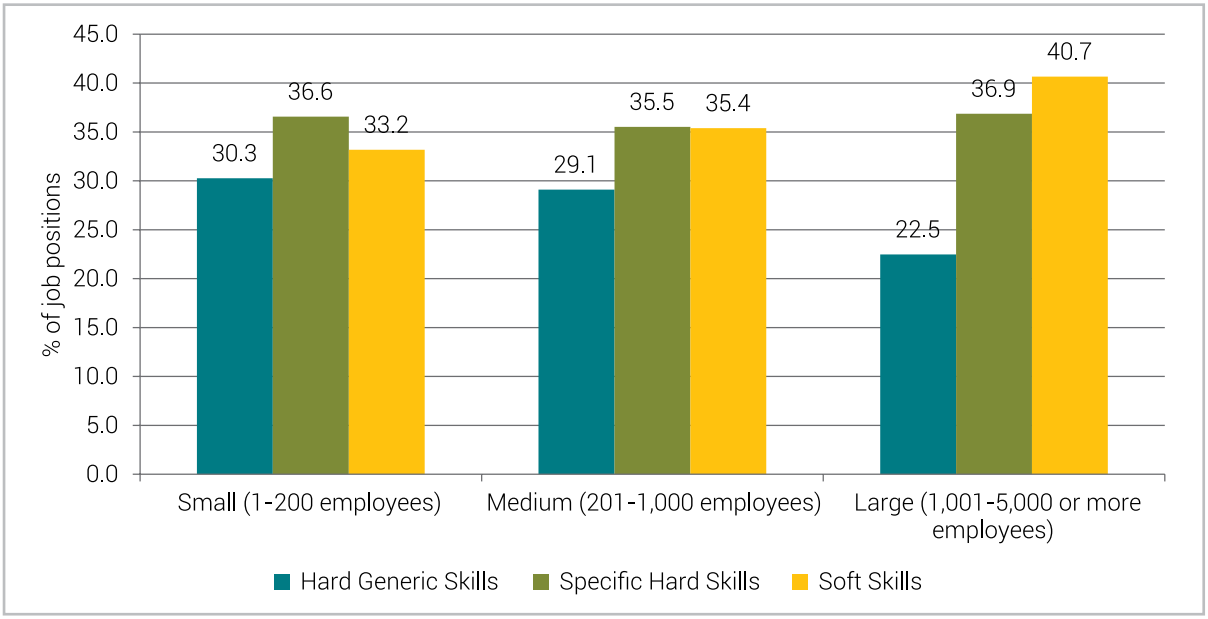
Apart from language skills, knowledge in business law, regulations and guidelines are equally crucial to perform tasks that are associated with legislations and regulations. Legislative and regulatory awareness proficiency is found to be more prevalent in supply chain, quality management, facilities, maintenance & related services, and human resources. Some examples include: understanding of quality management system of ISO 13485 for Quality Assurance (QA) Engineers who work in the design and manufacture of medical devices to ensure compliance with standards, rules and regulations; HR Generalists must be knowledgeable in employment law, industrial relations acts and practices.

While vacancies in facilities, maintenance and related services look for specific hard skills more than soft skills, all other job openings show that hard skills are generally not as important as soft skills. At least 70% of the job positions place soft skills as the required skills for all advertised vacancies except facilities, maintenance and related services. As discussed in Table 4.8, most of these vacancies require skills in relationship and service and achievement skills, which include good communication skills, problem-solving skills, ability to work in a team, self-motivated and result-oriented. These qualities are widely sought by employers.

In general, the larger the establishment is, the higher the demand for soft skills is compared with that of generic and specific hard skills. Figure 4.13 shows that nearly 41% of jobs advertised by large establishments, which have more than 1,000 headcounts, require soft skills. In contrast, the requirement for generic hard skills diminish in large establishments. However, the requirement for specific hard skills are indifferent for small, medium, or large establishments.

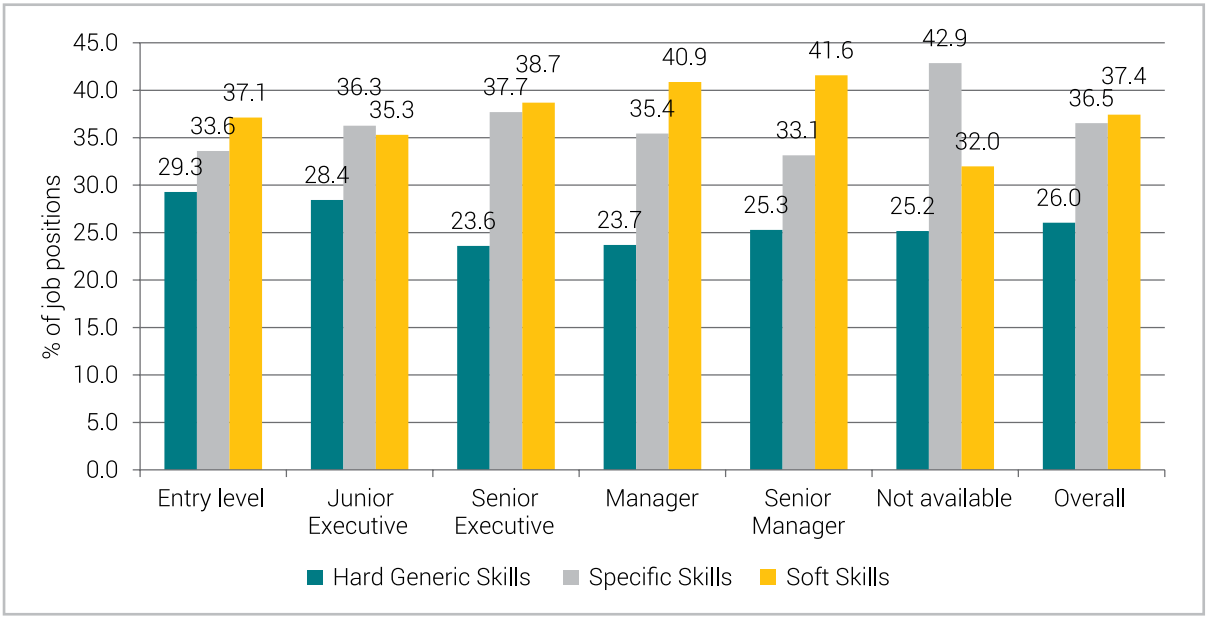
Similarly, as the job level goes up, more vacancies require soft skills more than other hard skills. A senior manager is expected to have soft skills to qualify for the role. Specifically, about 42% of this position require soft skills (Figure 4.14), and among the soft skills, achievement skills are highly sought-after, followed by relationship and services skills; but these positions require less cognitive skills such as analytical mind, conceptual thinking and information processing (Figure 4.15). As opposed to senior managers, cognitive skills are found to be essential for senior executive positions.

Figure 4.13: Generic hard, specific hard and soft skill requirements by firm size



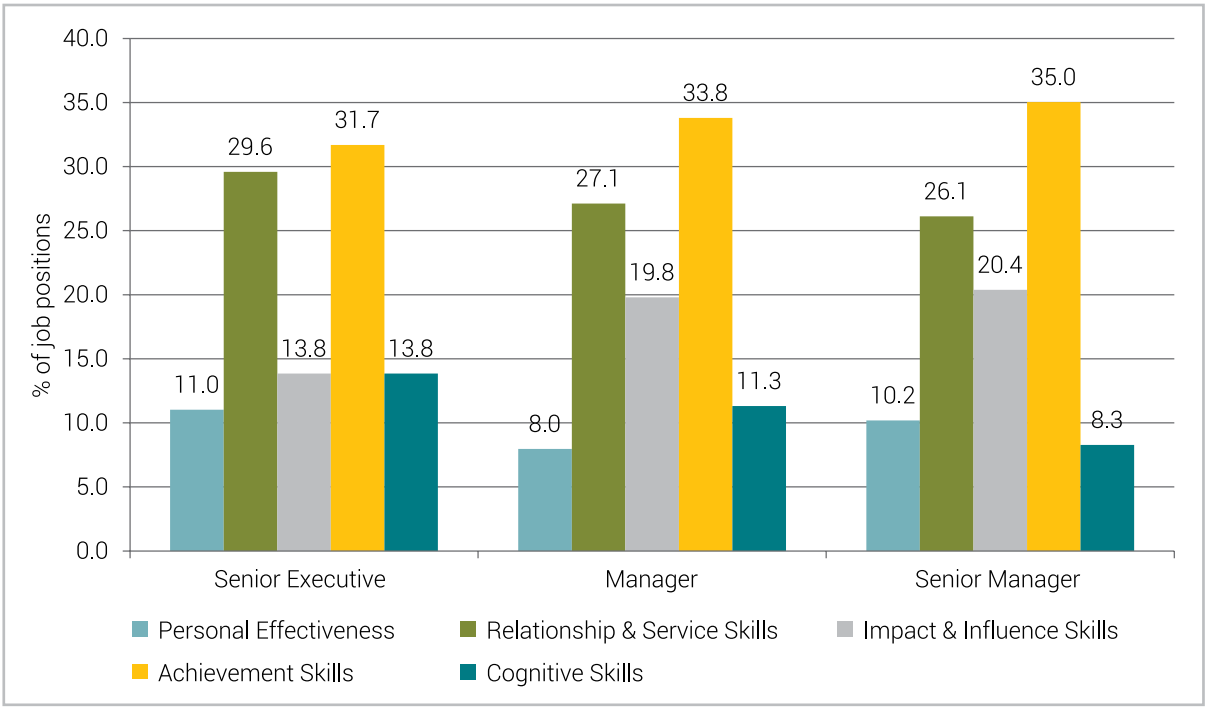
Source: Vacancy database

Figure 4.14: Generic hard, specific hard and soft skill requirements by position level



Source: Vacancy database

Figure 4.15: Soft skill sets required in top positions



Source: Vacancy database

4.3 Profiles that are considered as critical by the market

The Critical Occupation List (COL) was initiated by TalentCorp and the Institute of Labour Market Information and Analysis (ILMIA) to identify the critical occupation in Malaysia's key economic sectors. In this study, we reproduced the List of Critical Occupation 2016/17, and adapted it into the Penang context.

Critical occupations that are relevant and hard-to-fill in Penang's labour market were collected from the focus group meetings. These occupations seek to examine the representativeness of the national COL in Penang's employment market. The members of various focus groups are requested to specifically assert sub-occupations or job titles that are hard-to-fill in each sector for in-depth understanding of the specific critical occupations. The Penang-adapted COL 2016/2017 is appended in Annex 15 of Technical Report. The critical occupation is formed based on the Malaysia Standard Classification of Occupation (MASCO) 2013.

In relation to Penang's key economic drivers, oil & gas (including petrochemical) and aerospace sectors are omitted from the study. This means that Electrical & Electronics, Information and Technology and Global Business Services (IT & GBS), Telecommunications & Media, Financial Services, Accounting, Education and Medical Devices fit well into the Penang's economic structure, and therefore participants of focus groups are asked whether critical occupations are relevant and also hard to fill in Penang. We will discuss hard-to-fill vacancies in the next chapter.

The Penang COL is largely reflective on the national COL. Out of 29 respondents, over half of the respondents found that critical occupations identified in E&E sector are highly applicable to the Penang context, followed by the IT, GBS and Creative Industry (Box 4.1). This highly corroborates with the economic structure of Penang where E&E sector is noticeably the main economic source of growth in the state. Within E&E sector, *Electrical Engineers, Electronic Engineers*, and *Industrial and Production Engineers* are the top three critical occupations with the highest relevance to Penang's labour requirements, whereas *IT Services Managers; Mathematicians, Actuaries and Statisticians;* and *Business Services Managers* have the least relevance (Table 4.12).

Box 4.1: The Critical Occupations List (COL) report by TalentCorp

As part of the efforts under the 11th Malaysia Plan to address skill mismatches in the labour market, the Critical Skills Monitoring Committee (CSC) was formed, jointly led by TalentCorp and the Institute of Labour Market Information and Analysis (ILMIA), and Ministry of Human Resources (MOHR). The principal function of CSC is to adopt new approaches to skill imbalances monitoring, in collaboration with the World Bank and in line with international best practices. One of the key initiatives is to construct a Critical Occupations List (COL) that will facilitate the availability of talent based on industry specific needs.

The COL is an evidence-based list of occupations in Malaysia that reflects the most sought-after occupations besides identifying which industries are at risk of facing shortages or difficulties in hiring. The pilot COL 2015/2016 had reflected occupations that are skilled, sought-after, and strategic in six key sectors in Malaysia. It covered Electrical & Electronics, Oil & Gas, Information Technology & Global Business Services (IT & GBS), Telecommunications & Media, Financial Services and Accounting. Following its release, the report has been well received by policy makers and employers.

Since then, the CSC has been reviewing, strengthening, and updating the COL. This has led to the COL 2016/2017 undergoing an expansion to reflect 10 key sectors in Malaysia. The latest COL report expanded its scope by covering Electrical & Electronics (including Machinery/Equipment and Advanced Engineering), Education, Aerospace, Medical Devices, and Petrochemicals.

Top-down analysis and bottom-up evidence

The COL is an evidence-based and participatory approach to address skill imbalances in the country. Based on lessons learnt from international experiences such as the UK Migration Advisory Committee and Australia Department of Education and Training, Malaysia's COL is developed through a combined approach of top-down analysis and bottom-up evidence.

1. Top-down analysis: CSC identifies occupations that are skilled based on the categorisation of Malaysia Standard Classification of Occupations (MASCO) 2013; National statistics are analysed to detect occupations that are sought-after based on the Department of Statistics' Labour Force Survey 2011–2014, which shows high employment and wage growth as an indicator of high demand. If the occupations are skilled-based and sought-after, these occupations must be strategic, which are in line with Malaysia's investment and economic goals.
2. Bottom-up consultation: Results from the top-down analysis are then corroborated by the industry via a combination of surveys and consultations, along with engagements with sector regulators, industry lead bodies, and companies. The analysis covered selected firms located in the northern region (Penang and Kedah) and the southern region of Peninsular Malaysia (Johor) for the E&E industry; and firms located in East Malaysia focused on oil & gas sector.

The COL was finalised upon adjusting the preliminary COL in response to the feedback and validation from the regulators and industry lead bodies. It consists of 48 occupations that are critical across 10 key sectors in Malaysia (an increase from the previous 42 occupations listed). Occupations identified by CSC are based on the categorisation within MASCO (2013). Even though the final COL has been published, it is still open for feedback, providing the opportunity for government agencies, employers, and individuals to provide further input or evidence on sought-after occupations. This further contributes to the organic nature of the list.

How Can We Benefit?

An understanding of the specific skills demanded by the labour market helps the government to prioritise publicly financed initiatives such as TalentCorp's Returning Expert Programme (REP) and Residence Pass-Talent (RP-T), the Immigration Department's Employment Pass, government scholarships, upskilling and reskilling programmes, and courses offered by institutes of higher education, including TVET. The industry can also go beyond conventional business methods and explore alternative measures such as targeting Malaysians abroad and investing to develop sought-after skills, either through in-house training or industry academia collaboration. The public, in return, will be able to make better informed decision when it comes to selecting course of study and career paths based on the demands of the industry.

The following reflects the current and potential use of the COL in selected human capital policy interventions.

- Upskilling: An updated information on the type of specialisations and competencies that the industry requires.
- Technical Vocational Education and Training (TVET): The CSC aims to expand the list to semi-skilled occupations in the future, and will therefore provide information on the types of TVET occupations that are sought-after and the type of qualifications required.

- Graduate Employability: The COL can guide graduate employability programmes to provide relevant training and knowledge for graduates to elevate the employability rate.
- Scholarship Management & Higher Education: The COL incorporates industry evidence to provide guidelines for shaping higher education curriculum and scholarship allocations.
- Attracting Foreign Talent: The COL can be a useful tool to target expatriates based on their specific expertise and to fit a specific skill demand that the country is lacking.

Outcome

Besides identifying critical occupations, compilation of the COL is a useful guide for the following public initiatives:

1. University course review – New courses proposed by public universities are cross-checked against the COL for relevance to industry needs.
2. Graduate employability – With reference to the COL, training programmes for graduates and profiling tests for jobseekers are tailored to focus on skills that are required by the industry.
3. Returning Expert Programme (REP) – In facilitating the return of Malaysian professionals from overseas, additional points are now granted to REP applicants who are working in critical occupations.

The application of the COL for the following initiatives are currently in progress:

1. Scholarship management – The COL will be used by the Public Service Department (JPA) in determining and prioritising courses to offer through their scholarship programmes.
2. Residence Pass-Talent (RP-T) – In facilitating the employment of expatriates in Malaysia, additional points will be granted to expatriates working in critical occupations.

Overall, few differences emerged in regard to a Penang-specific COL relative to the national COL. Given the prominence of the E&E industry in Penang, *Software Developers, Manufacturing Professionals, Electronic Engineers* and *Mechanical Engineers* show a higher relevance in Penang than they do at national level.

Although *IT Service Managers* from Telco & Multimedia sector; and *Software Developers, Applications Programmers and Mathematicians, Actuaries and Statisticians* from IT, Global Business Services & Creative industry may not appear as relevant as occupations in the E&E sector, demand for these occupations is still relatively high, perhaps implying scarcity of these skills.

Table 4.12: The relevance of national COL to Penang*

Industry	Broad critical occupation	Relevance to Penang (%)
1. Electrical & Electronics Sector	Software Developers	62.1
	Manufacturing Professionals	65.5
	Electronic Engineers	72.4
	Mechanical Engineers	65.5
	Information and Technology (IT) Services Managers	27.6
	Electrical Engineers	79.3
	Mathematicians, Actuaries, and Statisticians	13.8
	Industrial and Production Engineers	65.5
	Applications Programmers	55.2
	Engineering Professionals Not Elsewhere Classified	24.1
	Policy and Planning Managers	62.1
	Mechanical Engineering Technicians	51.7
	Business Services Managers	44.8
	Electronics Engineering Technicians	62.1
	System Analysts	62.1

2. Telco & Multimedia Sector	Information and Technology (IT) Services Managers	17.2
	System Administrators	48.3
	Database Designers and Administrators	20.7
	Applications Programmers	41.4
	Telecommunications Engineers	34.5
	Database and Network Professionals Not Elsewhere Classified	13.8
	Mathematicians, Actuaries, and Statisticians	17.2
	Financial Analysts	37.9
	Systems Analysts	41.4
	Computer Network Professionals	27.6
	Management and Organisation Analysts	41.4
	Business Services Managers	41.4
3. ICT, Global Business Services, Creative Industry	Software Developers	37.9
	Applications Programmers	37.9
	Electronic Engineers	44.8
	System Analysts	37.9
	Mathematicians, Actuaries, and Statisticians	10.3
	Accountants	58.6
	Financial Analysts	44.8
	Graphic and Multimedia Designers	37.9
	Computer Network Professionals	41.4
	Information and Technology (IT) Services Managers	37.9
	Manufacturing Professionals	58.6
	Software and Application Developers and Analysts Not Elsewhere Classified	37.9
	Accounting Associate Professionals	48.3
	Information and Technology (IT) User Support Technicians	41.4
	Personnel and Career Professionals	58.6
	System Administrators	48.3
	Administrative Managers	31.0
4. Financial Services Sector	Financial Analysts	48.3
	Finance Managers	48.3
	Lawyers	44.8
	Accountants	62.1
	Financial and Investment Advisers	51.7
	Applications Programmers	48.3
	Securities and Finance Dealer and Brokers	27.6
	System Analysts	48.3
	Mathematicians, Actuaries, and Statisticians	13.8
	Information and Technology (IT) Services Managers	27.6
	Business Services Managers	34.5
	Personnel and Career Professionals	62.1
	Credit and Loans Officers	44.8
	Advertising and Marketing Professionals	48.3
	Research and Development Managers	34.5
	Insurance Underwriters	24.1
5. Accounting Sector	Financial Analysts	48.3
	Finance Managers	69.0
	Accountants	69.0

* The critical occupations in each sector are sorted in descending order based on the highest percentage of hard-to-fill occupations responded by the focus group members

4.4 Projected labour demand suggested by the employer survey

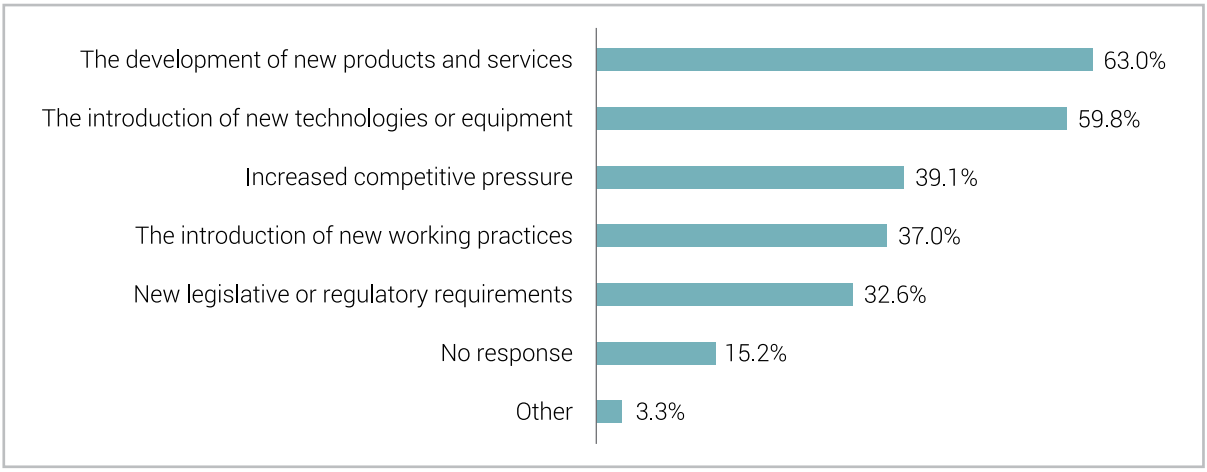
When respondents were asked whether emerging tasks in the next 12 months will necessitate their current high-qualified employees to acquire new skills, approximately 85% of the total responses to the employer survey expect their employees to acquire new skills or knowledge, while only about 11% of them do not require their employees to acquire new skills. This also indicates that only a handful of employers will not expect any newly emerging tasks that demand new skills. This can be due to the fact that some industries such as hospitality services, and transport and logistics are expected to have little changes in the next 12 months.

As for the reasons for acquiring new skills, the survey reported that it was mainly attributed to "the development of new products and services" (63%) followed by "the introduction of new technologies or equipment" (59.8%), as shown in Figure 4.16. In the manufacturing sector, functions that will be impacted include Research & Development (R&D), New Product Introduction (NPI), IT software, and programming. While in the services sector, these will affect the functions of an establishment in business development, GST software and corporate secretariat. "Increased competitive pressure" is the next reason for acquiring new skills, and it very much impacts corporate planning, sales and marketing, and production engineering.

The projected skill requirements in the future include 146 skills reported across 71 firms. Of these, most of the prospective skills require specific hard skills to perform newly emerging tasks. This is evident that specific hard skills are skills requiring certain proficiencies, which could be a niche area for a specific industry. About 65.8% of the skills are specific hard skills; 26.7% are soft skills; and only 5.5% are hard generic skills.

The survey also indicated that companies from high-tech manufacturing, other high-tech manufacturing, advanced producer and financial services, and IT/digital industry would require more specific hard skills than other industries. For example, hardware design, Autocad, cardene allegro and mentor graphic, RF debug, data automation and robotic engineering are needed by high-tech manufacturing in future whereas cloud technology, data science, SAP-cloud ERP system, Angular2, Java and SQL server are wanted by IT/Digital Industry.

Figure 4.16: Reasons for acquiring new skills as a result of newly emerging tasks (% of respondents)



Source: Employer survey

Soft skills are mostly required in GBS, and Advanced Producer and Financial Services. In particular, skills such as management, creative and critical thinking, adaptability, problem-solving, customer service, analytical, presentation, communication, public relations and team work are still required in the future.

With reference to the ability to meet future needs, a majority of the respondents believe that they are able to meet these needs in future except specific hard skills. Out of 71 respondents, 84.6% of them reported that they could meet the requirements of soft skills needed in the future, followed by 75% for generic hard skills and 68.8% for specific hard skills.

4.5 Evolving nature of work

Work is clearly evolving, which means that we are seeing new technologies and behaviours enter our workplace as economies restructure. This is not only limited to Penang's economy, but also a global issue. In the past three decades, economies and industries around the world – Europe, the United States and Asia – have been reshaped by technological advancement. As products, processes and practices change, so is work nature. This is a continuous process. Technological change continues to engender new ways of doing things, and once embodied in capital, whether physical or human, it creates more value with fewer inputs. It can be economically disruptive, rendering existing skills and organisational approaches obsolete and irrelevant, and requiring entirely new skill sets. Technological change continues to be an important driver of changing work features and skill needs. Significant shifts in labour markets will be envisaged as future work is expected to have vast characteristics compared with the large majority of current jobs.

At the company level, skill demand depends on types of products and services produced, and so are influenced by the organisation's product market strategy, future growth plans and adoption of new technologies. The development of new technologies facilitates the creation of complex, international supply chains and perhaps, the greatest driver of change. The precise skill demand for the future is still uncertain as it depends on the exact manifestation(s) of new technologies at company level. Besides technical skills (IT, Engineering, high level Mathematics, risk analysis, technical pre-sales, energy management expertise, data collection and analytics), these might focus even more on soft skills: generic ones (communication, teamwork, problem-solving and entrepreneurship), creative capabilities, and influence skills (ability to communicate, analyse and persuade)[42].

An illustrative case is the Factory of the Future[43] or Industry 4.0[44]. 'Industry 4.0 digitalisation for productivity and growth', taken from European Parliament Briefing 2015, "Industry 4.0 is a term applied to a group of rapid transformation in the design manufacture, operation and service of manufacturing systems and products." The 4.0 designation signifies the world's Fourth Industrial Revolution, the successor to three earlier industrial revolutions that caused quantum leaps in productivity and changed the lives of people throughout the world. It is the transformation of whole spheres in industrial production through the merging of digital technology and the internet with conventional industry. In short, manufacturing operation (suppliers, the plant, distributors, even the product itself) will be digitally connected providing a highly integrated value chain. The term 'Industry 4.0' originated in Germany, but the concept largely overlaps developments that, in other European countries, may variously be labelled: 'smart factories', 'industrial Internet of Things (IoT)', smart industry', or 'advanced manufacturing'.

42 See Yawson (2010)
43 See Skevi et al. (2014)
44 See Capgemini (2014), Deloitte (2015), European Parliament (2015), German Trade and Invest (2014), McKinsey Global Institute (2013), PwC (2016).

The employment and skill development implications of Industry 4.0 are expected to be substantial. The nature of manufacturing activity has been shifting from manual labour to programming, automation and smart machines. Employees with low skill levels risk becoming replaceable unless they are retrained. On the other hand, workers who are able to make the transition to Industry 4.0 may find greater autonomy and more interesting or less arduous work. Employers need personnel with creativity and decision-making skills as well as technical and ICT expertise. By 2020, labour markets in the European Union (EU) could be lacking as many as 825,000 IT professionals; this shortage may even be more pronounced in advanced manufacturing settings where big data analysts and cyber-security experts are required. While various initiatives have been undertaken to encourage the acquisition of e-skills, young people may not necessarily be interested in the digitalisation of the workplace: in one survey only 13% of young adults in Germany would consider a career in IT despite the majority of them viewed the sector as offering the best job prospects[45].

In Malaysia, while an increasing number of degree holders augur well for the supply side of the labour market, it remains to be seen whether it can keep pace with the demand side as the impact of new technologies – some potentially economically disruptive and impinging on work practices and organisation – is gradually felt.

Table 4.13 presents some vision of manifestations of technological transitions in Penang's economy. Those in the past and current may give rise to workplace changes; ongoing changes can be expected to make their mark in the future. Figure 4.21 presents an overview of Penang's potential technological pathway in the future as the new technological paradigm starts to enter. Table 4.14 presents a forecast of job transformation implications of the paradigmatic changes. It is imperative that Penang prepares and equips itself for a smooth transition.

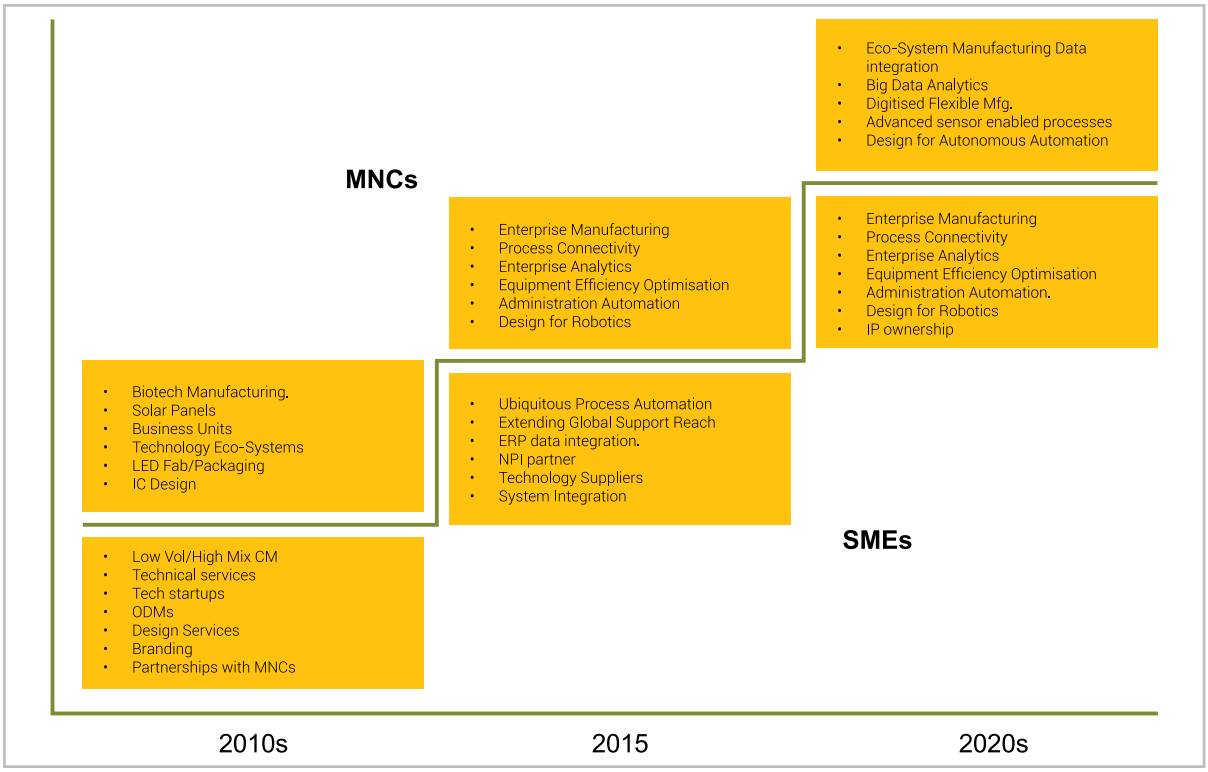
Table 4.13: Key technology trends currently occurring, impinging on work trends

Past	Present	Future
Trend Paths		
- Metals and traditional ceramics - Separate Engineering and Biology - Selective Breeding - Small-scale Integration - Micron plus lithography - Main Frame - Standalone computers	- Composites and polymers - Bio-materials - Genetic Insertion - Very large scale integration - Sub-micron lithography - Personal computer - Internet connected to machine	- Smart materials - Bio/Genetic engineering - Genetic engineering - Ultra/giga-scale integration - Nano-assembly - Micro-appliances - Appliances and assistant networks
Meta Trends		
- Single discipline - Macro-systems - Local - Physical	- Dual/hierarchically discipline - Micro-systems - Regional - Information	- Multi-discipline - Nano-systems - Global - Knowledge
Tickets to Technology Revolution		
- Trade schools - General University - Locally resourced products - Capital	- Highly specialised training - Specialised degree - Locally resourced components - Increased capital	- Multi-disciplinary training - Multi-disciplinary degrees - Products tailored to local resource - Mixed

Source: Yoon (2016)

[45] European Parliament (2015) pp. 2-4, 6-7.

Figure 4.17 Projected technological pathway in Penang



Source: Yoon (2016)

Table 4.14: Job transformation implications of prospective technological pathway

Phase	Outputs	Job Transformations
Design/NPI	• Intelligent and internet enabled machines and processes: - Easy integration between design and manufacturability - Fast design lead time - Hard tool postponement - Manufacturing system prototyping within virtual factories	• Increasing dominance of software simulations in design: - System awareness design - Network interoperability - Artificial intelligence - Robotics and Cybernetics - Machine networks - Advanced material systems - Specialisation with multi-discipline foundation - Collaboration within the entire design chain - Data Science
Manufacturing	• Interlinking factory capacities across supply chain • Real time data curation and analytics • ERP management across supply chain • Machine utilisation and process efficiency. • Predictive problem-solving • Manufacturing = Order management, planning, manufacturing, warehousing, and delivery.	• Data analytics-driven management: - Manufacturing system configuration and management - Software-enabled machine and process maintenance - Software upgrade development and process/hardware continuing improvements
Procurement	• Setting supply chain relationships and transaction rules: - Supplier chain virtualisation down to machine level - Capacity contracts - Setting and digitisation of rules of engagement	• Increasing non-transactional-based work: - Negotiations - Communications - Data Analytics

Source: Yoon (2016)

5

HIGH-QUALIFIED LABOUR AND SKILLS: THE SUPPLY SIDE

In this chapter, we delve into the supply side of high-qualified labour and skills in Penang. We elaborate on relevant supply side developments and constraints after some general observations on labour force growth and participation rate. An overview of the availability of high-qualified labour is followed by an analysis of skill supply in terms of occupations and skill sets. Through macro-data and findings from the employer survey, we give insight into recruitment patterns and difficulties. The latter allows identification of skill shortages in the market. We end with discussion on labour competition and how firms deal with this issue[46].

[46] Earlier versions of parts of this chapter are included in the project inception report, and Terhorst, J. and T. Verbraeken (2016). *Making the Transition into a High-Income Economy:* The Penang Case. Master Thesis, Department of Human Geography and Planning, Faculty of Geosciences, Utrecht University, The Netherlands.

5.1 Overview of Penang workforce

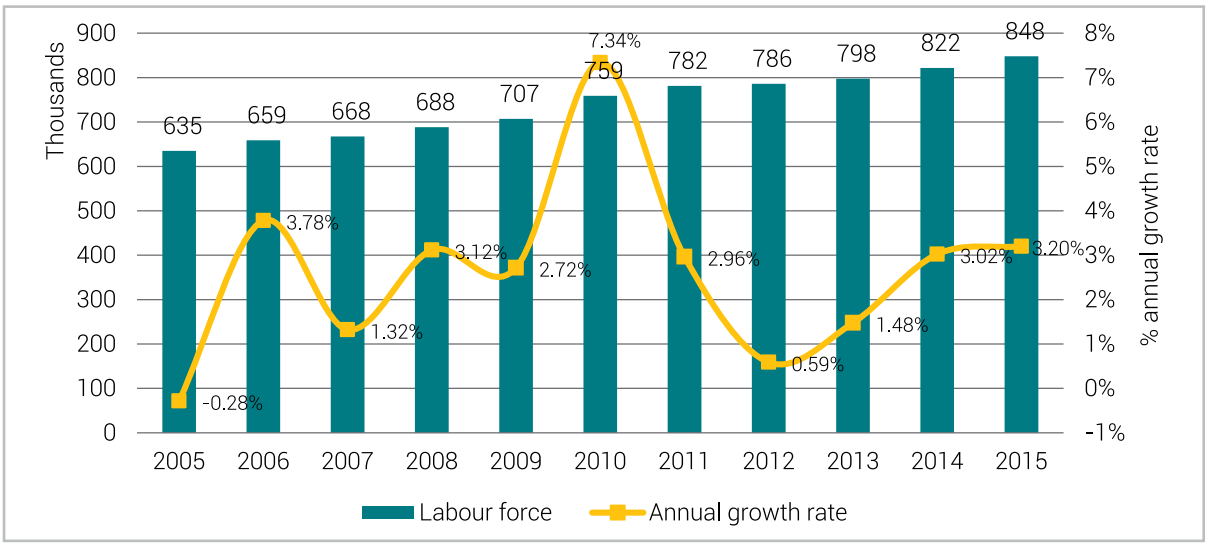
The labour force has steadily increased over the past 10 years, and it is made up of some 848,000 persons in 2015 (Figure 5.1). This means a labour force participation rate of almost 70% in Penang, which is slightly higher than the whole of Malaysia (68%) (Figure 5.2).

This was mainly due to the increased participation rate of women in the workforce. Since 2005, male participation rate has remained stable at about 80% while the female participation rate went up by almost 10 percentage points (from 49% to 59%) (Figure 5.3).

Penang's labour force participation rate is expected to remain steady in the coming years, and it may even show an upward trend as re-entry of women in the labour market is on the rise. It grew steeply during the 1997 Asian Financial Crisis from 60.6% in 1996 to 68.2% a year later (Figure 5.2). Prior to this crisis, Penang's labour force participation rate was below that of Malaysia as a whole. As Penang's economy grew, its rate surpassed the national average rate and moderated to 69.0% in 2016 from 69.9% in 2015; it ranks third after Putrajaya (77.6%) and Selangor (74.2%) respectively despite being the second-smallest state in Malaysia.

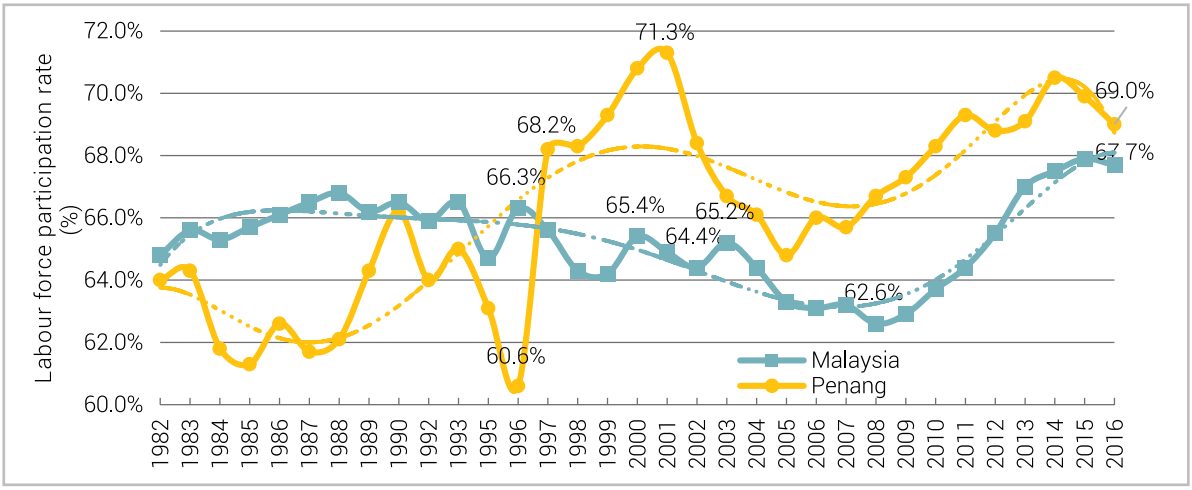
The unemployment rate, on the other hand, has declined steadily after a peak during the global financial crisis in 2008–2009. Both the Malaysian and Penang economies have experienced full employment with unemployment rates dropping to 3.44% and 2.1% respectively in 2016 (Figure 5.4).

Figure 5.1: Labour force growth in Penang, 2005-2015



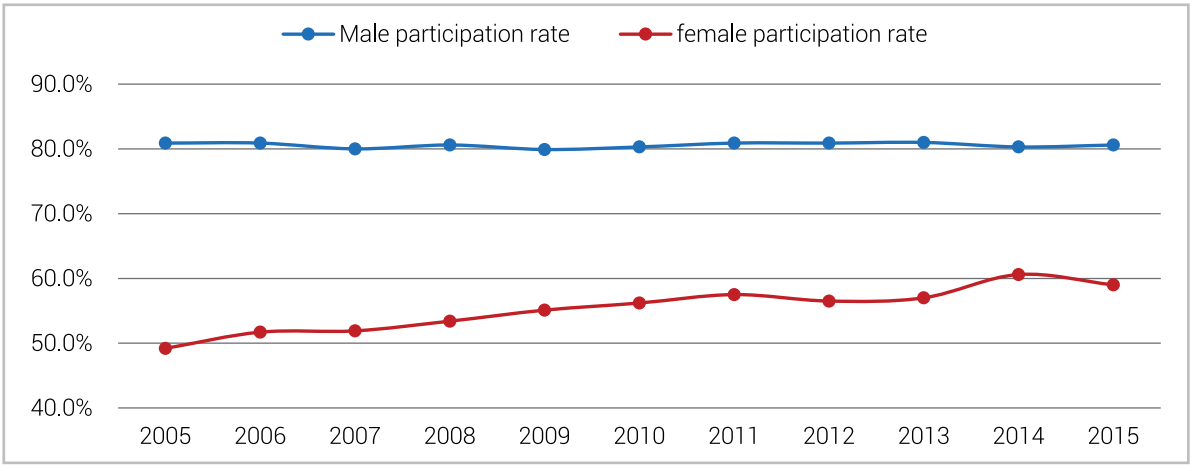
Source: Own calculations based on Labour Force Survey Reports, DOSM

Figure 5.2: Labour force participation rate in Malaysia and Penang, 1982–2016 (%)



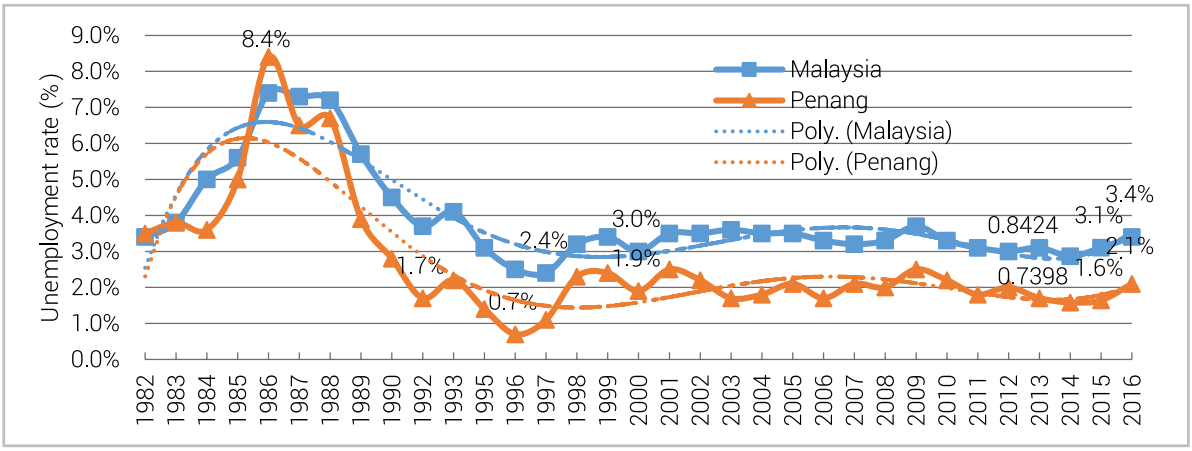
Source: Own calculations based on Labour Force Survey Reports, DOSM
Note: 1992 and 1994 are not available

Figure 5.3: Labour force participation rate by gender in Penang, 2005–2015 (%)



Source: Own calculations based on Labour Force Survey Reports, DOSM

Figure 5.4: Unemployment rate in Penang and Malaysia, 1982–2016



Source: Own calculations based on Labour Force Survey Reports, DOSM
Note: 1992 and 1994 are not available

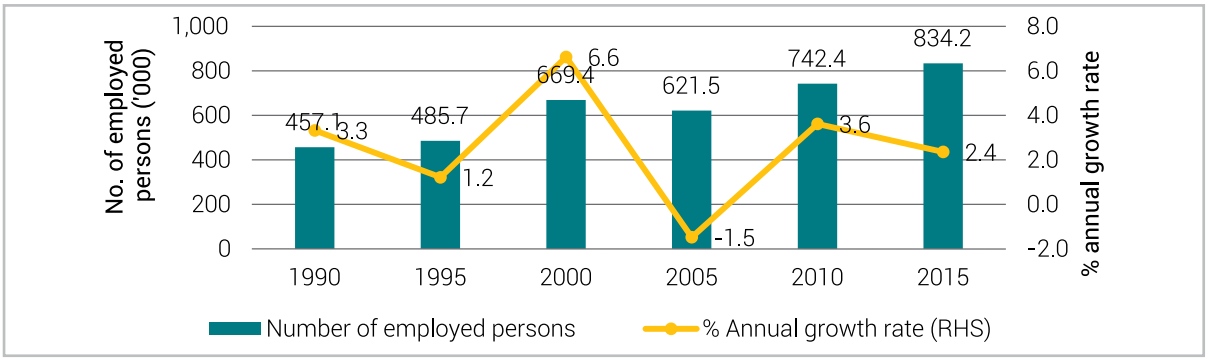
Employment has also seen favourable growth. The number of employed persons and annual growth spike in 2000 following a growth rate of 6.6% annually from 1995 to 2000 (Figure 5.5). In 2015, employment hit a new high despite a lower rate of growth over the past 10 years and is predicted to grow further with more influx of foreign and domestic investments in the manufacturing and services sectors. This will attract more people to the state, as reported in the 2016 Migration Survey Report by the Department of Statistics Malaysia.

The growth in employment along with low unemployment rate indicate a continuous robust labour demand, which the supply has difficulty keeping pace with despite more people entering the labour force. Over the period from mid-2013 to mid-2015, there have been about 21,000 advertisements for higher-qualified positions posted annually on the online job portal. Representing substantially less unique vacancies, more than half of these have been in the manufacturing sector while the electronics/semiconductor/wafer fabrication industries accounted for approximately 40% of vacancies in manufacturing sector.

Nonetheless, Penang's largest share of employment is now in the services sector, where its share has increased by about 10% from 49.2% in 1990 to 58.8% in 2015 (Figure 5.6). In particular, wholesale and retail trade, restaurants, and hotels activities accounted for the largest share of employment in this sector. Meanwhile, the manufacturing sector consistently made up more than one-third of the entire employment even though the number of employed people shrank gradually during the 2000s. The latter likely reflects the manufacturing landscape moving towards more technology- and knowledge-intensive operations, and also activities such as R&D, business management, outsourcing and software development.

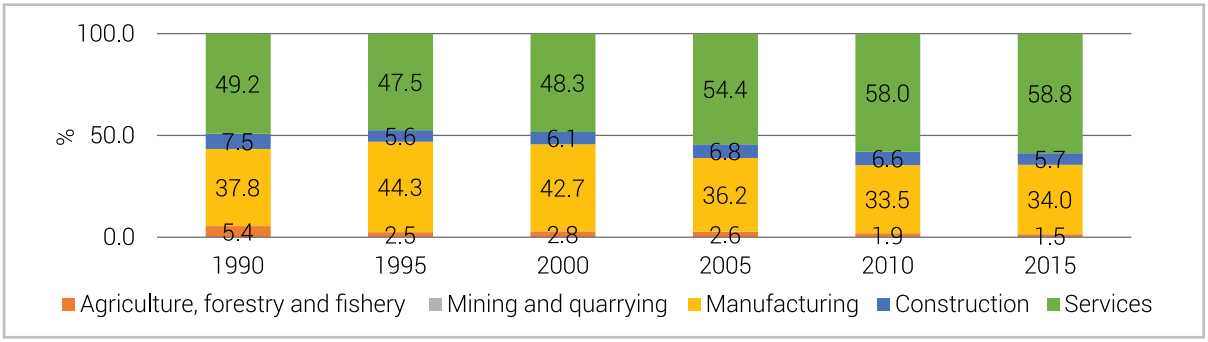
It should be noted that the services sector is heterogeneous, including lower level services such as community, social and personal services, administrative and support service activities. Between 2000 and 2015, the manufacturing sector's share of employment has declined by almost 9%. This corroborates a shift in labour demand towards the services sector.

Figure 5.5: Number and annual growth rate of employed persons in Penang, 1990–2015



Source: Own calculations based on Labour Force Survey Reports, DOSM

Figure 5.6: Share of employed persons by economic sector in Penang, 1990-2015



Source: Own calculations based on Labour Force Survey Reports, DOSM

5.2 Availability of high-qualified labour

On the demand side, skill needs have been expanding and evolving as the economy progresses. This demand has been increasingly directed to the availability of higher-qualified and skilled workforce. The sources of high-qualified labour supply include:-

i. Primary supply
   New entrants from educational institutions; retired persons exit the labour force;
ii. Secondary supply
   Existing workforce moves in the labour market, including in-migration and out-migration (regionally and internationally);
iii. Tertiary supply
   Unconventional workforce re-enters the labour market, including housewives, disabled persons, etc; and
iv. Quaternary supply
   Human talent is sourced from abroad to complement skills that are not available in the local market.

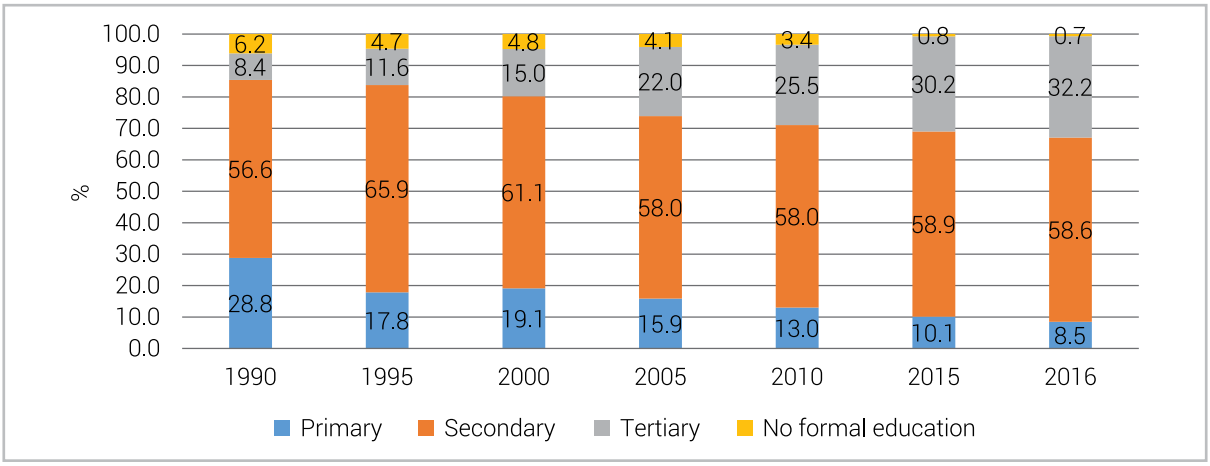
We focus here on primary and secondary supply sources.

5.2.1 Primary supply

The primary source of labour supply makes a fundamental contribution to high-qualified labour and skill competences in the job market, regardless of industry needs in all economic sectors. Malaysia's public institutions produced an average of about 113,682 graduates yearly from 2008 to 2015, with an increase rate of 3.8% annually. Social Sciences, Business and Law consistently constituted about one-third of the total graduates, followed by Engineering, Manufacturing and Construction, Science, Mathematics and Computer.

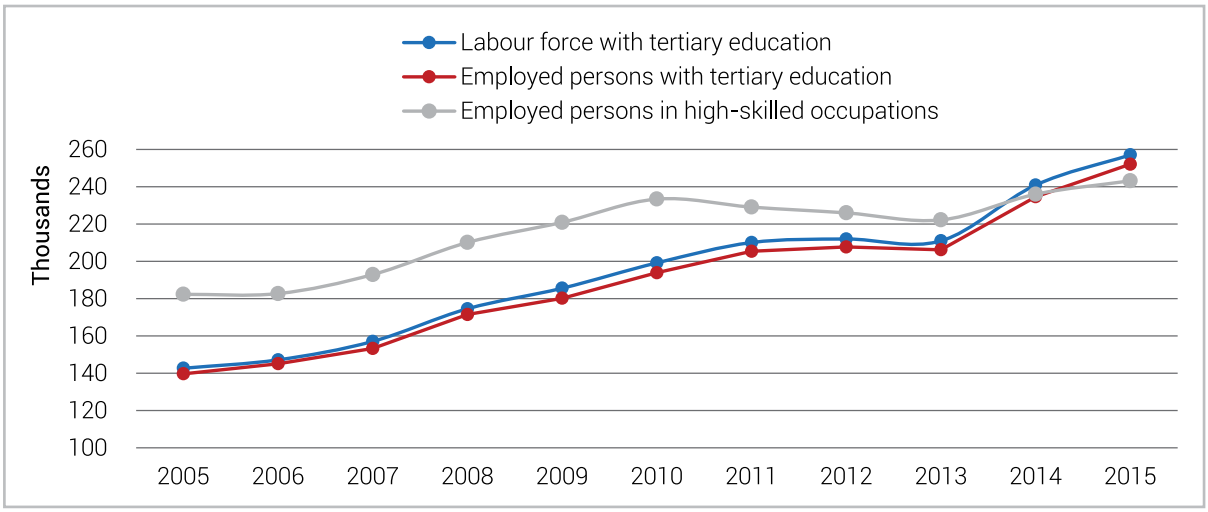
An increase in enrolment in tertiary education has translated into a relative increase of tertiary-educated labour force. After a steep rise between 1995 and 2005, tertiary education student enrolment has moderated in the past decade. Its share of employment has expanded by more than three-fold from 8.4% in 1990 to 32.2% in 2016 (Figure 5.7). While secondary-educated hires have not been varied significantly, primary-educated – and formally uneducated – hires have declined sharply during this period. This shows that Penang's employment market is progressing towards tertiary-educated hires. Furthermore, Penang ranked the fourth largest labour force with higher education in Malaysia (Table 4.1).

Figure 5.7: Share of employed persons by educational attainment in Penang, 2005-2016 (%)



Source: Own calculations based on Labour Force Survey Reports, DOSM

Figure 5.8: Employment numbers of tertiary-educated and high-skilled[47] occupations in Penang, 2005–2015



Source: Own calculations based on Labour Force Survey Reports, DOSM

Table 5.1: Top five states with tertiary-educated labour force in Malaysia, 2016

State	Labour force ('000)	State labour force (%)	Tertiary-educated labour force ('000)	State tertiary-educated labour force (%)
W.P. Putrajaya	38.9	0.3	26.4	67.9
W.P. Kuala Lumpur	855.4	5.8	365.2	42.7
Selangor	3,325.0	22.7	1,250.2	37.6
Penang	845.5	5.8	273.7	32.4
W.P. Labuan	43.6	0.3	13.1	30.0
Terengganu	447.2	3.0	134.1	30.0
Malaysia	14,667.8	100.0	4,065.1	27.7

Source: Own calculations based on Labour Force Survey Reports, DOSM

It appears that the absolute number of employed persons in high-skilled occupations have increased over the past decade, aside from the aftermath of the financial crisis (2010–2013). The aggregate supply of tertiary-educated persons has kept pace with the increase in demand for high-skilled labour, and the gap between the two has gradually closed, without necessarily engaging all tertiary-educated persons in high-skilled occupations. Since 2014, the supply of tertiary-educated persons, as well as the number of employed people with tertiary education exceed the number of those employed in high-skilled occupations. In fact, considering the entire decade, the number of employments with tertiary education have doubled that of high-skilled occupations. It appears that an increasing share of tertiary-educated hires has not been absorbed in high-skilled work.

[47] There are differences on the skill classes employed by the World Bank and the Department of Statistics Malaysia. The World Bank defines high-skilled as legislators, senior officials, managers, professionals, technicians, and associate professionals. Mid-skilled includes clerical workers, service, and sales workers. Low-skilled includes agricultural, forestry, and fishery workers, craft and trade workers, plant and machine operators and assemblers and elementary occupations. The Department of Statistics Malaysia categorises elementary occupations as low-skilled, and the rest of the low-skilled categories are mid-skilled. This graph follows the World Bank's skill positions classification.

5.2.2 Secondary supply

The secondary supply of labour consists of experienced workers who change jobs. This includes local shifts among experienced workers, as well as those moving from other states into Penang due to career opportunities and family matters. Impinging on both primary and secondary supply is a well-known phenomenon of brain drain.

a) Internal migration

Many employers opined that high-qualified workers with relevant work experience are not always easy to source. When there are insufficient experienced workers locally, employers may recruit workers outside Penang. For example, Penang faces a scarcity of IT professionals, and this has resulted in employers sourcing candidates from Kuala Lumpur or Singapore. Given the attractive fringe benefits, some workers are willing to move to Penang.

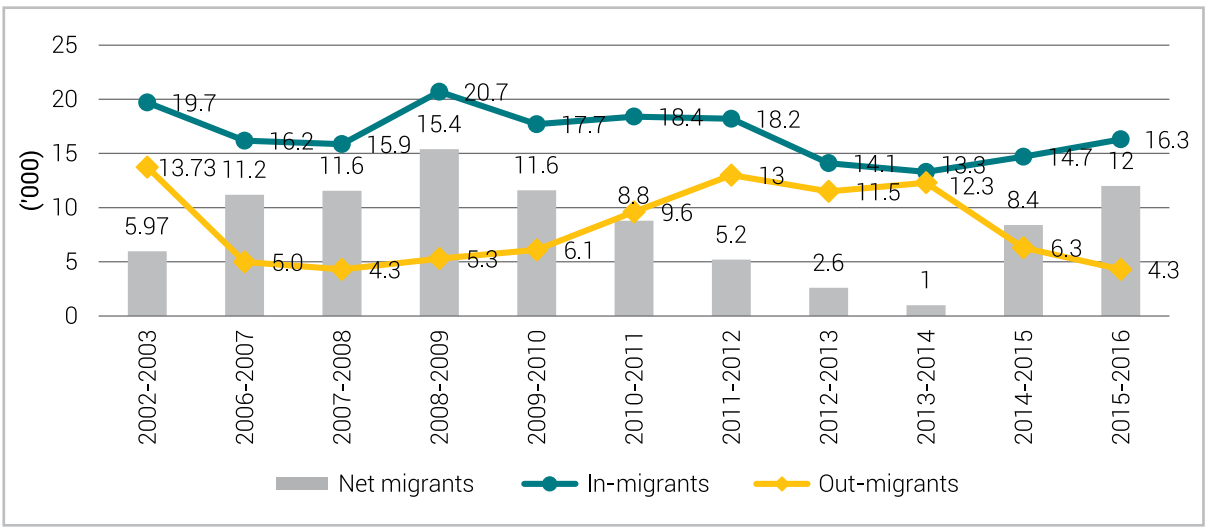
Labour in-migration thus constitutes part of the secondary supply. While Penang's net migration has been dawdled since the period of 2008–2009, it gained momentum again from 2014–2015; and grew at about 43% in 2015–2016 (Figure 5.9). This was mainly attributed to the sharp drop in the number of people moving out of the state.

In 2014-2015, about half of migrants aged 15–64 years who had moved to Penang were tertiary educated; about one-fourth of the in-migrants worked in sales and services occupations, followed by plant and machine-operators and assemblers, and professionals; nearly two-thirds of them employed in the services sector.

b) Local job mobility

A significant part of the secondary supply becomes available, or operates through labour mobility internal to the local labour market. As noted in Chapter 2, the Penang's labour market appears at a high level of mobility as indicated by applications to vacancies. Specialisations that receive a multiplier of more than 100 applications are engineering, manufacturing, accounting and finance, human resource, and education and training. This is far higher than expected if job applicants were mainly new entrants or unemployed. Although unemployment has become a source of labour supply, and the jobseeker ratio has eased as shown in Figure 4.8, unemployment level is still too low to be a significant factor in supply.

Figure 5.9: In-, out- and net migrants in Penang, 2002–2016



Source: Migration Survey Reports, DOSM

It should be noted again that the number of unique job applicants are far fewer than vacancies given the widespread practice of jobseekers applying multiple times. We have reasoned earlier that the anomaly implied in these data actually reveals a high level of labour mobility for those who are employed, as well as a prevalence of generic skills in the market. High mobility inclination implies the opportunity for firms to recruit more experienced workers through the channel of secondary supply. In fact, employers seemingly enjoyan abundant labour supply, while in actual fact the market is constrained. We surmise that the actual surplus should be sought in generic skill sets. This condition contributes partly to workers in unemployment (which is likely to explain the upward trend of jobseeker ratio, Chapter 6).

The application pattern appears to apply even more to the public sector. Reportedly, the Public Service Commission (PSC) received 1.56 million applications in 2016 to fill 25,046 vacancies in the public sector. If each applicant concurrently applied for 10 positions, this means that the job vacancies in the public sector each had more than 600 responses. It is a known fact that jobseekers are attracted to the public sector because of its attractive remuneration package – long-term security, pension scheme, affordable healthcare and housing loans – some of which are not limited to the entitlement of family members.

The tendency of high worker mobility appears ingrained in employees as they continue to seek a better position after a short period of employment. This situation resembles an 'employment carousel' where job-hopping can be seen to speed career advancement and ascend up the corporate ladder.

c) Brain drain

When a supply-demand misalignment occurs in a growing number of tertiary-educated graduates, which is attributed to less attractive salary and not on the par with earnings that can be obtained by employment, high-qualified labour may choose to remain outside the labour force, opt for more lucrative self-employment opportunities, or move outside the local labour market. All three scenarios appear to occur in Malaysia. The latter is definitely the case: there is ample documentation that Malaysia is experiencing significant brain drain, meaning that talent (high-qualified labour) moves out of the labour market to seek better opportunities overseas[48].

A survey conducted by Hays (Mar 2015) revealed that among 2,553 job applicants, 93% of them would contemplate leaving Malaysia to work overseas. According to World Bank (2011a), the main factors attracting Malaysian talents to move abroad include differences in earning potential, career prospects, quality of life and quality of education. Discontent with Malaysia's inclusiveness policies also plays a role; particularly among non-Malays who make up the majority of the diaspora. Following this, 'Loss of Young Talent Thwarts Malaysia's Growth' published by the New York Times stated that skilled workers or teenagers believe that Singapore provides better education systems, and offers higher salaries and opportunities to develop their fullest potential, which leads to better career advancement[49]. World Bank (2011) shows that the number of Malaysian diaspora[50] and brain drain[51] have escalated in 2000–2010 (Table 5.2). Brain drain from Malaysia to Singapore increased by more than 80% in the 10-year period.

48 See Choong et al. (2013); Jauhar et al. (2011, 2015, 2016); World Bank (2011)
49 See Gooch (2010)
50 Diaspora refers to the stock of Malaysian-born migrants, regardless of skill profile. Table 5.2 shows the diaspora numbers and percentage change between 2000 and 2010 for those aged 0+.
51 Brain drain here refers to the stock of tertiary-educated Malaysian-born migrants, aged 25 and above.

Table 5.2: Size of the Malaysian diaspora (age 0+) and brain drain (age 25+), by country of destination over time in numbers and % difference

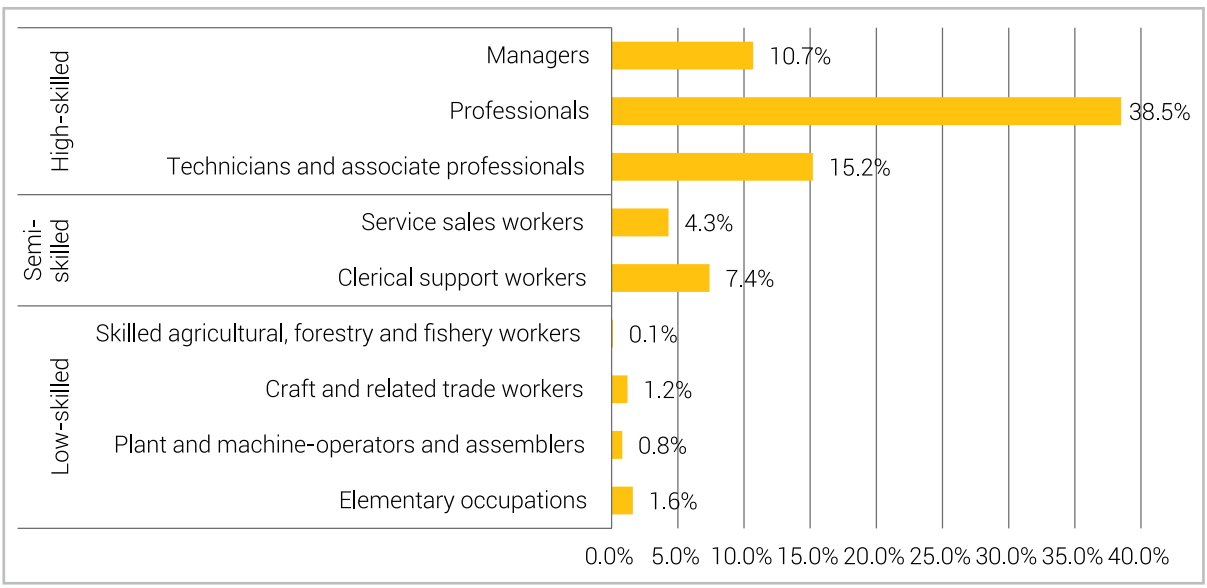
Country	Malaysian Diaspora (age 0+)			Malaysian Brain Drain (age 25+)		
	2000	2010	% Change	2000	2010	% Change
1. Singapore	303,828	385,979	27.0	66,452	121,662	83.1
2. Australia	78,858	101,552	28.7	38,620	51,556	33.5
3. United States	51,510	61,160	18.7	24,085	34,045	41.4
4. United Kingdom	49,886	65,498	31.3	12,898	16,609	28.8
5. Canada	20,420	24,063	17.8	12,170	12,807	5.2

Source: World Bank (2011a)

Brain drain in Malaysia is most critical in occupations classified as high-skilled (managers, professionals, technicians and associate professionals). According to a research undertaken by Penang Institute, high-skilled occupations accounted for more than 64% of the brain drain in Malaysia (Figure 5.10).

Just like Malaysia as a whole, Penang has been experiencing brain drain and difficulties in retaining talent. Although this can be to some extent compensated by hiring high-qualified labour from abroad – a practice companies have resorted to given the less inflow of talent into Malaysia – such drainage has negatively impacted quantitative and qualitative availability of higher-qualified labour and skills[52]. Unfortunately, available data do not allow disaggregation to Penang state level. But the data presented in Figure 5.10 can still serve as an indication of the patterns of labour outflow from Penang. Since the concept of brain drain mainly applies to tertiary-educated labour, it is conceivable that the results of brain drain studies in Malaysia are to a larger extent relevant to states that include large numbers of tertiary-educated persons. Penang is one of those states.

Figure 5.10: Brain drain by occupation in Malaysia, 2014



Source: World Bank (2011a)

52 See Kharas et al.(2010)

5.3 Skill supply

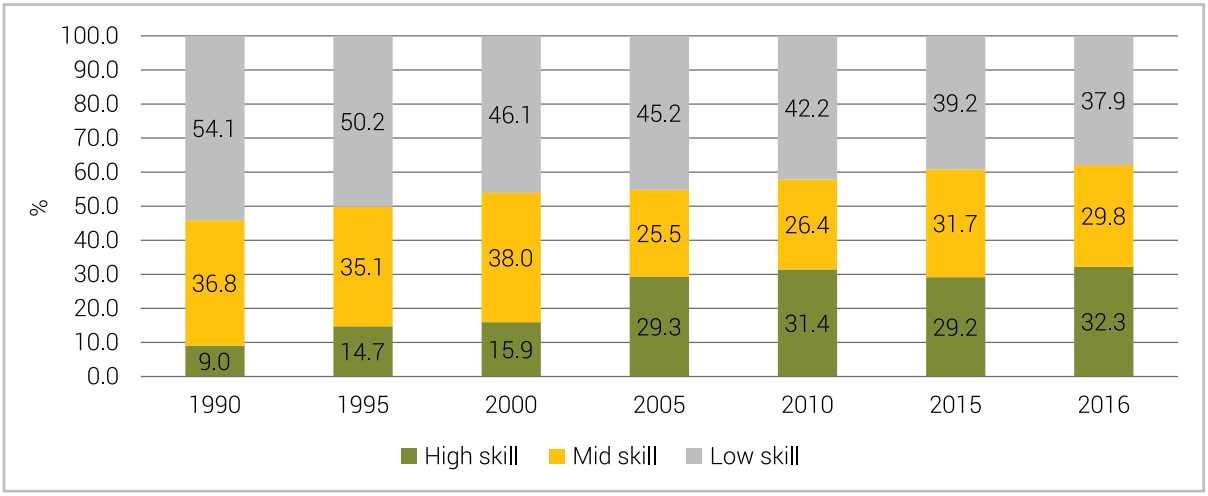
On the supply side, high-qualified workforce has expanded in absolute terms and proportionately in comparison with other categories. However, this is hardly a measure of sufficient higher-qualified labour skills availability. In Chapter 2, we have reasoned that while the overall workforce has been growing, employment growth induced by growing demand for labour, as well as demand shifts, results in a ***constrained*** labour market situation from a higher-qualified skills perspective.

Earlier, we observed a discrepancy between the increase in tertiary-educated employees and the number of employees in high-skilled occupations. While the number of employed persons in high-skilled occupations has increased in absolute terms, it is striking that the share of employment in high-skilled occupations has remained the same over the past decade (Figure 5.11). A significant surge occurred in the 2000–2005 period, but the upward trend did not sustain. Combining these facts, several developments are suggested. First, the trends may have contributed to brain drain. Second, the overall upgrade of the economy (in part moving up the value chain) shown in the first half of the last decade appears to have been halted. The major cause is not attributed to lack of high-qualified labour per se, but rather qualitative skill issues.

There seems to be a qualitative misalignment between the demand and supply of skills in the Penang labour market[53]. When high-qualified labour leave, a considerable share of the remaining labour appears to show deficiencies in qualifications and skills, and as a result, employability suffers. Despite its constrained labour market situation, this is only reflected in higher unemployment among relevant groups (See Chapter 6).

It becomes evident that there exists a mismatch between demand and supply in terms of high-qualified skills. When high-skilled workers leave the labour market, companies face difficulty filling gaps in critical areas where they most need to attract and keep labour. As a result of skills deficiency, part of the tertiary-educated pool would have to take up lower level jobs. These findings – which lend evidence of a middle-income trap – can be supported by the initiatives done by the state government in recent years, industry collaborations and a growing number of private institutions providing skill training.

Figure 5.11: Percentage of employed persons by skills spectrum in Penang, 1990-2016



Source: Own calculations based on Labour Force Survey Reports, DoSM

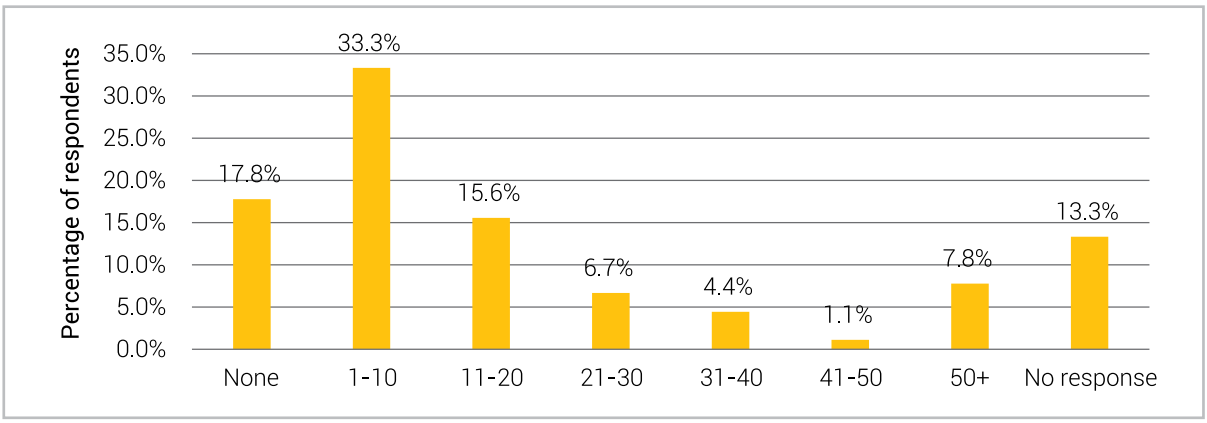
[53] As noted in the general introduction of this report, a range of studies and reports have documented and discussed this issue for Malaysia as a whole, different sectors in the economy, and different regions. See Fleming and Søborg (2012), Jimenez et al. (2012), Junaimah and Yusliza (2011), ILMIA & UPM (2016), IPSOS Business Consulting (2012, 2014a), KPMG (2012), MCMC & ILMIA (2015), PwC (2013a, 2013b), World Bank (2011a), World Bank & ILMIA (2014). PwC (2013b) and Penang Skills Development Centre (PSDC, 2012) are recent reports pertaining to Penang.

5.3.1 Skill supply at firm level: Recruitment patterns

To understand the employers' labour recruitment strategy and hiring characteristics, a number of questions were included in the employer survey. Nearly 70% of responding firms use JobStreet.com as a recruitment platform (Figure 5.14). To put recruitment in perspective, 56% of the companies did not advertise vacancies more than 30 times during the first six months of 2016.

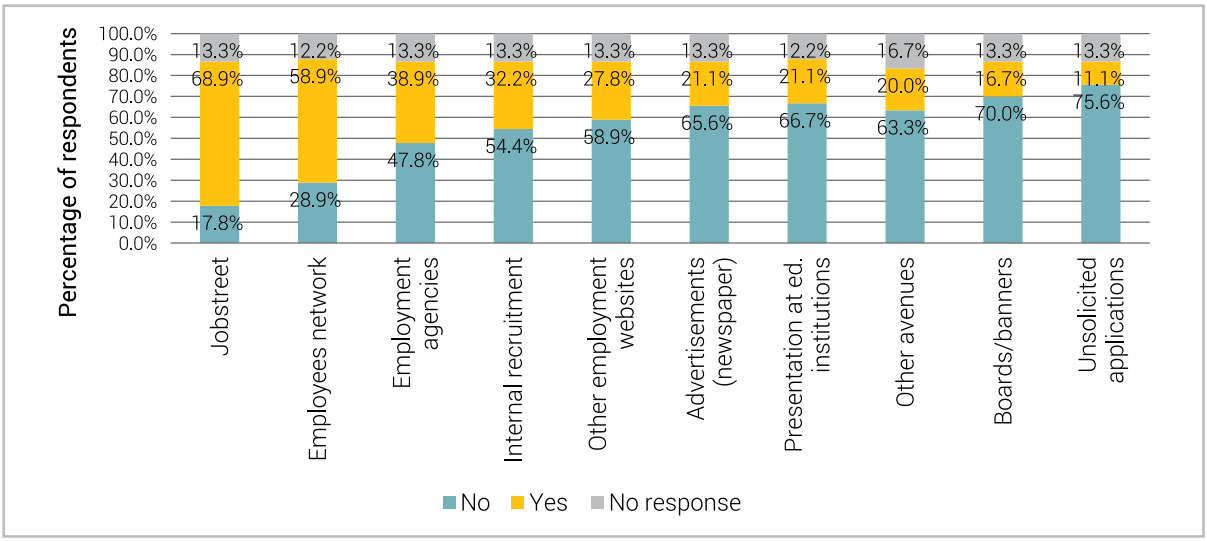
Some companies engage other recruitment channels such as employee network, employment agencies and internal recruitment to fill job openings. Apart from JobStreet.com (which is used as the prime recruitment platform), employee network is the next most favoured recruitment channel, followed by employment agencies and internal recruitment (Figure 5.13). Some recruitment agencies indicated that companies have a tendency to engage them for positions requiring experience as well as managerial positions. Nonetheless, some 11.1% of employers accepted unsolicited applications.

Figure 5.12: Number of times high-skilled positions have been advertised by employers from December 2015 to June 2016



Source: Employer survey

Figure 5.13: Responses on recruitment channels

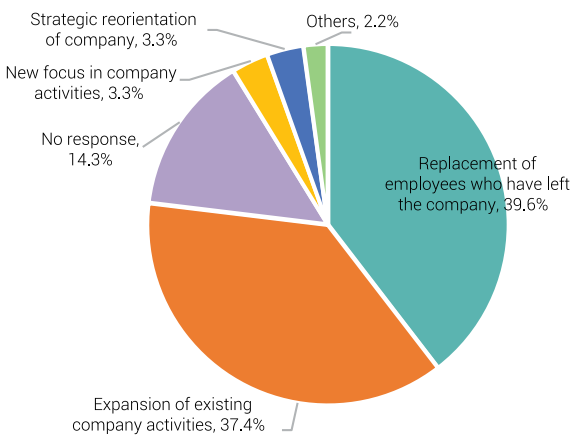


Source: Employer survey

If vacant positions are filled from the secondary supply, chain effects occur necessitating a range of employers placing job advertisements to recruit employees for positions that have been vacated. Companies hire employees to fill new positions created in the companies. From the employer survey, job openings were mainly attributed to replacement of employees who have left the company. Nearly 40% of the respondents stated this as the main reason for advertising job vacancies (Figure 5.14). Expansion of company activities came next with about 37% of firms stating this as the main reason for job openings.

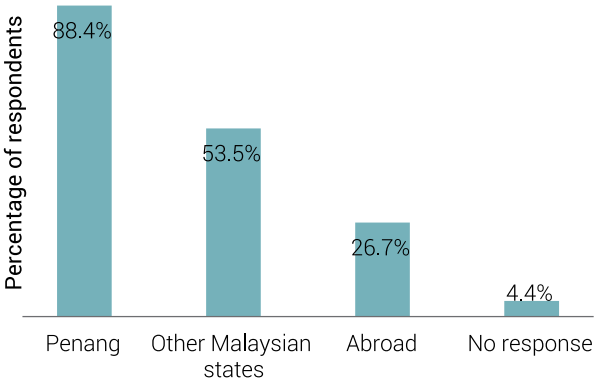
Labour recruitment primarily focused on Penang, followed by other states in Malaysia (Figure 5.15). Firms expand their recruitment reach to overseas job markets especially if they cannot find suitable persons locally to fit their precise needs. As stated by recruitment agencies, software developers specialising in SAP, Oracle, Java and .Net programming, as well as semiconductor circuit designers, are scarce in the local market, leading employers to import employees with these specific skills from abroad (e.g. India).

Figure 5.14: Main reason for advertising high-qualified positions



Source: Employer survey

Figure 5.15: Where do firms recruit labour for high-qualified positions?



Source: Employer survey

As information can be rather sensitive, firms were not keen to disclose responses to advertisements. For those that shared this information, most firms received an average of over 50 applications for each vacancy advertised (Table 5.3). This includes only 'eligible' ones. Several recruitment agencies stated that on average, 80% of job applications are irrelevant to the vacancies. Only 20% of applications are considered by employers for further evaluation. Not surprisingly, GBS firms receive far more than 50 applications on average for each vacancy. What contributes to this is the fact that skills required by GBS companies are widely available in the Penang market (in other words, they are related to a range of occupational skills). Although these companies are largely buyers in the market, job seekers are well-informed about their presence and growth and thus, are considered attractive employers.

Applications vary somewhat between positions. For instance, finance positions would receive far more applications than software development. The number of job applications tend to narrow down as the level of position becomes higher. Senior positions have a lower number of applications than fresh or junior positions.

Table 5.3: Employers' responses towards average number of applicants for advertised vacancies

Type of industry	Less than 50	51-100	101-200	201-300	More than 300	No response	Total
High-tech manufacturing	5	0	2	2	0	2	11
Other high-tech manufacturing	5	3	0	1	0	1	10
Precision Engineering & Automation	2	0	0	1	0	2	5
Medical Devices & Life Sciences	0	1	0	0	0	2	3
Advanced Producer Services & Financial Services	7	6	0	0	1	5	19
Global Business Services	2	4	3	1	0	1	11
Hospitality Services	3	0	1	0	0	5	9
Information Technology	5	2	1	0	0	4	12
Transport & Logistics	2	0	1	0	0	1	4
Education & Training Services	1	1	0	0	0	2	4
Medical Tourism	3	0	0	0	0	1	4
Total	**35**	**17**	**8**	**5**	**1**	**26**	**92**
% share	38.0	18.5	8.7	5.4	1.1	28.3	100.0

Source: Employer survey

A majority of firms offer candidates permanent positions as part of the employment terms except for precision engineering & automation and medical tourism industries. In some situations, companies hire candidates on contract or temporary basis due to budget constraints and other considerations. The duration of the contract is generally not longer than a year.

5.3.2 Recruitment difficulties

The employer survey also asked employers to state their success in recruitment; reasons for vacancies left unfilled; and whether job requirements have been fully met. Only a small majority of firms succeeded in filling all vacant high-qualified positions. Firms in other high-tech manufacturing, hospitality services and medical tourism clearly did not achieve the desired result (Table 5.4). Across industries, a large number of firms did not manage to fill high-qualified positions except medical devices and transport & logistics. GBS emerged again as the industry with the highest success rate (apart from medical devices). In terms of firm size, small and medium enterprises (SMEs) and multinational corporations (MNCs) recorded a higher share of filling the vacant positions compared with local large companies (LLC)[54]. This seems to suggest that at least some SMEs do not face problems in hiring.

[54] In this study, we use the number of headcount to define SMEs. A manufacturing firm is categorised as an SME if its total full-time employees do not exceed 200 headcounts while a firm from services sector is regarded as SME if its full-time employees do not exceed 75 headcounts. Firms that have more than these headcounts, are deemed as LLCs (Bank Negara Malaysia, 2013).

Table 5.4: Success rate in filling vacant high-qualified positions

Types of industry	Yes		No		No response
	No.	%	No.	%	
High-tech manufacturing	7	63.6	4	36.4	0
Other high-tech manufacturing	4	40.0	6	60.0	0
Precision Engineering & Automation	2	50.0	2	50.0	1
Medical Devices & Life Sciences	2	100.0	0	0.0	1
Advanced Producer Services & Financial Services	9	52.9	8	47.1	2
Global Business Services (GBS)	7	70.0	3	30.0	1
Hospitality Services	2	22.2	7	77.3	0
Information Technology	6	54.5	5	45.5	1
Trans port & Logistics	3	100.0	0	0.0	1
Education & Training Services	2	66.6	1	33.7	1
Medical Tourism	0	0.0	3	100.0	1
Total	**44**	**53.0**	**39**	**47.0**	**9**

Source: Employer survey

Advertising vacancies through traditional advertising channels plays an important role in attracting a slate of qualified candidates to meet the required criteria, and ultimately enhance the quality of the workforce. Overall, only 11% of firms stated that the majority of applicants (81–100%) meet most of the requirements. In this category, MNCs fared better than SMEs (Table 5.5). For all categories, about half of the firms indicated that less than 60% of applicants met the mark. Firms in services sector generally have a better rating compared with manufacturing firms. Clearly, meeting requirements is an uphill battle, especially for firms in manufacturing sector. Employers might not be willing to compromise, showing a strong preference to recruit only the perfect candidates. Both manufacturing and services sectors shared similar findings (Table 5.6).

Generally, MNCs should not encounter major issues in regard to skills availability as, on the whole, they are buyers in the market, are best informed, and have

Table 5.5: Firms' opinion on applicants for high-qualified positions meeting most of the stipulated requirements

Sector	Firm size	Percentage of applicants meeting most of the requirements stipulated in advertisements (% of firms)						
		0-20	21-40	41-60	61-80	81-100	No response (n)	Total (n)
Manufacturing	Local SME	33.3	0.0	16.7	50.0	0.0	0	6
	LLC	50.0	0.0	50.0	0.0	0.0	3	5
	MNC	18.8	25.0	31.2	25.0	0.0	2	18
Total		*25.0*	*16.6*	*29.2*	*29.2*	*0.0*	*5*	*29*
Services	Local SME	5.5	0.0	33.3	55.5	5.5	10	28
	LLC	0.0	10.0	50.0	30.0	10.0	2	12
	MNC	5.5	11.1	16.7	33.3	33.3	2	20
	N.A.	50.0	0.0	0.0	50.0	0.0	1	3
Total		*6.3*	*6.3*	*29.2*	*41.7*	*16.7*	*15*	*63*
Total	*Local SME*	12.0	0.0	28.0	56.0	4.0	10	34
	LLC	8.3	8.3	50.0	25.0	8.3	5	17
	MNC	11.8	17.6	23.5	29.4	17.6	4	38
	N.A.	50.0	0.0	0.0	50.0	0.0	1	3
Total		**12.3**	**9.5**	**28.8**	**38.3**	**11.0**	**20**	**92**

Note: N.A. firm size not given
Source: Employer survey

Table 5.6: Over the past two years, has this establishment hired applicants that actually fail to meet requirements (in full)?

Responses	Firm size	Manufacturing			Services			Total	
		No.	%		No.	%		No.	%
Yes	Local SME	3	3.3		11	12.0		14	15.2
	LLC	1	1.1		7	7.6		8	8.7
	MNC	9	9.8		16	17.4		25	27.2
Total		*13*	*14.2*	*46.4*	*34*	*37.0*	*61.8*	*47*	*51.1*
No	Local SME	3	3.3		13	14.1		16	17.4
	LLC	3	3.3		5	5.4		8	8.7
	MNC	9	9.8		3	3.3		12	13.0
Total		*15*	*16.4*	*53.6*	*21*	*22.8*	*38.2*	*36*	*39.1*
No response		1	1.1		8	8.7		9	9.8
Total		**29**	**31.5**	**100.0**	**63**	**68.5**	**100.0**	**92**	**100.0**

Source: Employer survey

the hiring power. MNC status is a pull factor for many qualified job seekers. MNCs continue to dominate in attracting the best talent pool. SMEs and, perhaps LLCs, on the other hand, may face recruiting challenges as they are left with the remaining pool of labour, most often the lower qualified. However, the picture is not quite evident. MNCs and SMEs alike are confronted with a significant number of applicants that do not meet hiring requirements. All have opportunities to attract but at the same time, are also faced with skill deficiencies as they hire applicants who do not meet requirements (Table 5.6). It is even more prevalent among MNC establishments, especially in services activities.

Failure in filling vacant high-qualified positions is primarily due to qualitative issues (77.7%) rather than quantitative shortage (22.3%). This result corroborates with the earlier finding that shortage is not due to insufficient number of graduates in the labour market. Rather, the market is faced with critical qualitative deficiencies in the high-qualified workforce. Specifically, there is inadequate supply of applicants for positions that require specialised knowledge/skills, as marked by high skill-specificity. As shown in Table 5.7, skill specialisation ranks as the top reason for unsuccessful recruitment. This is evident in positions within IT/ software, cloud & web, and product development. Another obstacle is applicants are too demanding in terms of salary and employment terms. This applies especially to applicants in technical positions. Evidently, lack of soft skills is not a major handicap in hiring persons. In terms of quantitative reasons, firms are concerned with the level of the competition in the market. This applies in particular to positions such as hotel officers, IT/software-related positions and technical support.

It is interesting to relate reasons for failing to fill vacant positions with the type of firm. Differences are quite evident, with a pattern that is not unexpected. Almost all SMEs stated intense competition in the market as main reason, despite scaling down their requirements. MNCs overwhelmingly gave qualitative reasons. This finding corroborates the idea that MNCs attract graduates from good universities, and hardly face competition as they can offer better wages, comprehensive fringe benefits, and at times, a better career path. Because of their reputation, they are also a magnet for top talent. On the other hand, inability to fill vacant high-qualified positions, especially technical positions rather than accounts, finance & administration, and hospitality, also represents one of the biggest challenges for MNCs.

Table 5.7: Reasons for vacant high-qualified positions not being filled (%)

Reasons not being filled	Accounts & Finance	Hospitality	IT/Software, Cloud &Web	Technical Support	Product Development	Others*	Misc.^	Total
Qualitative								
Too specialised skills	17.6	0.0	46.2	25.0	44.4	25.0	22.2	24.5
Applicants lack of experience	11.8	28.6	7.7	8.3	0.0	5.0	33.3	12.8
Applicants lack of qualifications	5.9	28.6	0.0	16.7	11.1	0.0	11.1	9.6
Applicants lack of soft skills	11.8	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Applicants too demanding	11.8	7.1	23.1	25.0	22.2	15.0	22.2	17.0
Applicants do not fit the establishment	11.8	0.0	0.0	8.3	0.0	0.0	11.1	4.3
Applicants lack generic skills (hard)	5.9	0.0	7.7	0.0	11.1	5.0	0.0	4.3
Applicants lack the right attitude	5.9	0.0	0.0	0.0	0.0	10.0	0.0	3.2
Quantitative								
Too much competition	0.0	21.4	15.4	16.7	11.1	40.0	0.0	17.0
Reasons not specified	17.6	14.3	0.0	0.0	0.0	0.0	0.0	5.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Other positions include manufacturing process, medical professionals, supply chain, tooling & machining, and design & art.
^Miscellaneous comprises reasons with unspecified positions.
Source: Employer survey

Although lack of soft skills is generally not stated as the reason for not being able to fill positions, many firms still express dissatisfaction about this. Overall, skill requirements that are commonly not met include: technical and firm-specific competencies, forward-looking attitude, communication and problem-solving skills, and industry-specific knowledge.

As requirements vary across job positions, the length of time taken to fill vacancies also varies by type of vacancies. This is confirmed by over half of the firms where irrespective of sector (manufacturing or services), MNCs (especially the larger ones) experience differences more profoundly than SMEs. MNCs' pattern may reflect higher skill-specificity of job positions. The employer survey shows that positions taking the least time to fill are technicians, finance, accounts & audit, human resources, and sales & marketing. Those taking the longest time to fill are engineers (Embedded Software, IT, Software, NPI, Test, Product, R&D), IC Designers, CNC machinist/programmers and management positions. Vacancies for technical positions appear to take a longer time to fill than vacancies for non-technical positions.

Companies also encounter a hard time retaining their best talent. Firms' responses generally confirmed this, and frequently indicated multiple impacts as evident in Table 5.8, which gives the frequency of mention of specific impacts by sector and type of firm, rather than combinations of impacts given by the 92 firms. Manufacturing and services firms do not show significant differences, neither do SMEs nor MNCs. Significantly, recruitment difficulties resulted in increased workload for other staff, delayed development of new products and services, and impact on quality. Loss of business appears to be a minor impact, but is more prevalent in MNCs than in SMEs. Cases where failing to win new projects from headquarters overseas happens when there is a lack of talented human resources. Overall, the picture is somewhat bleak.

Table 5.8: Impacts of labour recruitment difficulties (in % of firms)

Impacts	Manufacturing								Services									
	SME		LLC		MNC		Total		SME		LLC		MNC		Other		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Loss of Business	1	3.3	1	6.3	9	12.9	11	9.5	8	7.0	3	7.3	6	7.1	0	0.0	17	6.9
Delay in developing new products	5	16.7	2	12.5	10	14.3	17	14.7	12	10.5	5	12.2	11	13.1	2	22.2	30	12.1
Difficulties in meeting quality standards	5	16.7	1	6.3	8	11.4	14	12.1	13	11.4	7	17.1	10	11.9	1	11.1	31	12.5
Increase in operating cost	3	10.0	1	6.3	8	11.4	12	10.3	11	9.6	5	12.2	13	15.5	1	11.1	30	12.1
Difficulties with new working practices	2	6.7	1	6.3	3	4.3	6	5.2	9	7.9	3	7.3	7	8.3	0	0.0	19	7.7
Increased workload for other staff	5	16.7	3	18.8	10	14.3	18	15.5	16	14.0	7	17.1	12	14.3	2	22.2	37	14.9
Outsource work	3	10.0	3	18.8	5	7.1	11	9.5	8	7.0	1	2.4	6	7.1	1	11.1	16	6.5
Withdraw from offering certain product	0	0.0	1	6.3	4	5.7	5	4.3	10	8.8	1	2.4	4	4.8	1	11.1	16	6.5
Difficulties in meeting customer service objectives	3	10.0	2	12.5	6	8.6	11	9.5	10	8.8	5	12.2	9	10.7	1	11.1	25	10.1
Difficulties introducing technological change	3	10.0	1	6.3	7	10.0	11	9.5	17	14.9	4	9.8	6	7.1	0	0.0	27	10.9
Total	30	100.0	16	100.0	70	100.0	116	100.0	114	100.0	41	100.0	84	100.0	9	100.0	248	100.0

The biggest challenges in recruiting suitable persons for high-qualified positions as indicated by participants of focus group discussions include:

- Skills required are too specialised in relative to what is available in Penang. As some skills and tasks are firm- and industry-specific, employers have to give substantial training to employees to perform such tasks.
- High expectations on salary and benefit packages, not in tandem with the skills they possess.
- Poor communication and language skills as part of hard skills.

5.4 Skill shortages

Apart from the duration taken for vacancies to be filled, and whether or not stipulated requirements are met, the success in filling vacancies is also suggested through the hard-to-fill indicator. This was measured in three ways. First, vacancies are examined for persistency, defined on the basis of frequency of advertisements for the same vacancy. The measurement technique used in this study to identify persistency is explained in Annex 7 of the Technical Report. The second method was to ask recruitment companies and other well-informed stakeholders to indicate on a provided COL listing,

Table 5.9: Summary statistics of characteristics of job positions

	All		Persistent*		High demand**	
	Sum	%	Sum	%	Sum	%
Unique job positions	4,455	-	590	13.2	485	10.9
Job position levels						
Entry-level	471	10.6	57	9.7	50	10.3
Junior executives	1,639	36.8	213	36.1	188	38.8
Senior executives	1,718	38.6	258	43.7	199	41.0
Managers	459	10.3	49	8.3	38	7.8
Senior managers	84	1.9	13	2.2	10	2.1
No. job positions available	84	1.9	0	0.0	0	0.0
Company size						
1–50 employees	461	10.3	44	7.5	29	6.0
51–200 employees	633	14.2	62	10.5	50	10.3
201–500 employees	563	12.6	43	7.3	43	8.9
501–1,000 employees	473	10.6	44	7.5	41	8.5
1,001–2,000 employees	551	12.4	101	17.1	89	18.4
2,001–5,000 employees	626	14.1	81	13.7	64	13.2
more than 5,000 employees	1,096	24.6	209	35.4	167	34.4
Years of work experience						
Below 2 years	1,419	31.9	185	31.4	160	33.0
2–5 years	1,002	22.5	135	22.9	121	24.9
5 years and above	1,561	35.0	226	38.3	175	36.1
Broad skill classes						
Hard generic skills	2,363	53.0	298	50.5	237	48.9
Specific hard skills	3,314	74.4	457	77.5	369	76.1
Soft skills	3,396	76.2	482	81.7	403	83.1
Hard generic skills						
Environmental awareness	249	5.6	26	4.4	21	4.3
Legislative and regulatory awareness	720	16.2	81	13.7	64	13.2
ICT skills/E-skills	658	14.8	86	14.6	64	13.2
English language	1,132	25.4	145	24.6	109	22.5
Foreign language	1,172	26.3	128	21.7	105	21.6
Soft skills						
Personal effectiveness	807	18.1	111	18.8	94	19.4
Relationship and service	2,144	48.1	330	55.9	276	56.9
Impact and influence	908	20.4	119	20.2	93	19.2
Achievement skills	2,272	51.0	330	55.9	283	58.4
Cognitive skills	910	20.4	134	22.7	110	22.7
Measure of hard-to-fill						
Persistence	590	13.2	-	-	375	77.3
Measure of high demand						
Number of periods for which each unique job position appears	11,499	19.5	3,451	5.8	3,185	6.6

* At least 4 vacancies with the same job title, company name, and job position.
** Top 10% by frequency of occurrence of a unique job position.
Note: Summation for each characteristic is not necessarily equivalent to the total job vacancies.
Source: Vacancy database

not only the relevance to Penang, but also whether or not the vacancies are hard-to-fill. The third method is to identify hard-to-fill vacancies by gauging firms' experiences with regard to the presence of hard-to-fill vacancies in the past two years.

As for the first method, apart from showing the overall unique vacancies, Table 5.9 also examines the results of unique vacancies for persistency, equivalent to hard-to-fill. In quite a few instances, persistency outweighed frequency of high demand. Persistent vacancies constituted 13.2% or 590 positions while high-demand positions constituted 10.9% or 485 of the total vacancies.

Recalling Table 4.10 and 4.11 in Chapter 4, where vacancies have been grouped into 10 categories based on common titles of positions advertised by companies; these also exert information on persistency. Among the major job positions, the duration of advertising for software design, quality management and manufacturing process was slightly longer than other job openings. For example, these positions posted an average of 2.8 periods, which were equivalent to 5.4 weeks. This means that the openings were technically filled after 5.4 weeks as the advertisements did not appear in the next mining. Software design ranked high in persistency for the first half of 2016. This result is consistent with the input shared by employment agencies where supply of IT programmers, network engineers, and software engineers was indicated as problematic (with vacancies taking up to three to six months to fill).

Besides junior positions for which fresh graduates with at least a Diploma in Computer Science, Information Technology or Computer Engineering are recruited, many software design positions involve senior executive positions. These require at least five years' related experience. A similar pattern is observed in Information Technology positions, in particular business system analysts, IT business analysts and program administrators. Recruitment difficulties may undermine the growth of high-tech operations in the Penang's economy. In contrast, human resources management positions take the least amount of time to fill, and persistency is not prevalent. The majority of the openings are for junior and senior executive positions. In the case of the latter, at least five years of work experience is required. Furthermore, employers prefer to recruit a person who has at least a Diploma in the field of either Human Resource Management or Business Studies. Low persistency is thought to be related to high skills transferability impacting also employee turnover. This implies that firms have to continue to invest in recruitment and skilling.

As for the second method, interestingly, three categories can be identified from the hard-to-fill results. First, critical occupations that are relevant to Penang are also hard to fill. This category is evident in the E&E sector where *Software Developers, Manufacturing Professionals, Electronic Engineers*, and *Mechanical Engineers* are highly relevant occupations, and at the same time, they are the most hard to fill. (compared with other occupations in the industry).

Table 5.10: The Penang COL in terms of relevance of occupations and hard-to-fill occupations*

Industry	Broad critical occupation	Relevant to Penang (%)	Hard-to-fill (%)
1. Electrical & Electronics Sector			
	Software Developers	62.1	62.5
	Manufacturing professionals	65.5	58.3
	Electronic Engineers	72.4	54.2
	Mechanical Engineers	65.5	50.0
	Information and Communications Technology (ICT) Services Managers	27.6	45.8
	Electrical Engineers	79.3	41.7
	Mathematicians, Actuaries, and Statisticians	13.8	41.7
	Industrial and Production Engineers	65.5	41.7
	Applications Programmers	55.2	41.7
	Engineering Professionals not elsewhere classified	24.1	37.5
	Policy and Planning Managers	62.1	29.2
	Mechanical Engineering Technicians	51.7	29.2
	Business Services Managers	44.8	29.2
	Electronics Engineering Technicians	62.1	20.8
	System Analysts	62.1	16.7

2. Telco & Multimedia Sector		
Information and Communications Technology (ICT) Services Managers	17.2	50.0
System Administrators	48.3	37.5
Database Designers and Administrators	20.7	33.3
Applications Programmers	41.4	33.3
Telecommunications Engineers	34.5	33.3
Database and Network professionals not elsewhere classified	13.8	29.2
Mathematicians, Actuaries, and Statisticians	17.2	29.2
Financial Analysts	37.9	29.2
System Analysts	41.4	29.2
Computer Network professionals	27.6	25.0
Management and Organisation Analysts	41.4	16.7
Business Services Managers	41.4	4.2
3. ICT, Global Business Services, Creative Industry		
Software Developers	37.9	62.5
Applications Programmers	37.9	54.2
Electronic Engineers	44.8	37.5
System Analysts	37.9	37.5
Mathematicians, Actuaries, and Statisticians	10.3	33.3
Accountants	58.6	29.2
Financial Analysts	44.8	29.2
Graphic and Multimedia Designers	37.9	25.0
Computer Network professionals	41.4	20.8
Information and Communications Technology Services Managers	37.9	20.8
Manufacturing Professionals	58.6	20.8
Software and Application Developers and Analysts not elsewhere classified	37.9	16.7
Accounting Associate professionals	48.3	12.5
Information and Communications Technology (ICT) User Support Technicians	41.4	12.5
Personnel and Career professionals	58.6	12.5
System Administrators	48.3	12.5
Administrative Managers	31.0	4.2
4. Financial Services Sector		
Financial Analysts	48.3	41.7
Finance Managers	48.3	33.3
Lawyers	44.8	33.3
Accountants	62.1	29.2
Financial and Investment Advisers	51.7	29.2
Application Programmers	48.3	29.2
Securities and Finance Dealers and Brokers	27.6	29.2
System Analysts	48.3	25.0
Mathematicians, Actuaries, and Statisticians	13.8	25.0
Information and Communications Technology (ICT) Services Managers	27.6	20.8
Business Services Managers	34.5	16.7
Personnel and Career professionals	62.1	12.5
Credit and Loans Officers	44.8	12.5
Advertising and Marketing professionals	48.3	12.5
Research and Development Managers	34.5	12.5
Insurance Underwriters	24.1	8.3
5. Accounting Sector		
Financial Analysts	48.3	37.5
Finance Managers	69.0	29.2
Accountants	69.0	29.2

*The critical occupations in each sector are sorted in descending order based on the highest percentage of hard-to-fill occupations responded by the focus group members.

The second category concerns occupations that have a relatively high relevance to the state, but are not hard to fill. Despite substantial demand, the length of time taken to fill is relatively short, indicating less prevalence of skill issues. In Penang, *Electronics Engineering Technicians* and *System Analysts* in the E&E sector; *Business Services Managers* in the Telco & Multimedia sector; and *Finance Managers and Accountants* in the Accountancy sector fall under this category. The last category comprises occupations that may not be very relevant to Penang's economy, yet are likely hard to fill. Despite the fact that the relevance of *ICT Service Managers* in Telco & Multimedia sector; *Software Developers, Applications Programmers and Mathematicians, Actuaries and Statisticians* in ICT, Global Business Services (GBS) & Creative industry & Creative industry is limited, factors such as high-demand and hard-to-fill go hand-in-hand for these occupations.

Detailed COLs completed by focus group participants and MIDA representatives are included as shown in Appendix C and Technical Report: Annex 16. Table 5.11 shows the top 10 hard-to-fill job titles within five industry groups. The prominence of E&E sector-related occupations is evident. Following these, *SAP Consultants* and *Java Programmers* are frequently indicated as hard-to-fill occupations within the ICT, GBS and Creative industry.

Table 5.11: Specific job titles within top hard-to-fill occupations* in Penang

Industry	Broad critical occupations	Critical Sub-occupations/Specific job titles
1. Electrical & Electronic Sector		
	Electrical Engineers	*IC Design Engineers*
	Electronic Engineers	*IC Design Engineers*
	Electronic Engineers	*R&D Engineers (includes Product Design)*
	System Analysts	*Software Design Engineers*
	Electrical Engineers	*Embedded System/Firmware Engineers*
	Electrical Engineers	*R&D Engineers (includes Product Design)*
	Electronic Engineers	*Embedded System/Firmware Engineers*
	System Analysts	*SAP IT and Finance Applications Developers*
	Industrial and Production Engineers	*R&D Engineers*
	Electrical Engineers	RF Engineers
2. Telco & Multimedia Sector		
	Information and Technology (IT) Services Managers	Data Architects
	System Administrators	IT Architects
	Application Programmers	Software Developers
	Information and Technology (IT) Services Managers	Chief Information Security Officers
	Database and Network professionals not elsewhere classified	Security Technology Specialists
	Database Designers and Administrators	Data Scientists
	Mathematicians, Actuaries and Statisticians	Data Scientists
	Applications Programmers	System Programmers
	System Administrators	Enterprise Applications Architects
	System Administrators	System Administrators
3. ICT, Global Business Services, and Creative Industry		
	Financial Analysts	*SAP Consultants*
	Application Programmers	*Java Programmers*
	Application Programmers	PHP Programmers
	System Analysts	JD-Edwards (JDE) Consultants
	Software Developers	SAP Application Developers
	Application Programmers	.NET Programmers
	Graphic and Multimedia Designers	3D Artists
	Graphic and Multimedia Designers	Animation Directors

4. Financial Services Sector	
Finance Managers	*Financial Controllers*
Accountants	Accountants/Chartered Accountants
Accountants	Tax Consultants
Finance Managers	Tax Managers
Lawyers	Legal Managers
Accountants	Tax Managers
Finance Managers	Financial Reporting Analysts
Finance Managers	Credit Risk Managements
Finance Managers	Anti-Money Laundering Specialists
Financial Analysts	Research Analysts (Foreign language)
5. Accounting Sector	
Accountants	Tax Managers
Financial Analysts	Fraud Specialists
Finance Managers	Finance Directors
Finance Managers	Financial Controllers
Accountants	Tax Consultants
Financial Analysts	Fraud and Investigation Consultants
Accountants	Accountants

* Job titles in italics means 50% and above of respondents as hard-to-fill occupations.

As a third method to identify hard-to-fill vacancies, responses from the employer survey coincide to a large extent with the findings of the other two methods. Some 44% or 40 firms indicated that they experienced such hard-to-fill vacancies. Over half of these are in the services sector. In manufacturing, the majority are international companies while in the services sector the distribution is more even (Table 5.12). This again confirms that MNCs – despite their attractiveness – still experience qualitative skill shortages.

Hard-to-fill vacancies are prevalent in high-tech manufacturing, precision engineering & automation, hospitality services and GBS (Table 5.13). The emergence of GBS appears inconsistent with the earlier observation of success rate in filling high-qualified vacancies. However, companies experiencing rapid expansion have trouble meeting recruiting needs when there is substantial turnover as new establishments start to recruit. Thus, hiring the right candidates becomes a lot more difficult.

In terms of occupations, established hard-to-fill vacancies can be classified as engineering, accounts and finance, software/information software development, management and academic. Specific occupations are listed in Table 5.14. Some of the skill sets involved are relatively niche and specialised, stretching the duration taken to fill the available positions.

Table 5.12: Over the past two years, has your company experienced vacant high-qualified positions that proved to be hard to fill? (in % by firm size)

		SME		LLC		MNC		N.A.	
Sector	N	n	%	n	%	n	%	n	N.A.
Manufacturing	17	5	29.4	1	5.91	1	64.7	0	0.0
Services	23	6	26.1	6	26.1	10	43.5	1	4.3

Note: N=40 stated "Yes" to this question
Source: Employer survey

Table 5.13: Over the past two years, has your company experienced vacant high-qualified positions that proved to be hard to fill?

Industry	Yes	No	N.A.	Total
High-tech manufacturing	5	6	0	11
Other high-tech manufacturing	6	3	1	10
Precision Engineering & Automation	4	0	1	5
Medical Devices & Life Sciences	2	1	0	3
Advanced Producer Services & Financial Services	6	6	7	19
Global Business Services	7	2	2	11
Hospitality Services	3	6	0	9
Information Technology	3	6	3	12
Transport & Logistics	1	2	1	4
Education & Training Services	0	2	2	4
Medical Tourism	3	1	0	4
Total	40	35	17	92

Source: Employer survey

Table 5.14: Hard-to-fill job titles and position levels obtained from employer survey

Job title	Position level
Engineering IC Design, Product Developer/Product Development Engineers, Materials Engineers, RF Design Engineers, Circuit Design Engineers, NPI Engineers, Debugging Engineers, Robotics and Automation, R&D Hardware, R&D Engineers, Electrical Engineers, Reliability Engineers, Product Optimisation Engineers, Process Engineers, Microwave Hybrid Engineers, Epitaxy Engineers, PCB Design Engineers, Electrical Design Engineers, Mechanical Design Engineers, Tool & Die Engineers, Supply Quality Engineers.	Mid-level, Senior level, Managers, Senior Managers, Directors.
Accounts and Finance Account Services, Cash Management, Auditors, SAP-FICO (Financial Accounting and Controlling), Accounts, Finance, Accountant, Financial report, Trade finance, Tax, Advisory.	Junior Executives, Senior Executives, Managers.
Software/Information System Development Programmers, Software Engineers, System Analysts, Software Development, Programmer Analysts, Embedded Software Engineers, Google App Engineer (GAE) Development, Portal & Java Development, Process Integration Consultant, IT Engineers, Senior SQL Server Database/SSIS Developers, Senior Oracle ADF/Fusion 11g Web Application Developers, Web Application Programmers.	Non-Executive (Junior and Senior), Junior Executives, Mid-Level, Senior Executives.
Management Duty Managers, Clinical Operations, Front Office Managers, Hotel Managers, R&D Managers, Regulatory Compliance Officers, Program Directors.	Senior, Manager, Director.
Academic Lecturers, Senior Lecturers, Dean, Professors, Deputy Vice-chancellors, Vice-chancellors	Executives, Senior Executives, Managers.

Source: Employer survey

5.5 Competition for skills

Given the current labour market condition in Penang, the war for talent is inevitable. At times, hiring incentives can be a key to success in attracting highly qualified candidates. These may be in the form of wages above the market rate, attractive packages or perks.

The findings of the employer survey show that in Penang, over half of the firms provide special incentives to lure proficient candidates; this also applies to the manufacturing and services categories. Manufacturing firms offering incentives are largely MNCs (Table 5.15). For services firms, the distribution is more level. While only a small number of manufacturing firms relenting to the demands of candidates are SMEs, the proportion is higher in services. As depicted in Figure 5.16, a large majority of MNC companies sometimes accede to the demands of candidates. Interestingly, a substantial share (almost half) of SMEs in the services industries accede to the talented candidates' demands.

Employers use different strategies to resolve skill shortages. Three strategies frequently invoked are labour poaching, under-hiring, and employee retention. Among these strategies, retention is recorded to be favourably employed by most respondents (73.9%), followed by hiring of under-skilled candidates (52.2%). Labour poaching – hiring competitors' top performing candidates - is the last strategy used (26.1%).

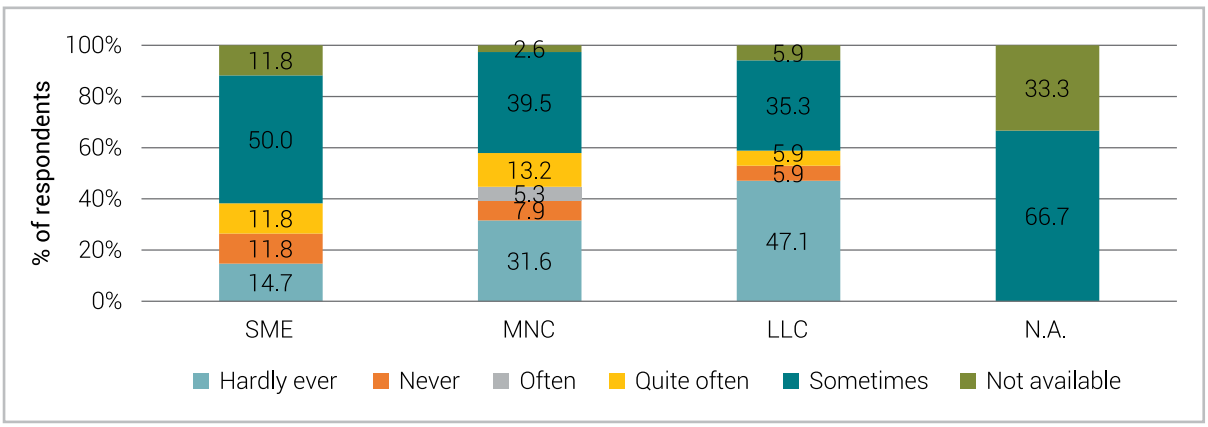
Unlike SMEs, MNCs tend to remain stringent on the requirements of academic qualifications and soft skills (language/communication). In view of this, MNCs and SMEs resort to hiring under-skilled persons to fill vacant high-qualified positions (Table 5.3). On the other hand, smaller companies do not necessarily have the tendency to hire less qualified candidates compared with multinational companies. It should be noted though, SMEs tend to adjust their demands downward more often by hiring candidates with Diploma alongside relevant experience and multi-tasking skills. SMEs focus considerably on hands-on experience. Hiring of under-skilled candidates by MNCs goes principally to those in the services sector.

Table 5.15: Do these establishments provide special incentives to hire a candidate who is proficient in the required skills (e.g. salary above the market rate)?

Sector	N	SME	LLC	MNC	Total
Manufacturing	15	13.3	0.0	86.7	100.00
Services	34	47.1	14.7	38.2	100.00

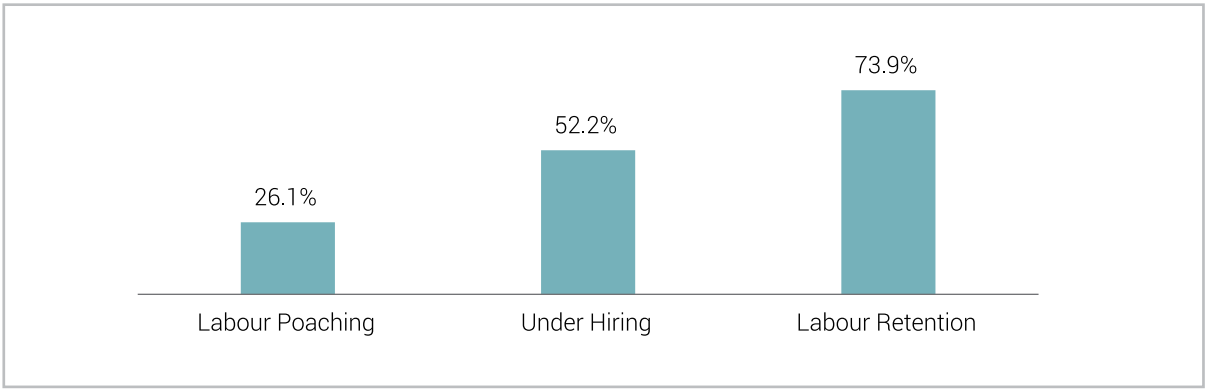
Note: N=49 stated "Yes" to this question
Source: Employer survey

Figure 5.16: How often does this establishment accede to candidates' demands? (%)



Note: N=3 did not disclose firms' headcounts. Hence, the size of firms is unidentified.
Source: Employer survey

Figure 5.17: Strategies used by firms to overcome skill shortages (% of firms)



Note: Respondents who did not respond: N=10 (labour poaching); N=7 (under hiring) and N=12 (labour retention).
Source: Employer survey

Table 5.16: Strategies to overcome skill shortages by sectors and firms size

Sector	Labour Poaching		Under-Hiring		Labour Retention	
	Yes (n)	No (n)	Yes (n)	No (n)	Yes (n)	No (n)
Manufacturing						
SMEs	2	3	3	3	6	0
MNCs	9	9	9	9	12	6
LLCs	1	3	1	3	2	1
Not available	0	0	0	0	0	0
Services						
SMEs	4	19	10	13	18	5
MNCs	4	14	15	3	18	0
LLCs	4	8	7	5	11	1
Not available	1	1	1	1	1	1

Note: Respondents who did not respond: N=10 (labour poaching); N=7 (under-hiring) and N=12 (labour retention).
Source: Employer survey

All SMEs in manufacturing industries favour retention, and likewise, all MNCs in services industries. Among some of the retention measures are conducive working conditions, attractive fringe benefits, career development and skill development. One of the respondents stated, "Incentives can be in the form of project-based bonus and/or profit sharing on top of yearly performance-based bonus." Employee retention also targets the prevention of poaching by other employers. Thus, it is also a defensive measure.

Labour poaching is the least favoured method used by firms to overcome skill shortages. It occurs though, in areas such as R&D, product design/solution design, and IT & software development. Larger companies seem to engage in labour poaching more often by providing rich compensation packages to lure employees with suitable qualifications, skills and experience. Six out of 10 participants in the focus group felt that labour poaching is prevalent in Penang. It is more likely to happen in manufacturing and GBS firms (including due

diligence companies). Not only does this potentially lead to fatter paycheques in the short-term, but in the long-term, it might also benefit workers by providing them chances to learn new skills, earn promotions that lead to better job titles, and acquire better brand-name on their resume, which is not always guaranteed in job-hopping. However, it is an unhealthy practice (wage inflation), yet not a critical issue in the Penang's labour market.

In regard to under-hiring, employers often have to 'compensate' this by internal upskilling and/or on-the-job training. Many MNCs have also started to employ fresh graduates and provide them with training. Upskilling is the topic of the next part of this report.

6

SKILL DEFICIENCIES AND GAPS: UPSKILLING INFRASTRUCTURE

This chapter focuses on Penang's education and upskilling infrastructure in relation to skill deficiencies and gaps. This infrastructure is sizeable and diverse, reflecting the skill issues pertaining to high-qualified labour, and how these are being addressed in multiple ways. We present a general framework of skills infrastructure where the primary, secondary and tertiary skill learning channels are discussed in detail in separate sections. Specifically, we cover :-

- Primary skill learning institutions and concerns surrounding their output and quality;
- Skill gaps of the secondary supply;
- The nature of these gaps, the role of upskilling taken by firms in different industries, avenues of upskilling and its impact; and
- Regional and local institutional initiatives to enhance high-qualified labour and skills.

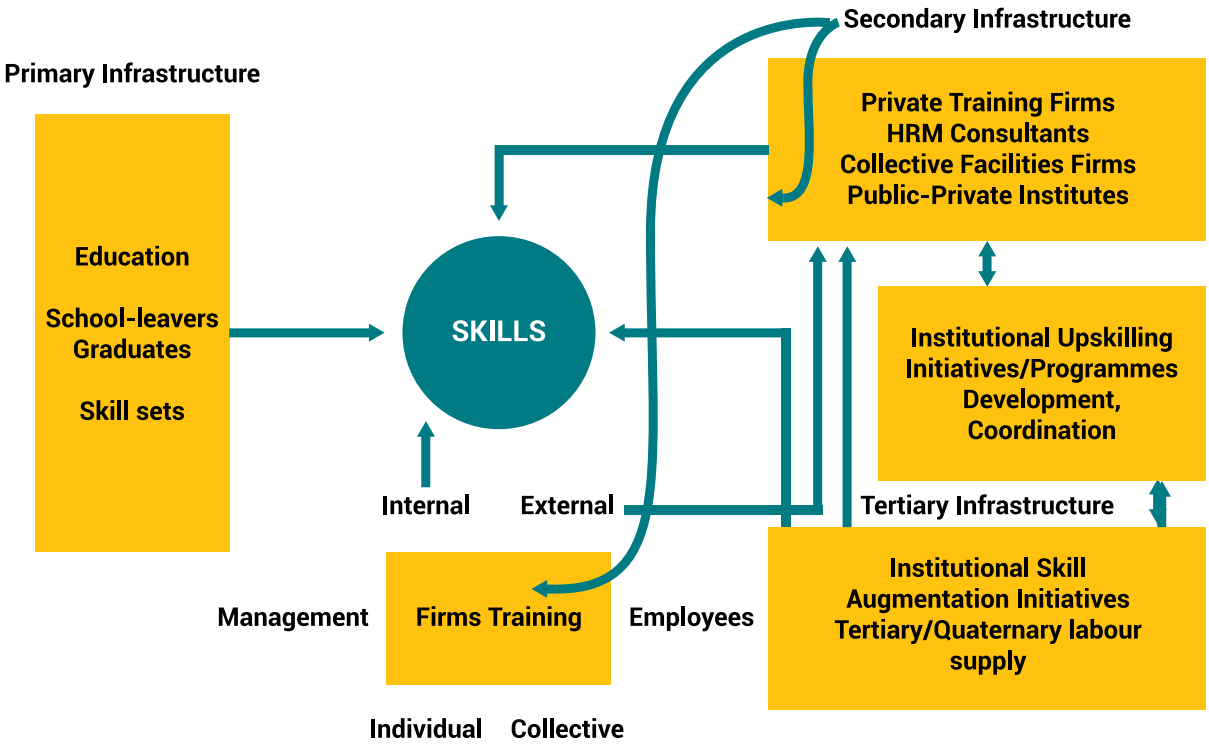
6.1 Framework

In Penang, the general structure of skill production consists of a primary, secondary and tertiary infrastructure. The first one – primary – consists of formal institutions of higher learning that equip diploma/certificate holders and graduates with skill-set to enter the labour market (Figure 6.1). Upskilling is the focus of a secondary infrastructure consisting of private training providers; HRM consultants, firms engaged in training, internal or external, individually or collectively. PSDC and FMM-run programmes are examples of collective arrangements. Public-private initiatives such as Malaysian-German Chamber of Commerce and Industry Training Programme (although in this case TVET targetted) are becoming larger in number.

A number of institutions such as NCIA have recently engaged in initiatives for development of training programmes; they are distinct from institutions that focus on skill augmentation, and have recently established a presence in Penang. As for the latter, the prime institution is TalentCorp, which through its programmes in an indirect way addresses deficiencies within the existing labour force through the avenue of mitigating shortages. We refer to institutionally developed and implemented programmes as the tertiary infrastructure that often uses (part of) the secondary infrastructure as implementation vehicle.

The secondary and tertiary infrastructure are sizeable. It is sometimes referred as unconventional, while the primary infrastructure is conventional.

Figure 6.1: Penang skills learning infrastructure



6.2 Primary skills learning infrastructure

The formal education system is the prime pathway of human capital building. Penang has a wide range of tertiary education institutions – colleges and universities – and programmes that cater to the needs of manufacturing and services industries. Altogether there are 27 private and eight public higher learning institutions offering tracks for certificate and diploma qualifications, bachelor degrees and postgraduate degrees. A listing of these institutions and available training programmes with accredited qualifications is presented in Appendix E.

As for certificate programmes, it is found that private higher learning institutions offer more tracks than public higher learning institutions. These include Social Sciences, Business & Law (Business IT, Human Resource Development etc.); Science, Mathematics & Computing (Hybrid System Technology, Computer System Administration, Computer Technology); Engineering, Manufacturing and Construction (Precision Machining Technology, Industrial Automation, Quality Assurance); and Services (Tourist Guide, Hotel and Tourism, and Cabin Crew Training). Penang has two public higher educational institutions offers certificate tracks, namely Institut Latihan Perindustrian Perai (in Welding & Gas Technology and Automotive Technology) and Institut Kemahiran Belia Negara Bukit Mertajam (Electronic Technology in Wiring).

Similarly, private institutions dominate the provision of diploma curricula. Those in Social Sciences, Business & Law offer most subjects, including Accounting, Business & Finance, Business Information Technology, Logistics Management, e-commerce & Marketing and so on. This is followed by Humanities & Arts (27 subjects); Science, Mathematics & Computing (20 subjects); Engineering, Manufacturing & Construction (19 subjects); Services (13 subjects); Health & Welfare (6 subjects); and Education (3 subjects). While public institutions have well-developed Social Sciences, Business and Engineering curricula, none of them offer subjects in Humanities & Arts (such as Digital Animation, and Graphic and Multimedia Design).

Universiti Sains Malaysia (USM) is the core provider for degrees as well as postgraduate programmes in the region. While most of the private institutions focus their degree programmes on Social Sciences and Business Studies (Accounting & Finance, Business IT, Commerce, Business & Human Resources), public institutions such as USM and Wawasan Open University (WOU) have a broader range of programmes.

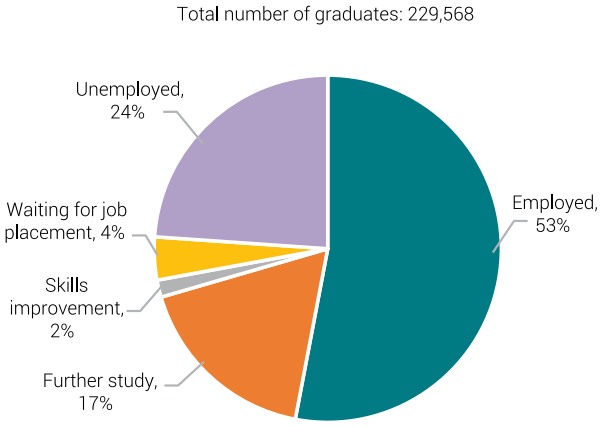
6.3 High-qualified entrants: Extent and causes of skill deficiencies

There is little evidence to argue that there is a substantial mismatch between curricula and industry demand. Therefore, the skill deficiencies can hardly be traced. There are, though, significant issues and challenges for the primary supply that contributes to an emergence and growth of unconventional sources of skills and modes of skilling. Three inter-related issues and challenges with regard to skill deficiencies are considered below.

6.3.1 Graduate employability

As delineated in the national Graduate Tracer Study 2015, while the majority of graduates are employed six months after graduation, nearly one-fourth of the total fresh graduates were not employed in 2015 (Figure 6.2). This means that unemployment could be high for this group of workforce despite the fact that the unemployment rates in Penang and Malaysia are relatively low.

Figure 6.2: Employment status of graduates six months after graduation in Malaysia, 2015

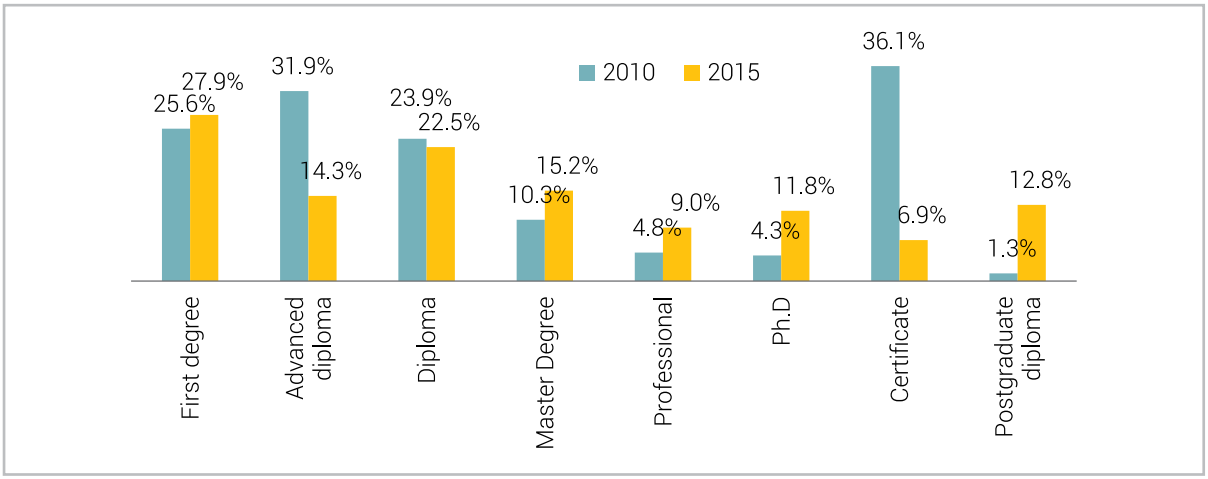


Source: Graduate Tracer Study, Ministry of Higher Education Malaysia (MoHE)

Within the group of graduates who had not found employment, nearly 28% were first degree holders; master's degree and Professional degree holders. PhD holders also constituted a fair share (Figure 6.3). This finding is corroborated by the Malaysian and Penang unemployment picture. Since 1990, unemployment has lingered around 2.4-3.4%; Penang even reaching a historic low of 0.7% in 1996 (Figure 5.4). It has consistently remained below the Malaysian average, recording at 3.4% against that of Penang at 2.1% in 2016. The Malaysian average has lingered at 3.0-3.5% throughout the 2010s.

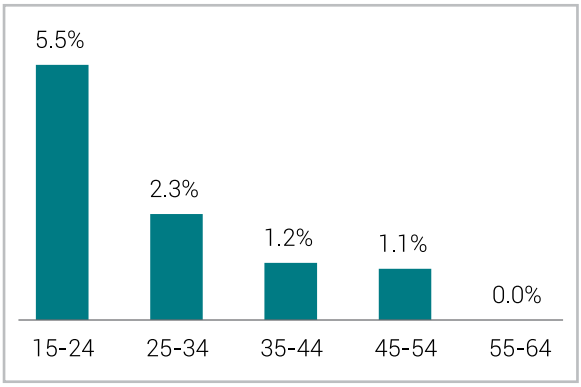
In contrast, between 2010 and 2015, the average unemployment rate among graduates with a first degree qualification climbed by 2.3%; unemployment among master' degree, PhD, or postgraduate diploma holders has escalated substantially by about 5% (Figure 6.3). Furthermore, Penang's youth[55] unemployment is disproportionately high even though it has dropped from 20% in 2005 to about 16% in 2015. The share is still disproportionally high compared with other age cohorts (Figure 6.4), and also the overall unemployment rate. Out of 18,100 unemployed persons, about 41% were youth registering at a rate of 5.5% in 2016. This partly reflects graduate unemployment in Penang.

Figure 6.3: Percentage of graduate unemployment by education level in Malaysia between 2010 and 2015 (%)



Source: Own calculations based on the Graduate Tracer Study Reports published by the Ministry of Higher Education Malaysia

Figure 6.4: Unemployment rate by age groups in Penang, 2016



Source: Own calculations based on Labour Force Survey Report 2016, DOSM

This result is likely due to the insufficient demand to absorb the growing number of tertiary educated workers, thus forcing them either to accept lower-skilled jobs, stay (voluntarily) unemployed, or move out of the labour market (migrate). This indicates a mismatch between the curricula of higher education and local market demands. Besides that, tertiary-educated workforce is insufficiently hired due to low employability, which implies that the workforce does not possess the required skills. Therefore, a dual process is suggested where mismatch between demand, supply, and skill deficiencies prompts some employees to leave the market or take up employment in less-qualified jobs despite their education qualifications. The 'learnt output' of curricula of higher education has two facets.

[55] Youth is defined as the age group of 15-24.

The first is the subject mix of graduates, in large part determined by their preferences. The second is the mix and quality of skills learnt.

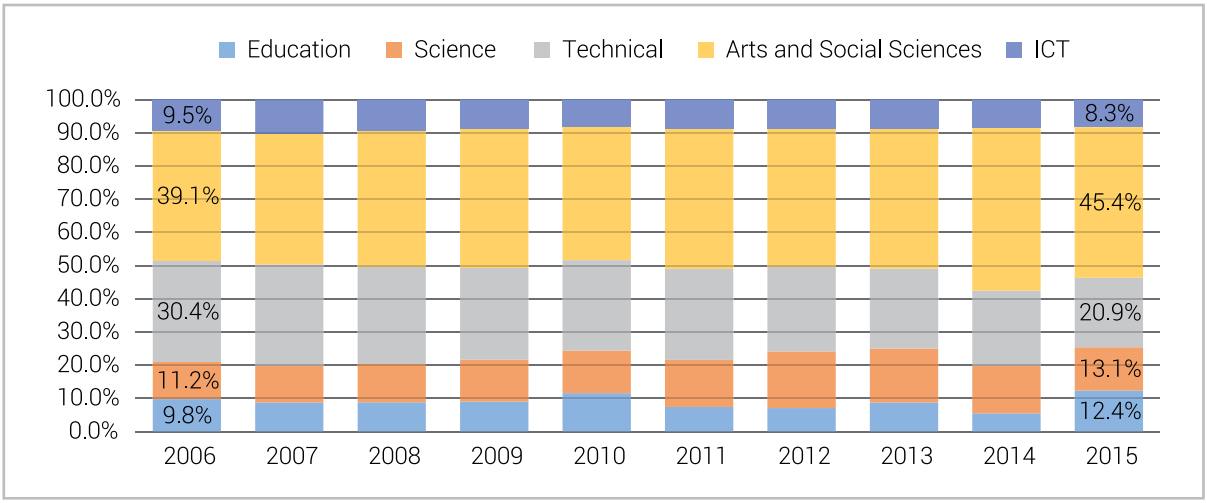
6.3.2 Subject choices of entrants

It is often asserted that a significant number of graduates in Malaysia choose their field of study without duly considering labour market demand. Figure 6.5 shows that the number of graduates opting for arts and social sciences fields have increased over time, while the share shows the opposite trend for technical, IT, or science related fields.

Figure 6.6 associates employment status (employed, further studies and unemployed) with graduates' major fields of study. While Arts and Social Sciences graduates constitute the largest group among the employed persons, this is also the case among those staying unemployed six months after graduation. In 2015, nearly half of them had an Arts and Social Sciences background.

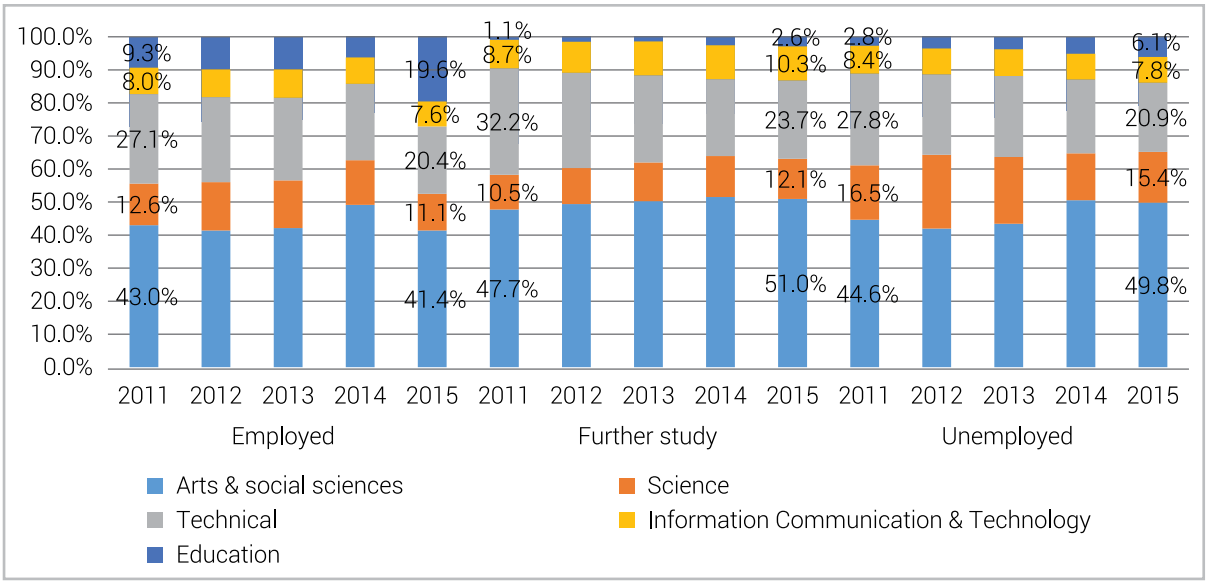
Social Sciences, Business, and Law remain as the favourite programmes among students originating from Penang. As shown in Figure 6.7, at least one-third of students from Penang graduating from public universities in Malaysia had pursued these programmes. While the fields of Engineering, Manufacturing and Construction produced the second largest number of graduates, the share has been shrinking over the years.

Figure 6.5: Graduates by fields of study in Malaysia, 2006–2015 (%)



Source: Ministry of Higher Education, Malaysia

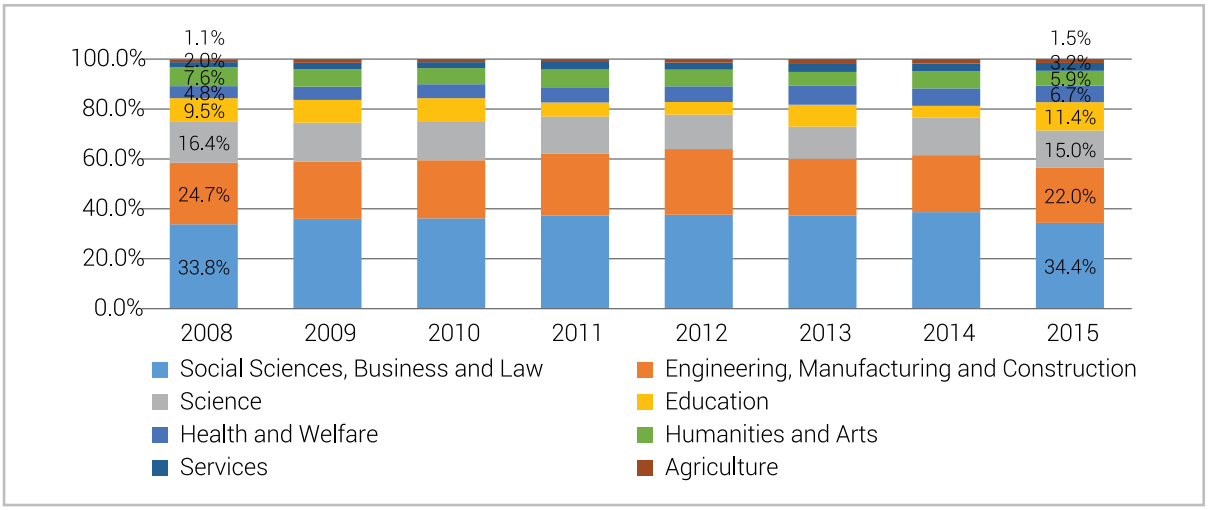
Figure 6.6: Graduates by fields of study and employment status in Malaysia, 2006–2015



Source: Graduate Tracer Study, Ministry of Higher Education, Malaysia

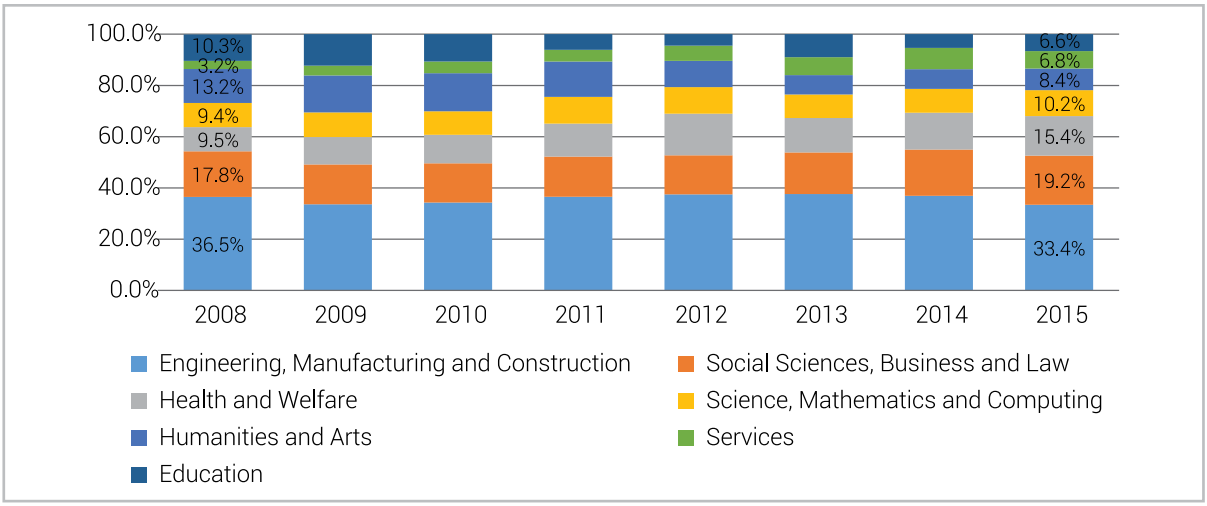
On the other hand, the structure of graduates from Penang's public higher learning institutions – USM and UiTM – is dissimilar to that of Malaysia. These universities yield an average of 5,600 graduates yearly in the period 2008–2015. Over one-third of them graduated in Engineering, Manufacturing and Construction (Figure 6.8). Thus, graduates from Penang's public universities show a trend with more scope for synergy between university programmes and industry.

Figure 6.7: Fields of study in Malaysian public universities of graduates originating from Penang, 2008–2015



Source: Own calculations and Planning, Research, and Policy Coordination Division, Ministry of Higher Education, Malaysia

Figure 6.8: Fields of study of graduates in public universities in Penang, 2008–2015 (%)



Source: Own calculations and Planning, Research, and Policy Coordination Division, Ministry of Higher Education, Malaysia

It seems that students today are more interested in other fields of study than traditional fields such as business, engineering, IT, accounting, finance, entrepreneurship, hospitality and culinary arts. However, the lacklustre interest in sciences and engineering programmes remains problematic. Thus, employers continue to lament that graduates select wrong fields of study as the chosen programmes do not parallel with industry needs.

6.3.3 Skill deficiencies: Are graduates/ school-leavers sufficiently prepared?

Looking at the number of graduates, it is estimated that the labour supply is able to fulfill the needs of Penang's firms if quality is met. In the World Bank's Enterprise Surveys, the fraction of firms reporting inadequate skilled workforce as major constraint was higher in Malaysia (2015: 12.2%) than in Thailand (2016: 2.1%), Philippines (2015: 3.5%) and Indonesia (2015: 10.8%). The high unemployment rate among high-qualified graduates can likely be explained in part by the lack of skills and knowledge from fresh graduates especially with low preparedness. Despite their qualifications, the skills acquired do not meet the standards required by employers.

Issues concerning low employability of fresh graduates can be supported by different international benchmarks. Malaysian universities have dropped in international rankings despite generous public funding[56]. It is often argued that work preferences and attitudes of graduates (in terms of salary demand and benefits) and preparedness (well-equipped to enter the labour market in terms of quantitative and qualitative skills) are in stark contrast. Such lack of sync has several aspects to it. First, in a constrained labour market, there is a general tendency to over-demand. The talent paradox is raising the stakes in the competition for critical talent, with organisations trying to outbid each other for a selected group of critical employees, and the skills they need to succeed. Next, over-demand does not concern price per se, but rather, fresh graduates' inability to meet the skills required by employers, leaving attitude(s) and demand(s) as part of the issues (see Box 6.1).

As for the level of employer satisfaction with new graduates, some 65% in the employer survey indicated that (fresh) graduates are partly or poorly prepared for the positions. This is mainly attributed to the lack of required hard skills, English and foreign language skills, soft skills and knowledge/work experience. Firms in advanced producer services and financial services rate preparedness of (fresh) graduates relatively poorer than firms in other industries. It may be noted here that the majority of firms in these two industries are MNCs. This is consistent with the higher than average skill requirement of MNCs.

[56] See World Bank (2007); Sharifah (2013)

Box 6.1: Graduates' attitudes and demands: Self- and employers' perceptions

All recruitment agencies interviewed agreed that salary and compensation packages are prime factors for fresh graduates to consider job offers. Working culture of the company and flexibility of working hours come next. Furthermore, training and career development opportunities are increasingly considered as self-evident, especially in the case of the millennials and Gen-Y.

Employers in many industries narrate such attitudes and often lament these, repudiating job-interviewees who appear only self-interested while showing lack of skill substance. This negatively impacts employability and actual hiring.

Insufficient training at colleges and universities is a concern expressed by stakeholders, among other recruitment companies. They comment that today's education system places too strong an emphasis on acquiring theoretical knowledge, and does not focus enough on teaching students to think critically and solve real world problems nor, collaborative enough in its approach to ensure students are equipped to succeed in a changing world. While internships are an excellent vehicle for exposure, too little is done and offered in this area. Industry and university should hold closer dialogues to achieve an effective supply of high-qualified labour.

Universities and colleges in first instance necessarily focus on skills at a generic level; it is harder to cater to skills specifically for individual industries and even more so individual companies. Positions with high skill-specificity requirements present hiring difficulties. For example, IC designers require knowledge in Spice simulators, Spectre, and Analog Artist. These are job- and firm-specific requirements. In some instances, employers need to work closely with institutes of higher learning to cater to and improve the basic level of specific skills needed in the industry. Gaps are being filled by an increasing number of industry-university collaborations in the form of tailored programmes.

Unconventional skills training comes into the picture when the skills acquired from universities are insufficient to perform the given tasks effectively. It also responds to skill gaps in the secondary supply, or – more narrowly – of existing employees in firms. The existence of a sizeable upskilling infrastructure is an expression of the presence of gaps, and at the same time contributes to solving these. A tertiary infrastructure also constitutes part of the response to skill gaps (and shortages that convert into gaps once skill-deficient persons are hired by firms). Box 6.2 elaborates the issues and challenges faced by the higher educational institutions.

Box 6.2: The voice of educational institutions: Issues and challenges

Educational institutions are aware of the negative perception of the market in regard to skills proficiency, employability, and industry readiness of graduates and school leavers. According to the attendants of the focus group on local educational institutions, there still exist gaps between industry needs and technical skills as well as soft skills taught in the curriculum. Programmes offered are not always producing industry-relevant graduates. They are aware that exposure to international experience, innovation, individual creativity, critical thinking, communications, and collaboration are necessary elements for student development. We highlight key issues and challenges faced by educational institutions below.

- While curricula have evolved in regard to the types of skills taught and learnt, there are important limitations and impediments. Time constraints of courses do not allow '21st century skills' to be incorporated to the desired level.
- Attitudes of many students are such that exposure to skills learning beyond what is being assessed or formally examined is not rightly valued. It is rather difficult to change the attitudes.

- Rules and regulations are such that devising and implementing curriculum changes are extremely cumbersome and time-consuming. The same applies to setting up industry-university collaborations (comprising internships, practical trainings in companies) and joint programmes with overseas educational institutions. The need for private colleges to comply with regulations, specifically Malaysian Qualification Agency (MQA) requirements, means that any curriculum change is subject to a lengthy process of approval. This creates great uncertainties for institutions in tailoring programme adjustments.
- Another issue brought up is that – while educational programme planning must necessarily be long-term in view of institutional factors – long-term needs of the economy are in fact not easy to forecast in terms of quantifying labour needs.
- Besides, it appears that skill shortages are more acute in niches of the economy and labour market. It is difficult for a large educational institution to cater to all these niches.
- As such, the industry cannot expect the educational field to be able to cater to the full range of industry needs, including a full set of soft skills.
- The industry could be more forthcoming in providing opportunities for internships and practical periods. It will remain difficult to create enough opportunities for students if this does not take place.
- Given the constraints faced by educational institutions, it is logical that a substantial secondary infrastructure – a web of (semi-)private skill providers – has developed. This development is not entirely adverse to the upskilling infrastructure as long as there is sufficient synergy between primary and secondary infrastructure. Nevertheless, there is little communication between skills training providers in responding to the market needs.
- While there is one in rudimentary form, the institutional structure for industry-university dialogue should be improved. The industry scope should be widened to encompass new and growing industries; dialogue should be carried out more frequently and be deepened with a view to establishing a well-functioning industry-education collaboration.
- On the other hand, curricula gearing towards industry needs and overall development of students should be maintained. The growing of human capital serves a deeper function than industry needs of the day. And it's also about long-run personal development.
- In sum, systemic changes in the educational field can substantially contribute to the needed flexibility (and perhaps) more autonomy of individual institutions of higher learning.

6.4 Secondary supply: Skill gaps

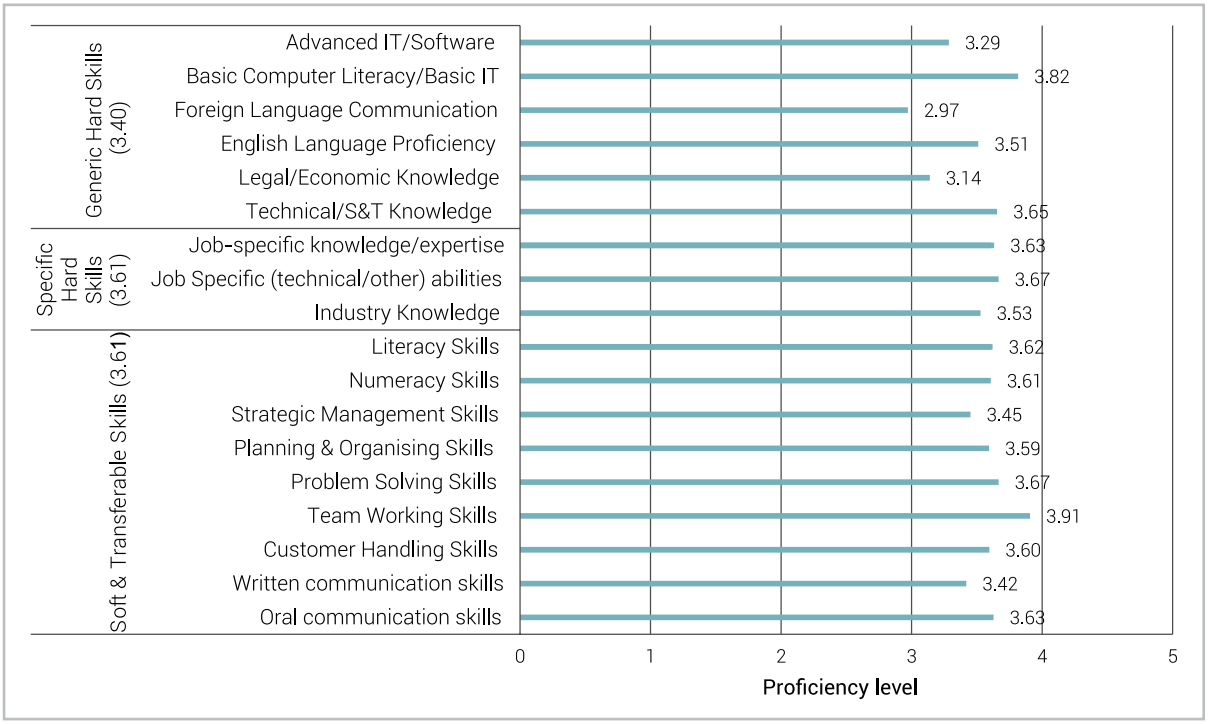
As discussed in Chapter 2, skill gaps refer to a situation where there is a mismatch in the skills being acquired and the skills required in the labour market, resulting gap between what the employers need and what jobseekers can offer. It is an internal skill deficiency. The gap exists within the firm's workforce. To a certain extent, skill gaps are unavoidable given the dynamics of operations of firms. However, the situation can be alarming when the gaps result in firms having difficulty meeting business objectives. The following sections discuss the indicators of skill gaps based on the results of the employer survey.

6.4.1 Skills proficiency of current employees

Skills proficiency is defined as employees who possess the skills, are able to apply these skills, as required by the establishments. To examine the skill gaps within the establishment, we asked employers to indicate the level of proficiency of current high-qualified employees in regard to generic hard, specific hard, soft and transferable skills.

Figure 6.9 depicts the average rating of skills proficiency of current employees. Employers could rate from very low (1) to high (5) proficiency. Specific hard skills, soft, and transferable skills score an average rating of 3.61 while the average score for generic hard skills is slightly lower at 3.4. The latter derives from relatively

Figure 6.9: Firm rating of skills proficiency level of current employees by specific types of skills



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

low scores on foreign language and IT skills as well as specific economic/legal knowledge. The rating of these skills contrasts with the rating of other generic skills, which is satisfactory. Surprisingly, English language proficiency is not rated as deficient as anecdotes suggest. Nevertheless, the ratings are hardly comforting. Generic hard skills are associated with the training provided at institutes of higher learning. The ability to use English language, IT and S&T knowledge are skills that should have been acquired in universities and/or colleges in the respective fields of study. These again raise the concern about the efficacy of tertiary education institutions in generating competences of high-qualified workers that match expectations of employers.

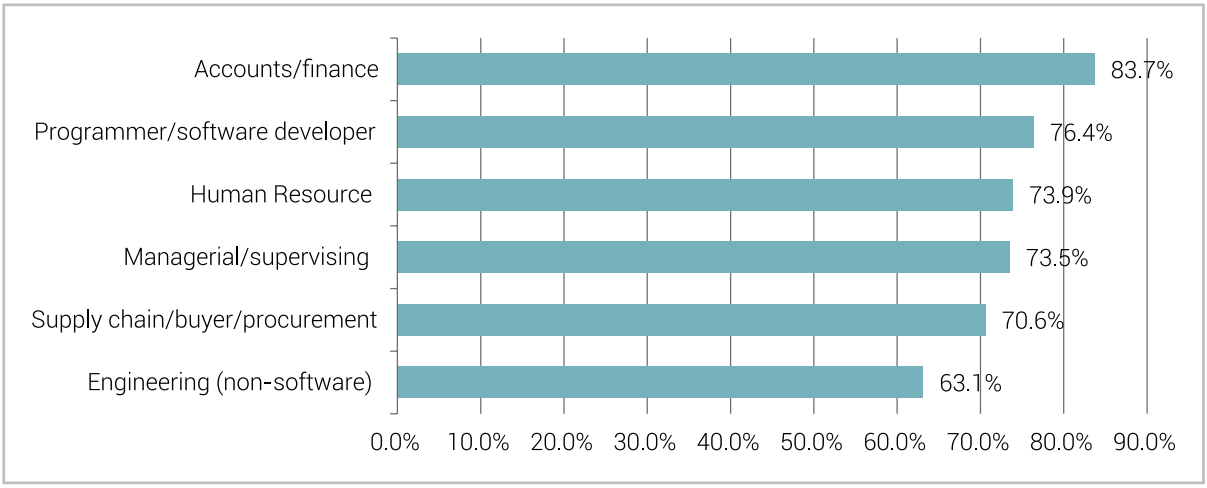
Specific hard skills, on the other hand, stand slightly above generic hard skills. Being job- and industry-specific, scarcity in the market is compensated by skill training. Employers are most willing to invest in these as they are crucial and least transferable. It may thus reflect the investment in training.

With respect to soft and transferable skills, the average proficiency level of current employees across the individual skills ranges between 3.42 and 3.91. While all score above the satisfactory level, communication and strategic management skills are rated the lowest (or below average). Interestingly, ratings given by firms in services sector (especially Global Business Services and Hospitality Services in the large local and foreign establishments) are more favourable than those given by firms in the manufacturing sector.

6.4.2 Ideal skill-set and how this requirement is met

Given the skills proficiency level of current employees, employers were also asked to specify the ideal skill-set for employees in diverse functions as well as the percentage of employees in core functions meeting this requirement. Ideal skill-set refers to the skills, knowledge and competencies necessary to perform a job. Ideal skill-set for a range of functions are described in full in Appendix D. It obviously varies across job

Figure 6.10: Average share of employees in top five high-qualified job positions that are fully skilled



Source: Employer survey

positions. Fully skilled in this context is equivalent to having all skills in the ideal skill-set. Respondents have shared their estimates for core job functions of their establishments. The average fully skilled score for the top five high-qualified positions based on firm responses are presented in Figure 6.10. Accounts & finance top in the list where firms have rated an average of 83.7% of employees as fully skilled. This implies that current employees working in accounts & finance positions have high likelihood to fulfill the ideal skill-sets required by employers compared with other high-qualified positions. The ideal skill-set includes knowledge of tax systems, accounting software and corporate regulations.

Programmers and software developers come next where firms considered an average of 76.4% of employees to be fully skilled. These positions are rather specific and require cutting-edge technical skills that encompass programming languages (Javascript, Python, C++, mobile app, etc.) or web design skills (user-interface and user-experience). With only 63.1% of employees thought to be fully skilled, non-software engineering functions score the least favourable, lower than functions in supply chain management, management and human resources.

6.4.3 Skills that need the most improvement

Skill gaps can also be derived from employers' perception pertaining to skills that need most improvement within the establishments. Table 6.1 presents skills that need most improvement in terms of generic hard skills, specific hard skills (technical and business skills) and soft skills, as expressed by different types of firms. Specific technical skills and soft skills clearly emerge as skills that need improvement. Of 34 SMEs, more than half cite specific technical skills as needing the most improvement. LLCs on the other hand, regard soft skills as needing the most improvement compared with other skills. This is expressed by about half of SMEs but by less than 40% of MNCs. MNCs also view the importance of specific technical skills improvement.

The specific technical skills include engineering, programming, design and software development while soft skills include communication (spoken and written), problem-solving, critical thinking and presentation skills. This is primarily explained by either lack of training and experience or recent hiring by company. With technology evolving rapidly in high-tech manufacturing firms, it is difficult for employees to keep pace. This is the most frequently mentioned reason for the poor performance in specific technical skills.

Table 6.1: Skills that need most improvement by firm size (%)

Types of Skills	SME	LLC	MNC	Not Available (Firm size undetermined)
Generic Hard Skills	0.0	12.0	13.2	50.0
Specific Hard: Technical Skills	53.1	20.0	39.7	50.0
Specific Hard: Business Skills	0.0	4.0	7.4	0.0
Soft Skills	46.9	64.0	39.7	0.0
Total	100.0	100.0	100.0	100.0

Source: Employer survey

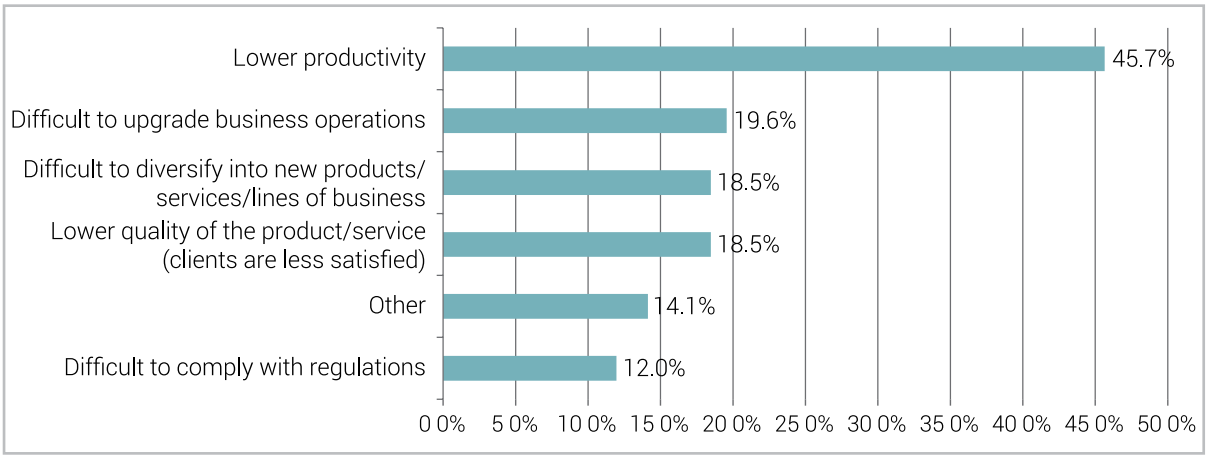
Although not always used as consideration in recruitment – as seen earlier – in view of general availability, the findings here still confirm the increasing relevance of specific hard and soft skills in the functioning of higher-qualified employees, illustrating again the specific dynamics of skill demands as firms and industries change.

6.4.4 Negative effects of skill gaps

Skill gaps can negatively affect business performance of an establishment. It will increase business operating costs, and affect firm's capacity to absorb new technologies. The surveyed firms generally agreed on the main consequences of skill deficiencies. As shown in Figure 6.11, about 46% indicated that this situation lowers firms' productivity; about one-fifth of firms are affected in diverse areas: making it difficult to upgrade business operations, and/or difficulties in diversifying business activities into new products and services, and/or leading to lower quality of products and services. The low productivity appears to have the most impact on LLCs; second on SMEs, and then MNCs. Overall, difficulty complying with regulations is the least cited by surveyed firms.

The findings are in line with feedback from employers where skill gaps can potentially cause delays in meeting customer commitments, or compromise the quality of output. In some instances, proficient employees are required to work more to compensate for those lacking in competencies. Hence, measures mitigating skill deficiencies are crucial to improve business efficiency.

Figure 6.11: Impacts of skill gaps of current employees (%)



Note: Three respondents did not respond to this question.
Source: Employer survey

6.5 Overcoming issues and skill gaps

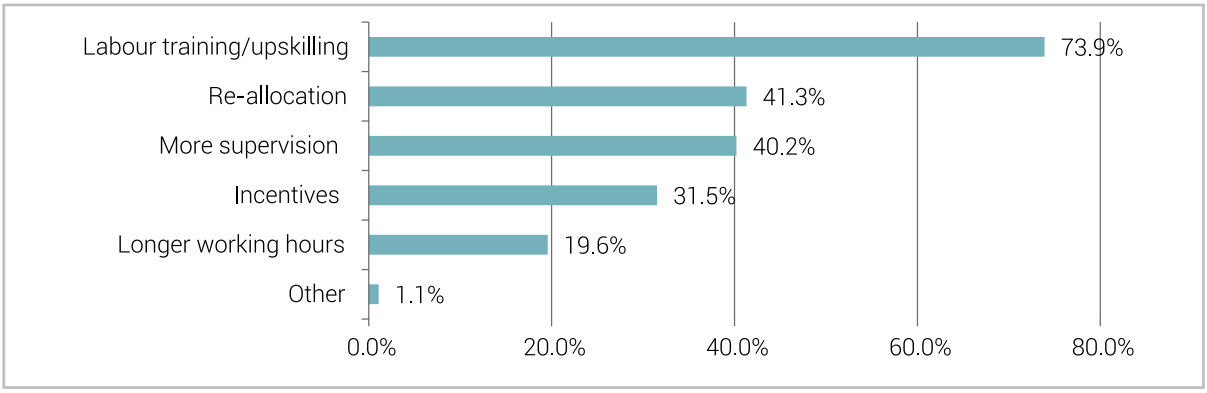
6.5.1 Firm responses

Many establishments have already adopted an array of measures to mitigate skill deficiencies. The most common measure taken by nearly three-quarters of those affected is to provide labour training or upskilling (Figure 6.12). Employers are more likely to attract and retain good employees if organisations offer training and development initiatives. This, in turn helps businesses run better. Likewise, experienced employees are also given training on firm-specific skills and knowledge.

Re-allocation of skilled employees to assist those with skill deficiencies is the second ranked measure to improve performance. The majority of the large MNCs in high-tech manufacturing addressed skill deficiencies using this method. This can be explained by the fact that large MNCs have adequate resources to re-arrange their manpower. Less proficient employees require more supervision – this method is also frequently used (40.2%), while long working hours (for proficient employees) appears less favourable and practical for obvious reasons.

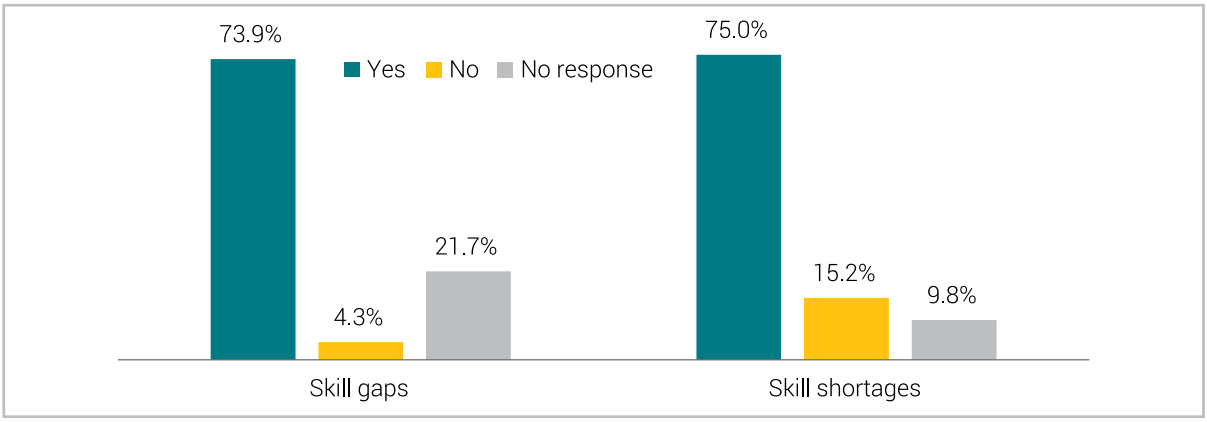
Three-quarters of firms provide labour upskilling to current employees and new hires (Figure 6.12). Likewise, almost all establishments in each industry provide skills training to their employees. However, foreign establishments (originating from Germany, Japan, Singapore and the United States) are more inclined to offer skills training to their employees than local establishments.

Figure 6.12: Measures taken to address skill deficiencies



Source: Employer survey

Figure 6.13: Share of employers' responses to training/upskilling for addressing skill gaps and skill shortages



Source: Employer survey

Firms also embark on skills training when the required skills are not available in the market (Figure 6.13). As employers deem certain skills to be very crucial to business operations, an extended period of vacancy advertisements is undesirable. Therefore, firms opt to under-hire and upskill new hires.

In order to address skill gaps, firms offer training programmes that are taught in schools and universities. For instance, upskilling/training on English communication and writing skills, and foreign language skills is often offered by employers. Such competences are also learnt in educational institutions. It is difficult for employers to entirely focus on upgrading the skills of existing employees on cutting-edge technologies and practices. A large majority of surveyed firms conduct training continually, only a small number provides training to new hires. This suggests that many establishments choose continual skills training to sustain business operations. Although the return on investment is slow, the long-term gains associated with employee training will make a difference.

6.5.2 The modes of skills training

There are two basic modes to skills training: internal and external. Internal training includes on-the-job training, mentoring and coaching, while external training is carried out outside the establishment (in skills development centres or training providers). The latter has become more prominent. As collectively organised and managed facilities such as the Penang Skills Development Centre (PSDC) has only recently started to widen its scope to offer programmes for higher-qualified employees, the skills formation void was previously filled by private training providers that currently constitute the core of the secondary skills training infrastructure. These offer courses in a range of fields for class attendance-based and online. Box 6.3 provides some insight into the extent and scope of the training provider web. Training/upskilling is no longer confined to employees but is also targeted to management. This is the domain of an increasing number of management/HRM consultancy firms with *Xtrategize* being a typical case. Public-private arrangements are gaining significance in the areas of employee and management training.

The employer survey reveals that about 74% of firms use skills training as a measure to close the widening skill gaps. As for skills that are not available in the market, about 75% of firms offer training programmes to resolve skill shortages (Figure 6.13). Internal training is most common in large companies where resources are available and expatriates can be brought in for knowledge transfer purposes. As part of the retention policy, large foreign companies also send local high-qualified employees to the headquarters for skill upgrading.

Small establishments, especially those in advanced producer services, financial services and information technology, favour internal over external training for cost and efficiency reasons. At times, these establishments bring in trainers. Some SMEs shun external skill training for two reasons. First, frequently all personnel are needed for the workload. Tasks will not be completed according to schedule if employees are sent for skill training externally. Agreements with clients cannot be complied with. Second, employers may face the difficulty to recover the costs of investing in external training programmes as the risk of employees leaving the company is particularly high. In view of such retention difficulties, small establishments are more inclined to capitalise on in-house training, specifically on-the-job training.

Box 6.3: Secondary skills training and management development infrastructure

A. Private training providers: DreamCatcher

Penang has a range of private providers offering hard and soft skills training to high-qualified employees to improve their competences at the workplace (see Appendix E for the listing). They complement the roles of the conventional education infrastructure by providing skill enhancement courses. Most of these skills serve the specific needs of certain industries and individual firms.

As employers promote hard and soft skill development to enhance the effectiveness of professional staff, upskilling programmes are offered by private skill enhancement centres that have developed substantial links with the manufacturing

and services industries in the region. USAINS Holding, The Coding House and Dream Catcher are examples of private skill training set-ups employers frequently connect to for employee upskilling. They provide leading edge programmes such as Advanced ESD, EMI/EMC, Linux Shell Programming, Programming and Interface ARM Cortex-M Microcontrollers and Python Programming. Apart from technical competences, business hard and soft skill courses are also offered by skill training providers. Business Development, Leadership and Management, Project Management, Communication and Business Analytics are instances of courses offered. Dream Catcher is briefly discussed here as a case being used to fill important skill gaps for a specific set of firms.

Founded in 2002, DreamCatcher is another training centre that provides technical training courses for the E&E industry, initially focusing on wireless technologies. It has since diversified its focus and industries, the latter to encompass Life Sciences (Instrumentation, Pharmaceuticals and Medical Devices); ICT and GBS (Software development, ITO); and Oil & Gas (Offshore Engineering). The company now offers more than 500 technical courses to cater to the critical needs of these industries in a large range of fields. Since 2005, it has trained more than 25,000 engineers and scientists. The portfolio of courses is specifically designed to serve the complete value chain of technical development within the targeted industries. These include: professional training (short courses targeting experienced engineers), Certification Programmes (structured programmes lasting 1–6 months, targeting new engineers) and University Courseware (comprehensive coverage of electronics and telecommunication engineering curriculum for tertiary education).

The staff consist of a large number of industry consultants and experts with intimate knowledge of latest technologies, allowing customised training for clients. The company works with a range of private firms as technology partners to ensure industry-leading tools are used to enhance learning experience. This enables the company to integrate a significant number of technology platforms in training. Dreamcatcher is considered by the industry as a top training provider in the market.

B. Management Consultancy: Xtrategize

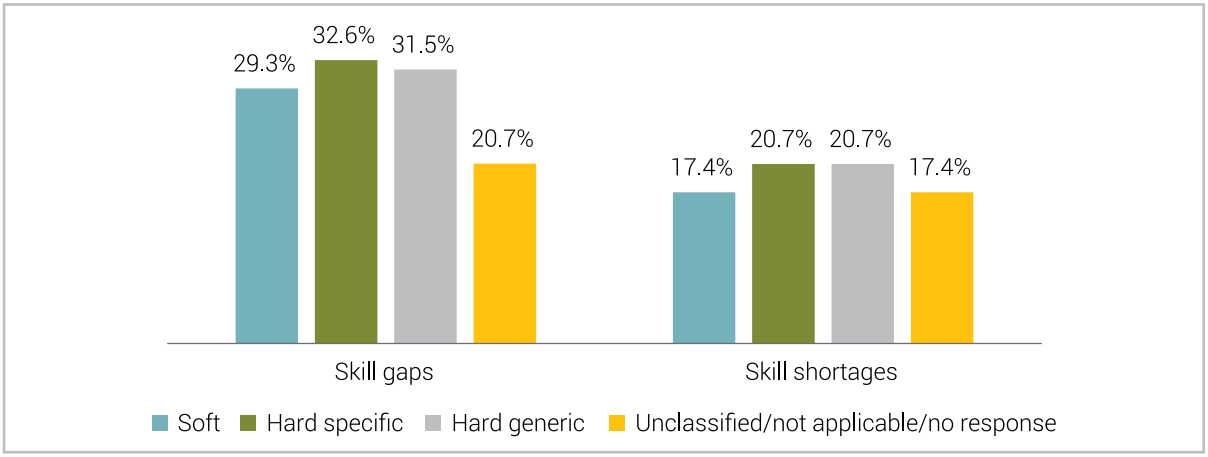
Management-oriented consultancy cum training firms is equally a growing sector as management skills need improvement too. Upskilling of management staff to acquaint them with new management philosophies and practices is less likely to be carried out internally. One case of a local management consultancy firm is highlighted here, namely Xtrategize.

Xtrategize advertises itself as Digital & People Enablers for organisations and people to realise their professional and human potential using state-of-the-art technology to drive, sustain and enhance competitive edge. The company focuses on advisory, design and execution of digital strategies, assisting customers to define the online presence of their brand and how to have social impact or make money via digital and technology solutions. The main concern is the big picture of company identity, brand design and execution. For this purpose, the company offers strategy, technology, creativity, monitoring and project management services, which weave together to provide a one-stop niche service for clients. Its specialities are digital branding, strategy consulting, technology advisory, programme management, custom development, value engineering, socially impacting projects, education, mentoring & coaching, creative design & identity, roll-outs & internationalisation and social media.

6.5.3 Orientation of training programmes

Most of the MNCs use internal and external channels to upskill their employees. This is particularly prevalent in high-tech manufacturing and GBS establishments. Upskilling is directed mostly to technical and soft skills, and addresses skill gaps more than skill shortages. As for skill gaps, Figure 6.14 shows more emphasis on specific hard skills (32.6%), followed by hard generic skills (31.5%) and soft skills (29.3%). Upskilling for specific and generic hard skills involves IC design, GST, programming and soft applications, while soft skill training includes leadership, problem solving and communication. Mitigating skill shortages through training is mostly directed to hard generic and specific skills.

Figure 6.14: Nature of skills training by type of skill situations

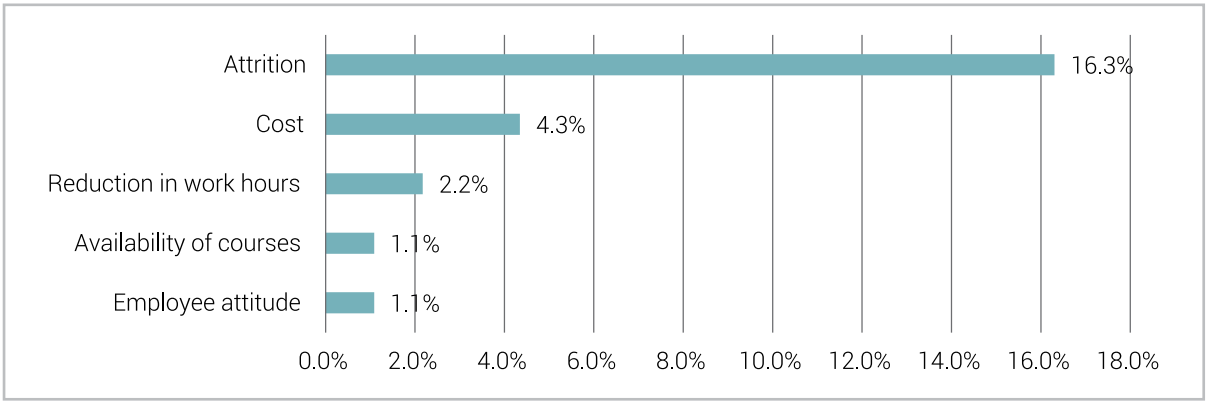


Source: Employer survey

6.5.4 Impact of investment in skills training

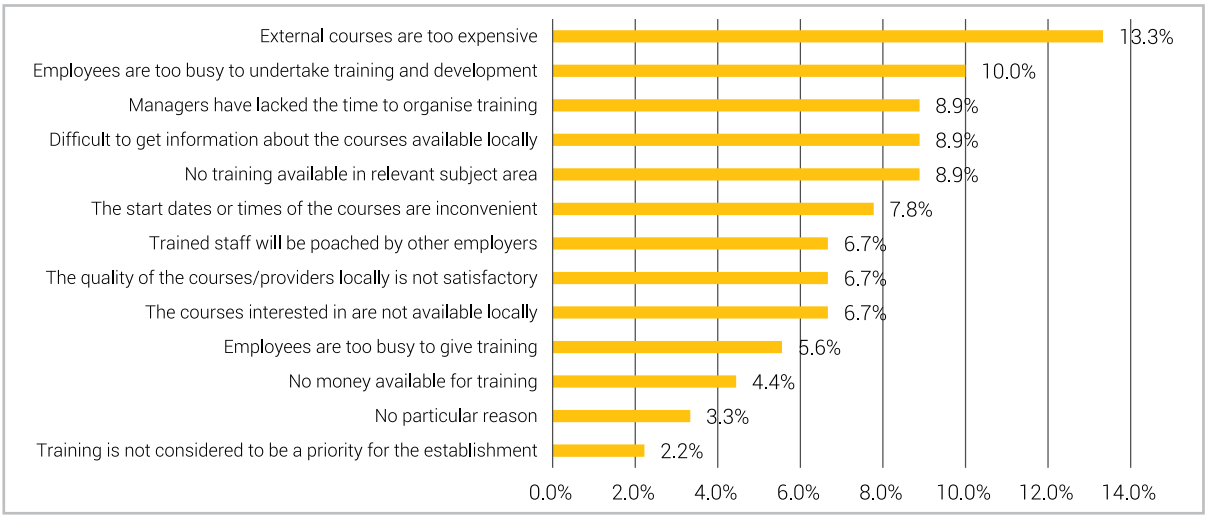
While staff turnover is a grave concern in regard to investment in skills training in light of the high mobility in Penang's labour market, just over a quarter of firms believe that investment in skills training has negative impacts. Labour turnover comes as a high cost to recruitment of replacements and administrative hiring. Use (or waste) of resources in this way is over-ridden by the importance of training/upskilling, which is essential to the achievements and operations of a business to stay competitive and for employees to develop the potential and capabilities, and hence, increasing productivity and skill-set. Yet, there is a limit to the costs incurred. In fact, as shown in Figure 6.15, such costs are the second most mentioned negative implication although the proportion of firms mentioning this is small. The costs of external courses and the difficulty to release employees for training are impediments and negative factors expressed by firms, preventing them from offering upskilling to address skill shortages and skill gaps (Figure 6.16 and Figure 6.17).

Figure 6.15: Factors negatively impact investment in training



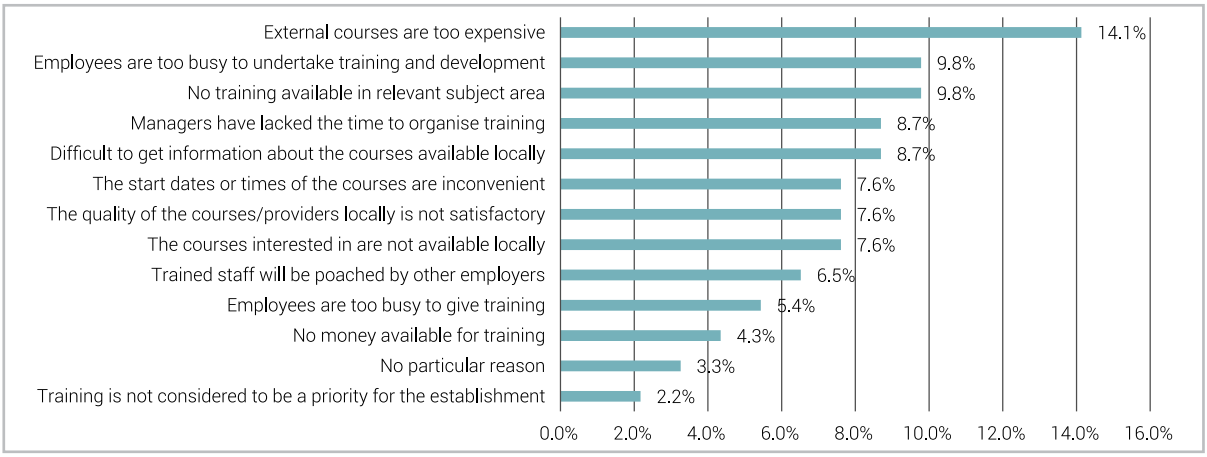
Source: Employer survey

Figure 6.16: Reasons preventing organisations from providing skills training to remedy skill shortages



Source: Employer survey

Figure 6.17: Reasons preventing organisations from providing skills training to remedy skill gaps



Source: Employer survey

6.6 Regional and local institutional initiatives to enhance human talent

To conclude the analysis in this chapter, tertiary infrastructure is briefly considered. Institutional initiatives constitute two types: upskilling and skill augmentation, both coordination and implementation of programmes. Skill augmentation focuses on stimulating a tertiary and quaternary labour supply.

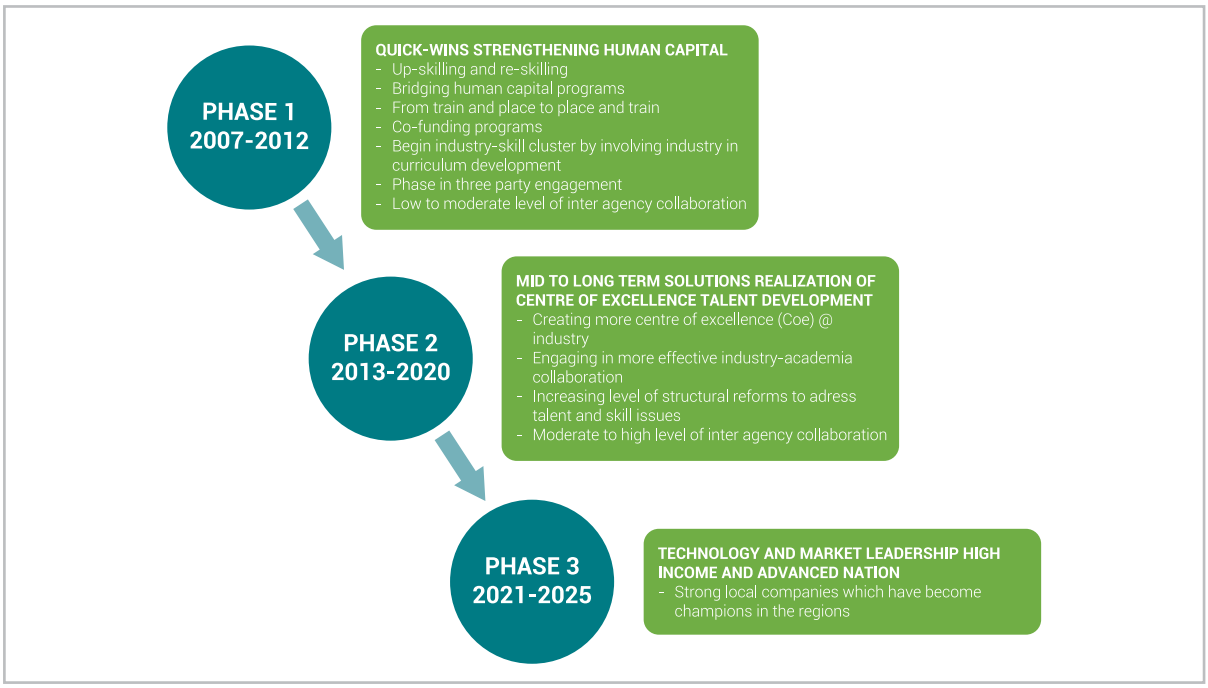
6.6.1 The initiatives of Northern Corridor Economic Region (NCER)

The Northern Corridor Implementation Authority (NCIA) has become more active in co-developing and coordinating upskilling programmes. The NCIA recognises the necessity to ensure the supply of semi-skilled and high-qualified labour is equipped with the right skills to meet market demands. It is working towards a deepening of industry linkages towards human capital development, with a focus on three economic sectors: agriculture, manufacturing and

tourism. Human capital investment is envisaged to grow in several areas. Those in education include, first, establishing sector-specific tertiary institutions for hospitality industry (tourism), business management, high-tech manufacturing, and agriculture; and second, expanding vocational programmes. Investment is also made in research centres for agriculture, biotechnology and high-tech manufacturing, as well as in programmes that apply the latest technology and globally recognised standards in conventional industries.

The strategies are implemented through a number of phased programmes. The three phases are shown in Figure 6.18.

Figure 6.18: The NCER human capital development plan



Source: Northern Corridor Implementation Authority (NCIA) retrieved from http://www.koridorutara.com.my/wwd_3_edu_strategies.html

6.6.2 Initiatives by Penang government and private sector

The Penang Science Cluster (PSC), Karpal Singh Penang Learning Centre and Penang Science Café are initiatives subsidised by the Penang state government to create a climate that stimulates interest of and engage the young generation in science, technology, engineering and mathematics (STEM). These are public-private initiatives in which MNCs participate by sharing expertise with schools and university students while the centres link students with the industries. Through these initiatives, students become more acquainted with the practical use and value of science and technology.

Apart from schools and university students, fresh engineers can also take advantage of these initiatives in several ways. They can become hands-on mentors for students, applying what they have learnt through the questions raised by school pupils and students visiting the learning centres. A two-way learning process not only helps students to understand science better, but also assists fresh engineers to apply and improve communication skills, in particular spoken English. Second, the Science Cluster provides a base for enterprising young engineers with new ideas by inspiring start-ups. These receive further institutional support from PSC.

Since 2012, PSC has annually organised new innovation-oriented programmes in sPICE. The Penang Lego Robotics Programme and Penang International Science Fair are examples of these large events. Through these, MNCs and universities disseminate scientific knowledge to the public. The Penang Science Café is established as part of the Penang Science Cluster. Its function is to provide facilities for workshops, meetings, presentations, discussions and another learning platform for the public.

The Karpal Singh Penang Learning Centre, as one of the innovation initiatives (see Table 4.4 in Chapter 4), adds another curriculum for students who are interested to learn more about Science, Technology, Engineering and Mathematics (STEM). The learning centre also provides a platform and facility for them to engage and interact with firms in several industries, and to practise English communication skills. The state government intends to establish a similar learning centre in each district in Penang by 2025. These centres can help students to be competent and employable in the workplace of the future.

6.6.3 The Penang Future Foundation Fund

To stem the tide of brain drain and to accelerate the building of Penang as a hub for talent, the state government has introduced the Penang Future Foundation Fund in January 2015. The focus is to nurture talent and retain them in the state. The RM40 million fund has been endowed by a generous benefactor; application of a scholarship is open to all Malaysian students regardless of race, religion, gender and state of residence, although preference will be given to those from Penang. This is important as the accumulation of talent will help Penang to attract even more talent and ultimately achieve the status of an intelligent and international city.

The criteria for award are based first on merit with additional regard for the potential for future leadership. As such, applicants need not only be high-performing but also have a good record of extra-curricular activities. The minimum academic achievement is 3.0 CGPA in Sijil Tinggi Pelajaran Malaysia (STPM), matriculation, or diploma. Awarding also takes into consideration financial needs in light of own (family) resources. For this purpose, applicants' background is screened and means-tested so that scholarships can be awarded to talented and deserving students from low- and middle-income households. Finally, scholarships will only be awarded to students pursuing (undergraduate) degrees in science, technology, engineering, or accountancy.

The fund aims to award RM10 million every year to undergraduate students who have gained entry to public and private universities in Malaysia, as well as foreign universities with campuses in Malaysia. A selection committee is set up, which consists of distinguished individuals from the state government agencies and industry players. The scholarship covers full tuition fees for the selected courses, provided the total fees do not exceed RM100,000. It also offers an allowance of RM12,000 per annum. To elevate Penang towards a hub for talent, scholarship holders need to serve a bond in either private or public organisations in Penang.

The scholarship is currently awarded to local undergraduate degree students in the aforementioned disciplines. In future, the Penang Future Foundation Fund hopes to receive additional donations from philanthropists so that the scheme can be extended to benefit those who pursue studies in top universities overseas or those pursuing post-graduate studies.

6.7 Skill augmentation initiatives

6.7.1 Tertiary labour supply

Tertiary supply refers to the unconventional labour supply in the workforce. Well-qualified housewives and handicapped persons who have been out of the labour force for a period of time are likely to face challenges in closing the skill gap. Therefore, training programmes need to be provided to ensure that the knowledge of re-entrants is relevant to market needs. Government can play a part in this by providing lifelong training and assistance platforms, thus continuously encouraging this labour force to resume employment after child rearing or other career break.

Women leave the workforce may be because of the lack of childcare support, marriage or relocation of spouse. While above the national average, the recent increase in female workforce is an encouraging sign. In Penang, since the establishment of a local TalentCorp office, programmes are brought to the state aiming to enhance tertiary supply. The programmes seek to reduce impediments to re-entry into the workforce, thus tapping more into the unconventional pool of high-qualified labour. TalentCorp has introduced the 3R approach – Return, Retain and Rise. The approach entails bringing women on a career break back into the workforce through a Career Come-back Programme; retain women in the workforce through implementation of a work-life balance programme; and to increase female representation in senior management positions. The career come-back grants enable employers to offer work-life integration via flexible work arrangements and family facilities such as mentoring programmes, flexi-hours and so on, which are co-funded by TalentCorp.

6.7.2 Quaternary labour supply

This supply refers to the sourcing of human talent from abroad to complement skills that are not available in the local market. It forms part of the measures taken by employers to bridge the widening skill shortages by hiring potential talented candidates with the right skills outside their backyard. This has been supported institutionally through TalentCorp programmes and incentives for some time.

There are two categories in quaternary supply. The first is to bring in expatriates to the country for the purpose of technology and knowledge transfer. Work engagement can be either short-term or long-term. For instance, TalentCorp introduces the Residence Pass-Talent (RP-T) scheme to attract highly qualified expatriates to live and work in Malaysia for up to 10 years. This is a retention scheme offering foreign talent more flexibility to switch employer without having to renew the pass. It also facilitates the application process of top foreign talent passes including spouses to work in Malaysia without the need to apply for an employment pass. Applications of more than 3,900 expatriates have been approved from 2011 to 2015.

In Malaysia, highly qualified expatriates centre around business services, oil & gas and energy, communication, education and financial services. India tops the list of nationalities of expatriates under this scheme, followed by Australia, Japan, the United Kingdom and the United States. As presented during TalentCorps' E&E Sector-Focused Dialogue in Penang on 22 August 2016, more than 70% of the expatriates are C-suites (top management) and technical experts earning a monthly salary of RM20,000 and above; over 90% of them have at least 10 years of global working experience; and more than 85% hold a Bachelor's degree or above.

As for the second category, TalentCorp reaches out by assisting employers to connect with Malaysian students and professionals abroad. Facilitation of the return of Malaysian professionals abroad is provided under the Returning Expert Programme (REP). Professional returnees are entitled to a 15% flat tax rate on taxable income from employment for a period of five consecutive years. They are also exempted from car duty/taxes for up to a maximum of RM150,000 when purchasing one locally manufactured Complete Knocked Down (CKD) or bringing back a fully imported Complete Built-up (CBU) car per application, while foreign spouses and children will be granted Permanent Resident (PR) status.

The average age of returnees under REP is 38 years old with the majority of them holding tertiary qualifications. They earn an average salary of RM30,000 per month. The E&E sector is one of the top five sectors employing REP returnees, alongside oil & gas, energy, financial services, business services, and communications sectors. Many of them have returned from Australia, China, Singapore, the United Kingdom and the United States. An added incentive for return will be the benefits extended to families of the returnees under the REP. Among programmes that reach out to professionals are the Summer Break Programme, Employability Sessions and Career Fairs, which target Malaysian students living abroad.

7

HIGH-QUALIFIED LABOUR AND SKILLS IN CORE MANUFACTURING INDUSTRIES

This chapter gives an in-depth analysis on the demand and supply of high-qualified labour in core manufacturing industries in Penang. The employer's hiring experience and job specifications are among the indicators for human capital landscape examined in this study. Measures taken by employers to mitigate skill shortages and skill gaps are discussed along with the future skill requirements.

7.1 High-tech manufacturing: Industrial electronics, semiconductors and optoelectronics

7.1.1 Industry overview

Investment structure

- Electronics & Electrical (E&E) Products remain the backbone of Penang's manufacturing investment. The industry accounted for about 61% of the total capital investment and created nearly 50,000 job opportunities, representing 57% of the total jobs created from 2011 to 2016.
- The industry is highly connected to the global economic events as foreign investment has consistently made up more than 90% of the total capital investment in E&E industry over past decades.
- Therefore, a shift in the world economy especially in advanced countries and industry cycles is likely to affect the global E&E demand, which will have a cascading impact on Penang's human capital landscape.

The steady-state industry with higher value-added activities

- High-tech manufacturing industry has experienced steady-state growth.
- Increased cost of operation has resulted in firms moving lower value-added manufacturing out of Penang. Moving up the value chain, many firms have taken the step to downscale labour-intensive operations and shift to high value-added knowledge-oriented activities.
- Coupled with the emergence of Internet of Things (IoT) and wearable electronics, the nature of jobs has evolved following the shift in operations. At this juncture, more high value-added jobs are available in the fields of research, design and development.

Optimistic market growth in global semiconductors and LED

- Growth in the semiconductor industry is expected to accelerate in 2017 and 2018. The forecast by Gartner shows that worldwide semiconductor revenue is projected to increase by 12.3% in 2017, citing stronger commodity memory and improved unit production estimates for premium smartphones, graphics cards, and automotive applications.[57]
- LED lighting is a growing industry. Malaysia's LED industry accounted for 10% of the global LED market and the industry was estimated to grow at 28% from 2013 to 2017 (PwC, 2013b). Penang-based LED companies are key contributors and have the largest share of research and development activities in Malaysia.

Industry composition and nature of operations

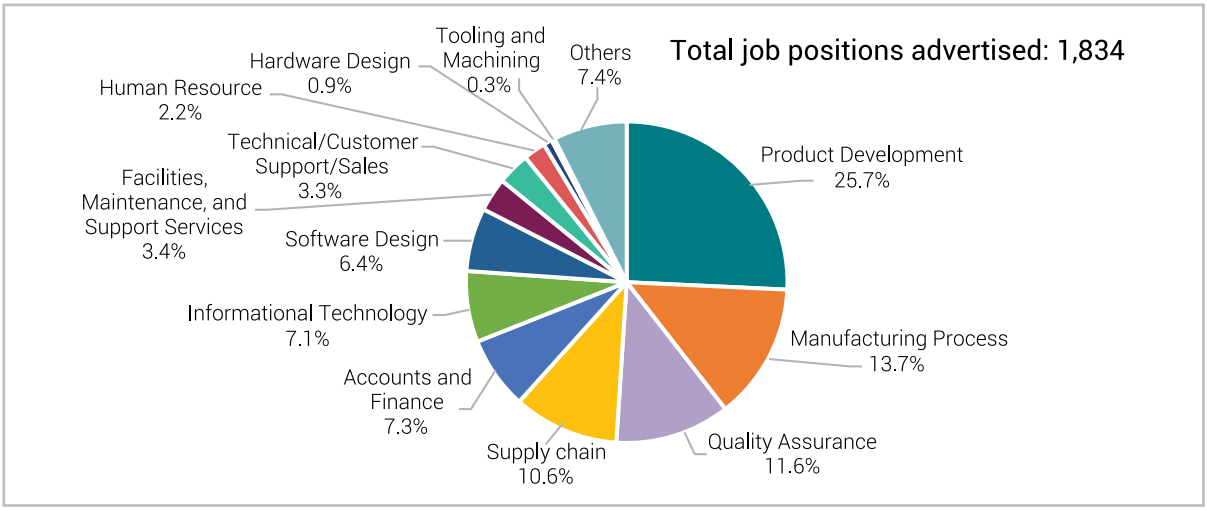
A majority of companies in this industry are located at the Bayan Lepas Free Industrial Zone, Penang. The industry can be divided into three main sub-industries as follows.

Table 7.1: Description of sub-industries of high-tech manufacturing in Penang

Sub -industry	Key industry players	Business activities	Operational activities
1. Industrial Electronics	Flextronics, Keysight Technologies, Dynacraft, Tai Ohm Electronic	Test and Measurement, Resistor, Plated Lead Frame, Printed Circuit Board Assemblies	Manufacturing, Order Management, R&D
2. Semiconductors	Intel Microelectronics, Renesas Semiconductor, Globetronics, ASE Electronics, Broadcom, Integrated Device Technology (IDT), Hewlett-Packard	Timing Devices, Semiconductor Chips, Semiconductor Solution	Manufacturing, Process Development, Product Development, R&D, Design Centre
3. Optoelectronics	OSRAM Opto Semiconductors, Lumileds Lighting, Itramas Manufacturing, Opulent Solutions	Light Emitting Diode (LED), Solid State Lighting, Printed Circuit Board, Thermal Solutions, Automotive Lighting	Design, R&D, Manufacturing, Engineering and Development

[57] Gartner (2017, April 13). Gartner says worldwide semiconductor revenue forecast to increase 12.3% in 2017. Press Release. Retrieved from http://www.gartner.com/newsroom/id/3678417

Figure 7.1: Major job titles advertised in high-tech manufacturing industry in Penang



Source: Vacancy database

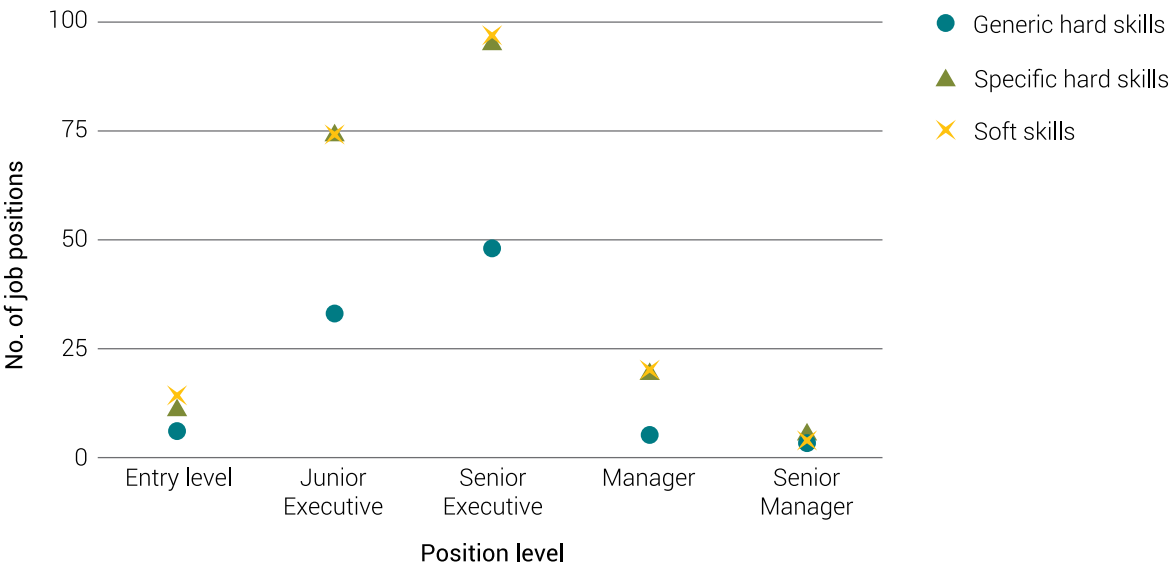
7.1.2 High-qualified labour demand

In Penang, high-tech manufacturing posted the largest number of job vacancies in the first half of 2016. Out of 4,455 job vacancies, firms advertised 41.2% or 1,834 where large foreign firms with more than 5,000 headcounts accounted for half of the top 10 recruiting companies. Flextronics advertised the highest number of job vacancies in Penang (13.5%), followed by OSRAM (11.8%), Keysight (8.3%), Plexus (7.5%) and Robert Bosch (6.3%) (Appendix A).

Product Development – largest share of high-qualified vacancies advertised

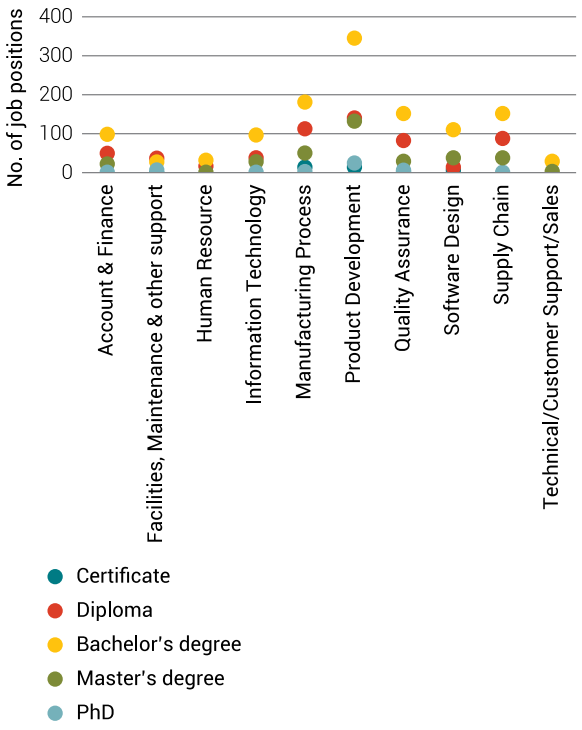
About one-fourth of the recruitment is made up of product development industry comprising Test Engineers, R&D Engineers, Mechanical Design Engineers and Process Development Engineers. This is then followed by manufacturing process (13.7%), quality assurance (11.6%) and supply chain (10.6%) (Figure 7.1).

Figure 7.2: High-demand jobs by types of skills and position levels



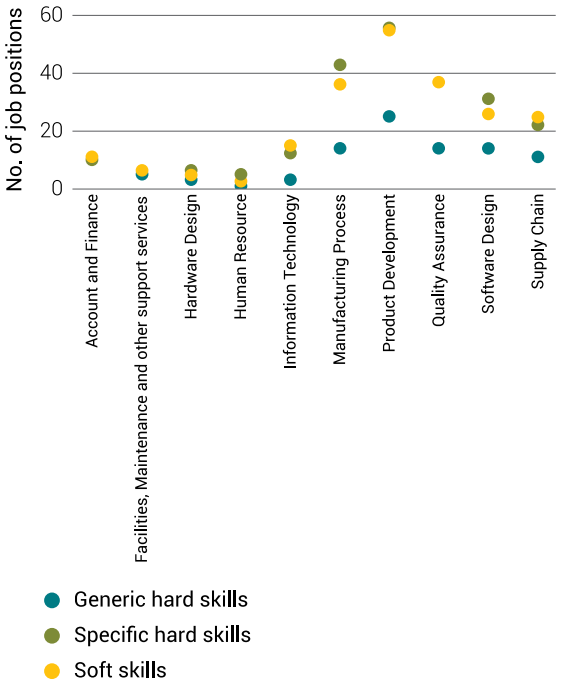
Source: Vacancy database

Figure 7.3: Top 10 jobs advertised by major job titles and educational requirements



Source: Vacancy database

Figure 7.4: Persistent job vacancies by types of skills and major job titles



Source: Vacancy database

The characteristics of high-demand vacancies are summarised as follows.

Position level: Senior executives

- A total of 46.5% comprise senior executive positions.
- Employees at senior positions are prone to circulate across larger firms due to the substantial vacant positions available.
- In the first six months of 2016, over half of these positions were advertised by large firms with more than 5,000 employees.

Skill-specificity: Technical positions

- Skill-specificity is particularly important in technical positions such as product development (R&D Engineers, Product Development Engineers and IC Designers) and software design (Software Engineers, Mobile Application Developers and Embedded Software Development Engineers).
- About 98% of job vacancies in software design and 83.5% in product development require specific hard skills.
- Software design positions include programming languages (C++, ASP.Net, AJAX etc.) and knowledge in ERP system (Oracle, SAP, and Siebel).
- Product development positions require experience in mechanical drawings, SPC monitoring, IC design and product test technology.

Educational level: Bachelor's degree

- A majority of the advertised positions require Bachelor's degree except positions in facilities maintenance and other support services – higher number of positions requiring diploma education (Figure 7.4).
- Product development records the largest number of positions requiring Master's degree and PhD.

Most sought-after skills: Soft and specific hard skills

- For higher level positions, specific hard and soft skills gain more importance (Figure 7.2).
- Soft skills include achievement skills (self-motivation and results-oriented), relationship and service skills (communication, team player and interpersonal skills).

Generic hard skills: Foreign and English language skills needed

- Although generic hard skills are less emphasised by companies, foreign and English language skills are among the hard skills highly demanded.
- Foreign language skills such as Mandarin, Japanese and Korean are not only found in customer-related positions, but also in technical vacancies such as Mechanical Engineers, Electronic Project Engineers and Process Engineers.
- This means that these vacancies not only required candidates to have specific degree in engineering programmes, but also the ability to use foreign language is equally important.

Average length of job postings: more than three months

- While vacancies are advertised for 2.7 periods, high-demand vacancies take 6.7 periods, which correspond to slightly more than three months.
- For example, senior positions from software design are advertised for an average of 8.4 periods, equivalent to more than four months especially in Advanced R&D Software Engineers and Senior PHP Programmers and Expert C# Software Engineers.

7.1.3 High-qualified labour supply

Supply characteristics

The supply source

- Employers cast a wider net by recruiting workers not only in Penang, but also from other states in Malaysia. The workers comprise fresh university graduates – that is primary supply – in Penang and other parts of Malaysia, as well as by those who are currently employed – secondary supply.
- Employers also recruit workers from abroad when they cannot find suitable candidates locally.
- However, according to an interview with MIDA Penang, employers are encouraged to hire local workers rather than hiring expatriates. It is important that they explore all avenues to fill the position by a local before looking outside the country – regardless of the establishment's country of origin.

Abundance of job applications

- The majority of the surveyed employers receive an average of close to 100 job applications (45.5%) for each job opening. Besides that, it is also striking to note that some firms collect an average of about 100–300 job applications for each advertised position (36.4%). These firms could be reckoned as "preferred" firms by jobseekers.
- This is consistent with JobStreet's analysis for Malaysia where an average of 218 job applications was received for engineering positions in 2016.

Recruitment profiles

Reasons for recruitment: Replacement of outgoing employees

- Replacing employees who have left the company is the main reason for job vacancies.
- This reason is cited by less reputable companies handling mid- to high- end manufacturing activities.
- The next key reason mainly highlighted by more reputable companies in high-end operations is business expansion. This coincides with the new investment plans announced by high-tech manufacturing companies – estimated to create approximately 1,000 new jobs.
- Strategic re-orientation of company activities is often referred to by well-established, large foreign companies embracing high-end manufacturing operations.

Other recruitment channels: Employee network

- Apart from using JobStreet.com for recruiting new hires, the majority of respondents also use employee network as one of the key avenues to tap into the potential recruiting high-qualified employees.
- Nearly 83% of the total respondents make use of their employee network for this reason.
- Some companies implement an employee referral programme where they incentivise their existing workforce to recommend new employees using their personal network and reward them when the new employees pass their probation period.

7.1.4 Human capital issues and challenges

Quantitative supply constraints

About 16% of total job vacancies can be defined as persistent. These vacant positions could potentially be hard-to-fill, holding all other assumptions constant. The characteristics of positions that require a longer duration to fill are summarised below.

Position level: Senior executives

- A longer time is required to fill vacancies if employers demand higher-qualified candidates with more work experience.
- Senior executive positions have the highest level of persistent vacancies (46.1%) followed by junior executives (35.6%).
- A high percentage of jobs require more than five years of experience, which records at 42%; 23.1% require workers to have two to five years of work experience; and 30.8% required less than two years of work experience.

Most affected job functions: Software design

- Software design has the largest proportion of persistent vacancies.
- Over one-quarter of the vacancies are advertised for more than four periods of mining – equivalent to two months. This is then followed by positions in quality assurance (19.8%) and manufacturing process (19%), while accounts and finance have the least occurrence of persistency (11.2%).

More specific hard and soft skills in technical positions than non-technical positions

- Technical positions with lower requirements in hard skills (Figure 7.4) include information technology, manufacturing process, product development, quality assurance and software design.
- In non-technical positions, only supply chain has shown a big difference between the requirement of generic hard skills and non-generic hard skills.
- All job positions highly value the importance of soft skills along with specific skills except positions in manufacturing process and software design.

Most affected skills: Specific and soft skills

- Over 80% of persistent vacancies require applicants to have specific hard skills and soft skills.

Box 7.1: Employer surveys of high-tech manufacturing: Hard-to-fill vacancies

The majority of respondents cite that recruitment can be different in terms of **length of time taken** to fill a vacancy. About 64% of them find differences in time across job functions.

- Jobs taking the least time to fill: Administrative, fresh engineers, process and product operation engineers, support services such as finance, human resources and facility.
- Jobs taking the longest time to fill: Engineers, chargemen, IC designers and product development engineers taking about 4-5 months and senior positions.

All hard-to-fill positions mentioned are technical ones (Table 7.2). These closely correspond with the critical occupation list (COL) identified by MIDA Penang specifically in high-tech manufacturing sub-industries. **Hard-to-fill positions** such as IC Design Engineers cut across both junior and senior positions.

Table 7.2 Hard-to-fill job positions over the past two years

No.	Hard-to-fill positions	Position level
1	Reliability Engineers	Senior Executives
2	Product Optimisation	Senior Executives
3	Product Development Engineers	All
4	Process Engineers	Directors
5	IC Design Engineers	All
6	Data Scientists	Mid-level
7	Robotics and Automation	Mid-level

Source: Employer survey

The majority of hard-to-fill vacancies involve **experienced workers**, signaling the difficulty to hire senior or higher level workers. Hence, the undersupply of high-qualified experienced labour remains a key challenge in high-tech manufacturing industries.

The key reasons for the inability to fill vacant positions relate to qualitative reasons. These include too specialised skill requirements, insufficient work experience, soft skills deficiency and rigid terms and conditions. These make up the most-cited qualitative skill shortages.

Conclusion: The shortage of experienced workers in the field of engineering is particularly more critical than the shortage of non-experienced workers.

Partly prepared fresh graduates, and "satisfactory" skill integration of experienced hires

- While a majority of graduates are poorly prepared for the positions offered to them, 27.3% of total employers quote fresh graduates as being ill-equipped for the positions.
- Reasons for poor preparation include lack of required hard skills, soft skills and English language skills. Poor attitude/personality and lack of working experience or maturity are the next most cited reasons.
- As for the level of skill integration of experienced hires, there is some degree of skill-relatedness among companies in Penang, which intensifies labour movement. Skills acquired from previous employment could be highly related to skills required by current employers.
- 54.5% of the respondents cite "good" for experienced hires and 36.4% state "satisfactory".

Experienced hires demand for high salaries

- The majority of the respondents note that applicants demand high salaries. Most experienced candidates expect a substantially higher salary (10–15% more than their current salaries) with some demanding even more. Meanwhile, others request a high salary and less work load.

Skill gaps

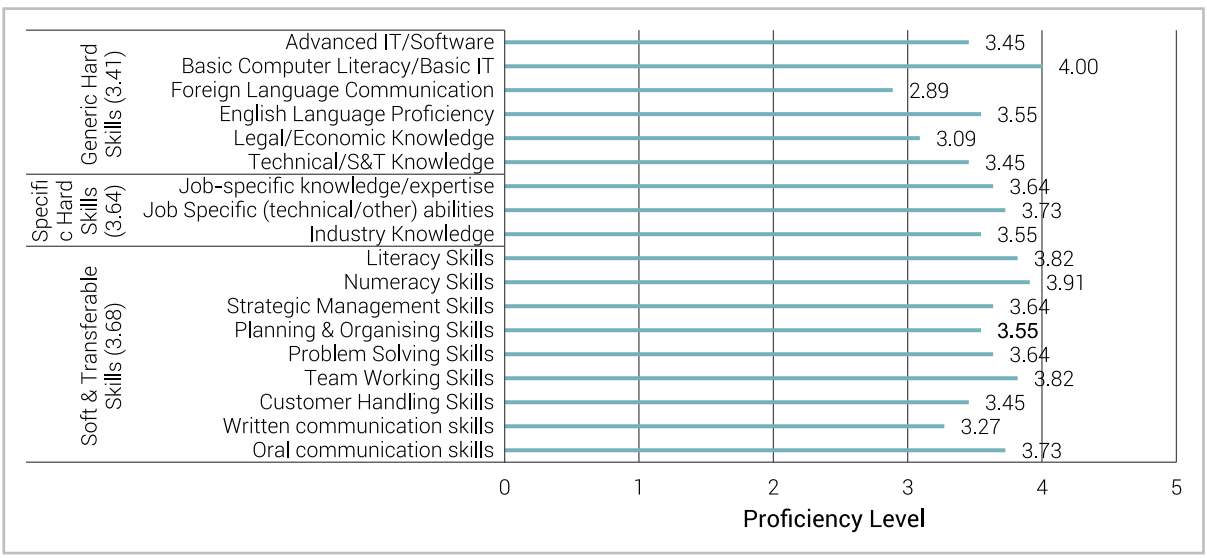
Proficiency levels: Deficiency in generic hard skills

- In a scale of one to five with five being highly proficient, current employees, on average, are relatively more proficient in soft and transferable skills (3.68) than in specific hard skills (3.64) and generic hard skills (3.41). Scoring the lowest in proficiency, generic hard skills are yet to fulfill employers' needs. Foreign language communication accounts for the lowest skills proficiency (2.89), followed by legal/economic knowledge (3.09). In contrast, basic computer literacy or IT is rated the highest in generic hard skills (4.0). This shows that a higher education system is able to produce workers with high competencies in basic computer skills, but not in foreign language communication and economic knowledge.

Positions where skills need the most improvement – Engineering

- Engineering positions (which include package development, material development, reliability lab, robotic and automation and IC design) are frequently mentioned by employers in regard to areas where improvement is needed. Engineers are required to improve communication skills, problem-solving, critical thinking, customer service, and presentation skills. Hard skills that need most improvement include product knowledge, test and package development, and software programming concept.

Figure 7.5: The skills proficiency level of current high-qualified employees by types of skills in high-tech manufacturing in Penang



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

7.1.5 Moving forward: Future skill requirements

Acquiring new skills due to newly emerging tasks

- Most employers believe that employees need to acquire new skills as a result of newly emerging tasks in the next 12 months. "The development of new products and services", "the introduction of new technologies or equipment" and "increased competitive pressure" are expected to introduce new emerging tasks. This finding corroborates with the results highlighted in the overall industries where manufacturing value chain is expected to impact the operation of R&D, IT software and programming, and sales and marketing.

Ability to meet future needs – generic hard skills but not in specific hard skills

- The prospective generic hard skills and soft skills will be able to meet future needs. Generic hard skills make up the activities of optical engineering, process improvement, SAP knowledge, phosphor technology, procurement and IT application development. Specific skills, on the other hand, may have little potential to meet future needs. These skills are related to the areas of robotic engineering, programming languages, scripting languages and test application. This future skill-set is in fact consistent with industrial evolution, which gears towards artificial intelligence, big data and cloud computing.

7.2 Other high-tech manufacturing: Electronics manufacturing services, telecommunication products, and magnetic & optical recording storage

7.2.1 Industry overview

Labour retrenchment due to firm closure and downsizing

- In the storage market, shipments of hard-disk drives (HDD) have seen a sharp decline in recent years. It has been overtaken by solid-state drive (SSD) in storage solutions for ultrabooks and ultrathin notebook PCs.
- In view of this shift, Penang, which used to be home to hard-disk drive makers, experienced closures and employee layoffs in the past two years. Re-orientation of organisation has also caused communication equipment producers to close down part of its facility.
- Nearly 3,000 employees were retrenched or had accepted voluntarily separation scheme (VSS) in the manufacturing sector in 2016; more than double the number in 2015.
- In particular, data storage producers have laid off the most number of employees with a total of 4,650 workers affected (Table 7.3). In light of the demand for skills, the majority of these workers have been absorbed by other companies, as over 10,000 jobs have been created in the past three years, according to MIDA figures.

Increased demand of Electronics Manufacturing Services (EMS)[58]

- The activity of outsourcing production of parts and components for electronics products has continued popularity in recent years. Due to the rapid change in "smart" electronics, the role of EMS providers is to integrate the change and vertically complement the needs of Original Equipment Manufacturers (OEMs) in the manufacturing value chain.
- Within the Automotive and Lighting sector, growth is projected at 23.6% annually until 2020.[59]

Industry composition and nature of operations

Electronics Manufacturing Services (EMS) makes up nearly 40% of other high-tech manufacturing firms in Penang. This is then followed by consumer electronics (21.9%), data/telecommunication & IT products (17.1%), computer peripherals (15.2%), and magnetic and optical recording/storage media (7.6%). Other high-tech manufacturing industries can be categorised into four main sub-industries, and the nature of business operational activities are presented in Table 7.4.

[58] EMS involves multiple industries. These include computing, consumer devices, avionics, medical, robotics services, cloud server, and automotive.
[59] PwC (2017). Market analysis for EMS/Distributors. Technology Scorecard. Retrieved from https://www.pwc.com/gx/en/industries/technology/scorecard/ems-distributors.html

Table 7.3: List of firms exiting manufacturing operations in Penang as of October 2016

Exit companies (reported)	Type of manufacturing activities	Number of workers affected
Seagate Technology Plc [60]	Disk drive maker	3,000
Western Digital Corporation	Disk drive maker	1,200
Rubicon Technology Inc	LED substrate	-
Amphenol Corporation	Communication equipment	150
HGST Technologies Malaysia	Hard-disk drive maker	450
Fairchild Semiconductor	Semiconductor	1,000
Total workers affected		5,800

Source: Various news reports. Only companies that reported their status are captured.

Table 7.4: Description of sub-industries of other high-tech manufacturing in Penang

Sub-industry	Key industry players	Business activities	Operational activities
1. Computer peripherals	Smart Modular Technologies, Scarmel, Unico Electronics	Designer, manufacturer and supplier of speciality of memory and storage solutions, computer hardware	R&D; manufacturing; logistics.
2. Electronics Manufacturing Services (EMS)	Alliance Contract Manufacturing, Cincaria, Inari, Paramit, Sanmina-SCI Systems, Polar Electro, Schott Glass, Venture, Kontron, Benchmark Electronics	Contract manufacturing, Electro-mechanical assembly, technical services	Design and manufacturing; global procurement and supply management; product functional testing and validation; packaging, and logistics.
3. Data/ Telecommunication & Information Technology products (hardware)	Amphenol TCS, G-Tek Electronics, Motorola Solutions, TF-AMD	Communication solutions; Connectors; Telecommunication equipment & related products; micro devices	Design, precision engineering; Manufacturing and R&D; Supporting operations: global purchasing operations, global procurement.
4. Magnetic & optical recording/storage media	National Instrument, Sandisk Storage Malaysia, TS Matrix	Electronics, flash memory storage, memory modules	Manufacturing, R&D and IT.

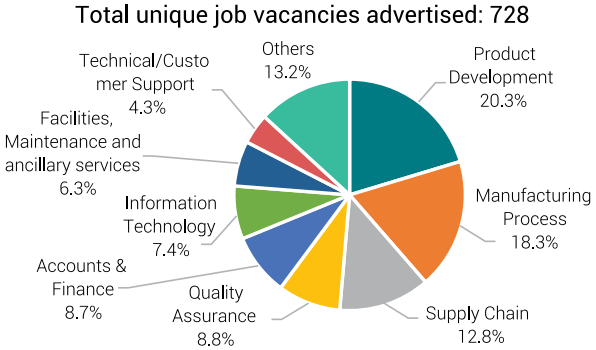
7.2.2 High-qualified labour demand

In the first half of 2016, a total of 728 job vacancies have been advertised by recruiting firms. Of this, Motorola advertised the highest number of job vacancies in Penang (12.5%), marginally followed by Sandisk (11.7%), National Instruments (8.0%) and Sanmina-SCI Systems (7.3%).

Product development – the key high-qualified vacancies

Product development accounts for the largest share of high-qualified vacancies advertised by other high-tech manufacturing industries: approximately one-fifth (Figure 7.6). This is then followed by manufacturing process (18.3%), supply chain/procurement (12.8%), quality assurance (8.8%), accounts and finance (8.7%) and information technology (7.4%). This suggests that recruitment is actively concentrated on product innovation, which requires knowledgeable workers to undertake research, design and development activities.

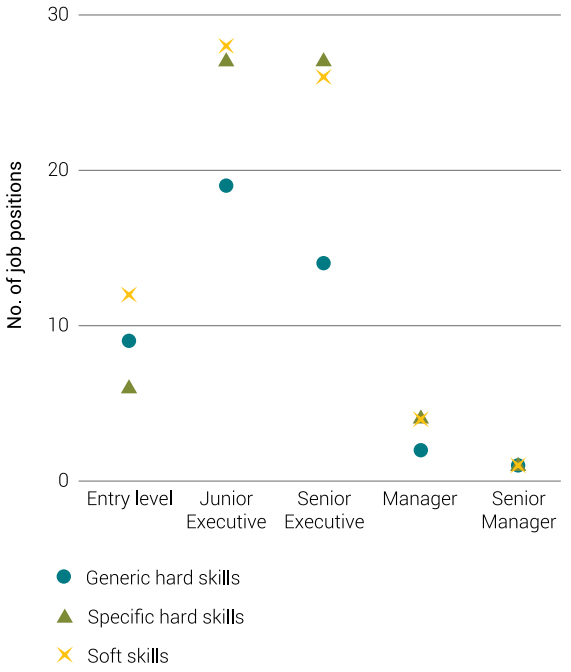
Figure 7.6: Major job titles advertised in other high-tech manufacturing industries



Source: Vacancy database

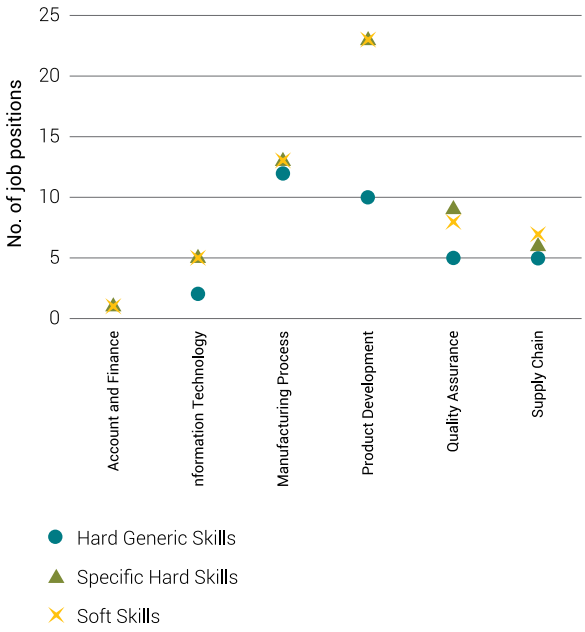
[60] Job vacancies posted by Penang Seagate made up 6.5% of the total vacancies in this industry despite restructuring plan on the closure of its manufacturing facility – where job cuts reportedly affect mainly employees in production.

Figure 7.7: High-demand jobs by types of skills and position levels



Source: Vacancy database

Figure 7.8: High-demand major job titles by types of skills in other high-tech manufacturing industries



Source: Vacancy database

The characteristics of high-demand vacancies are illustrated as follows.

Position level: Junior executives

- Nearly 43% of positions concern junior executives, followed by senior executives (34.5%).
- In junior positions, the majority of vacancies require up to five years of work experience; they are mostly advertised by firms with 1,001–2,000 headcounts.
- According to the employer survey, while fresh graduates and applicants with more than two years of work experience are mentioned by most companies, the latter remain as the predominant target in hiring.
- Recruitment of junior positions is largely in the job functions of manufacturing process, supply chain/ procurement, quality assurance, and accounts and finance.
- Unlike technical positions, non-technical positions such as supply chain/procurement, and accounts and finance are less restrictive as most of these positions require less than five years work experience.

Skill-specificity: More prevalent in junior, senior, and technical positions

- In contrast to the junior positions in high-tech manufacturing, this industry witnesses a great number of junior positions requiring specific hard skills along with soft skills. This trend is clear in the technical job functions, namely product development, quality assurance and information technology.
- For instance, a PCB Layout Development Engineer in Robert Bosch is required to possess basic knowledge in product engineering and problem-solving skills such as FMEA, DFMA, 8D, etc.
- Meanwhile, a QA Engineer in Sandisk Storage is required to have knowledge in PCBA manufacturing process and experience in manufacturing product quality management; and an IT Programmer Analyst in NI Malaysia is required to be proficient in multiple technologies including database systems, PL/SQL, Java and Oracle applications.

Educational level: Bachelor's degree

- Candidates with Bachelor's degree are highly demanded across all major job functions. This is then followed by requirement for Diplomas.

Highly sought-after skills: Soft skills

- Soft skills are highly sought-after across all levels of job positions (Figure 7.7).
- Similar to the results found in high-tech manufacturing, companies put greater emphasis in soft skills as the level of position becomes higher.
- Specifically, achievement skills are the most frequently requested soft skills; this involves 64.3% of the high-demand vacancies.
- For example, a PCB Design Engineer in Motorola Solutions is required to be self-motivated while Product Engineers are required to possess analytical and problem-solving skills.

Generic hard skills: English language and legislative and regulatory awareness skills

- A good command of English language is predominantly mentioned by other high-tech manufacturing companies; about 27.4% of the vacant positions require fluency in technical English. Interestingly, this proportion is higher than the overall vacancies posted in the industry (26.2%), indicating that English language skills are key generic hard skills preferred by other high-tech firms.
- Competencies in legislative and regulatory rank the second-highest sought-after requirement across generic hard skills; about 16.7% of high-qualified positions need these competencies to ensure compliance with corporate and government policies and procedures. This is highly needed in supply chain/procurement positions where about one-quarter of the vacant positions asked for these skills.
- For example, Supply Chain Security Specialists in Motorola Solutions are required to understand regulatory licensing and requirements in relation to supply chain security and trade compliance certification.

Average length of job postings: Exceeding three months for high-demand vacancies

- On average, while companies advertise for 2.6 periods, high-demand vacancies take 6.4 periods, which correspond to slightly more than three months.
- Senior positions in product development post an average of 6.6 periods or more than three months, particularly Software Engineers, Electrical Engineers and Digital Design Engineers.

7.2.3 High-qualified labour supply

Supply characteristics

The supply source

- Firms prioritise offering job offers to local high-qualified workforce.
- According to the employer survey, half of respondents recruit employees from Penang who are attached to Malaysian companies in mid- to high- end manufacturing constituting the majority.

Recruitment profiles

Reasons for recruitment: Firm's expansion

- Firm's expansion is the main reason for recruitment. Four out of five firms that cite firm's expansion originate from the United States (US).
- When the US companies are active in hiring new staff due to firm's expansion, other high-tech manufacturing performs relatively better than other industries.
- Meanwhile, replacement of employees who have left the company is cited as the next reason for high-qualified job openings.

Other recruitment channels: Employment agencies

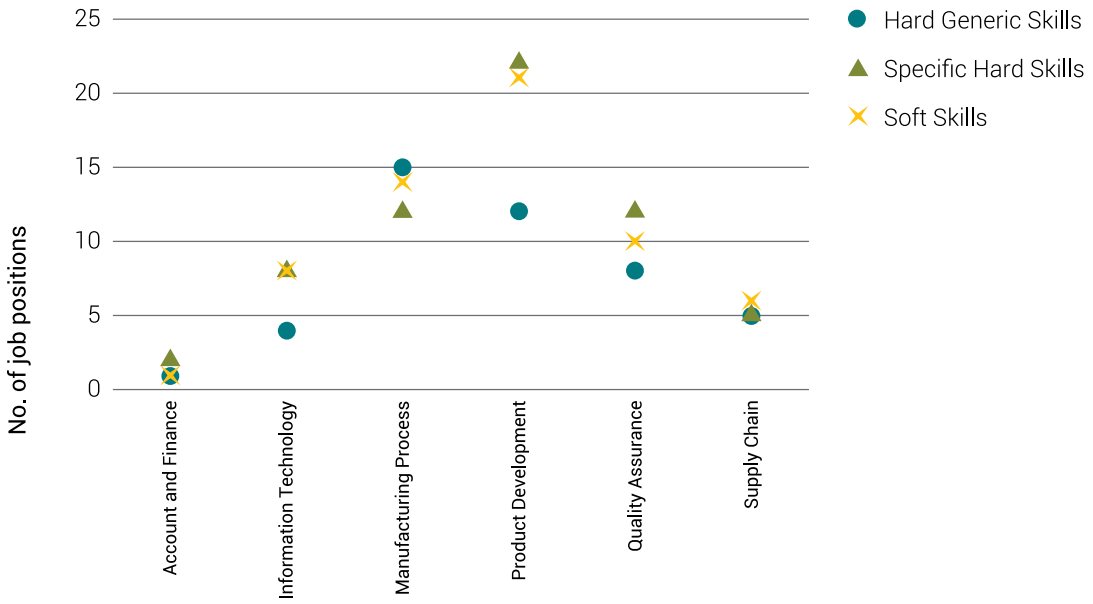
- Apart from using JobStreet.com, a majority of the respondents also engage agencies to recruit high-qualified employees.
- About 80% of the total respondents make use of these agencies.

7.2.4 Human capital issues and challenges

Quantitative supply constraints

The constraints of high-qualified supply are examined in positions that require a longer duration to fill. About 12.5% of unique job vacancies are reported to be persistent – advertised for a period of at least two months. The characteristics of hard-to-fill high-qualified vacancies are presented as follows.

Figure 7.9: Persistent job vacancies by types of skills and major job titles



Source: Vacancy database

Position level: Senior executives

- While junior positions are high in demand, these positions relatively do not take as long to fill as vacancies for senior positions.
- Senior positions constitute about 43% and the same proportion goes to positions that require more than five years of work experience.
- As an example, Sandisk Storage advertised for six consecutive periods – which is approximately three months – for a Senior Production Planner with at least five years of work experience.

Harder to fill positions require specific skills

- Technical positions such as product development (Staff/Senior Electrical Engineers, Product Engineers) and quality assurance (QA Engineers, Experienced Debug Engineers) are harder to fill, requiring more specific skills than soft skills (Figure 7.9).
- Unlike high-demand vacancies, persistent vacancies seek candidates with specific skills to meet job requirements. While the skill requirements for information technology (IT Analysts, Senior Java Analyst Programmers) are comparable, persistent vacancies in manufacturing process (Manufacturing Equipment Engineers, Industrial Engineers) require more generic hard skills for high-demand vacancies in general.

Most affected skills: Soft skills

- About 82% of the high-qualified vacant positions weigh the importance of soft skills followed by specific hard skills (76.9%) and generic hard skills (62.2%).
- Within soft skills, vacant positions requiring achievement skills take a longer time to fill followed by relationship and service skills.
- Personal effectiveness, which is equivalent to the ability to work independently and handle stress is the next most affected soft skills.

Most affected job functions: Product Development

- While quality assurance field makes up the largest share of persistent vacancies, they take marginally shorter time to fill compared with product development and information technology, which are advertised for an average six periods – corresponding to three months.
- Product development and information technology on the other hand post as long as 6.2 periods and 6.1 periods respectively – more than three months.
- Within product development, Senior Electrical Engineers (Power Amplifier), Senior Electronics FPGA Engineers and Staff Engineers (Application) are advertised for four consecutive months.
- Strikingly, entry level IT Programmer Analysts are advertised longer than five consecutive months while Senior Programmer Analysts are advertised continuously for more than four months (see Box 7.2).

Box 7.2: Employer survey of other high-tech manufacturing: Hard-to-fill vacancies

Some companies have not succeeded in filling all the vacant high-qualified positions. From Table 7.5, it can be seen that the unfilled positions are largely attributable to lack of applicants in highly demanding specialised skills. This refers to job functions in product development, information technology and supply chain.

Table 7.5: Reasons for high-qualified positions not being filled

	Reasons not being filled	Job titles
Qualitative		
	Positions require highly demanding specialised skills Applicants wrongly qualified Applicants are too demanding Applicants lack generic skills (hard) Applicants lack the right attitude Quantitative	RF Sustaining Engineers, Supply Chain Managers, RD Debug Technicians, Product Managers/Supervisors, CMM/CNC Programmers, Senior Programmer Analysts Electrical Design Engineers Engineers, Supervisors IT Executives Supervisors
Quantitative		
	Too much competition	NPI Engineers, Machinists, Welders, QA Engineers

Source: Employer survey

Some job vacancies can remain unfilled due to too much competition. This competition can likely be explained by the skill similarity among job positions leading to the quantitative shortage of skill supply. The job vacancies involve a number of areas: product development (NPI Engineers), quality assurance (QA Engineers) and machining (Machinists and Welders).

The majority of the respondents mention that recruitment differentiates in terms of the **length of time taken** to fill a vacancy.

- Jobs requiring the least time to fill: Junior engineers, manufacturing engineers, technicians and sales.
- Jobs requiring the longest time to fill: Embedded software engineers, NPI engineers, test engineers and R&D engineers.

Hard-to-fill positions consist of technical and non-technical positions (Table 7.6). In particular, **hard-to-fill positions** such as Embedded Software Engineers, Hardware Designers and PCB Design Engineers cut across both junior and senior positions while R&D Hardware Engineers are hard to fill at managerial level. Meanwhile, non-technical positions such as Regulatory Compliance Officers are difficult to fill at director level.

Table 7.6: Hard-to-fill job positions over the past two years

	Hard-to-fill positions	Position level
Product Development and manufacturing process		
	R&D Hardware Engineers	Managers
	NPI Engineers; Debugging Engineers	Mid-Level
	Electrical Design	Senior
	Hardware Designers; Embedded Software Engineers; PCB Design Engineers,	Junior & Senior
	Process Engineers	Engineers
	CNC/CMM Programmers	Executives
	Supply Quality Engineers; Tool & Die Engineers	-
Information Technology		
	System Analysts; SAP-FICO	Executives
	IT Engineers	Mid-Level
	Database Admin	Junior & Senior
Non-technical positions		
	Regulatory Compliance Officers	Directors
	Program Directors	Directors
	Safety & Compliance Officers	Junior & Senior

Source: Employer survey

Conclusion: Hard-to-fill vacancies are more likely to affect junior and senior technical positions than non-technical positions.

Partly prepared fresh graduates; "satisfactory" skill integration of experienced hires

- Respondents collectively indicate that not all positions that had been filled fully match the job requirements in advertisements.
- Particularly, six out of 10 employers indicate that fresh graduates are partly prepared for the tasks.
- For underprepared fresh graduates, lack of required hard skills such as technical knowledge or job-specific knowledge is the most cited reason. This finding also reflects the necessity to improve practical training by schools and universities supplementing teaching and learning of theory.
- Despite the fact that the majority of the respondents are satisfied with employees' existing skill integration in the establishments, lack of soft skills such as problem-solving and teamwork are the reasons for the poor integration of experienced hires. Half of them cite "good" for the level of skill integration while the rest state "satisfactory".

Employees' preferences towards multinational corporations

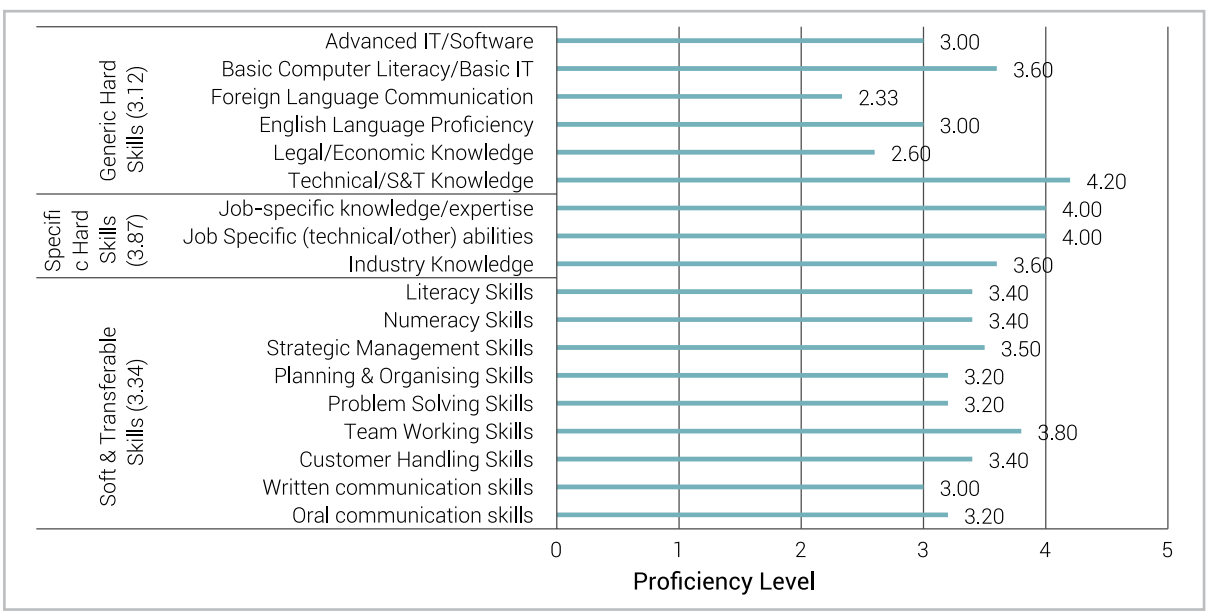
- About 80% of the respondents on average receive close to 100 applicants for individual job vacancies posted. One respondent reports 100–300 job applications.
- Looking at the firms' countries of origin, more than 50 job applications per vacancy are from non-Malaysian companies, mainly originating from the United States. This further emphasises labour preferences towards multinational corporations.
- Jobs in more reputable multinational corporations tend to be more attractive than others. Competitive pay structure and opportunities for overseas training are among the reasons diverting many high-qualified jobseekers away from SMEs.

Skill gaps

Proficiency levels: Satisfactory in specific hard and soft skills but not in generic hard skills

- In a scale of one to five with five being highly proficient, current employees are relatively more proficient in specific hard skills and soft skills (3.78) than generic hard skills (3.27). All specific hard skills score not less than 3.5, implying that employers are satisfied with the industry knowledge and job-specific abilities and knowledge possessed by their current employees (Figure 7.10).
- Foreign language communication on the other hand rates the lowest in generic hard skills (only 1.78) with legal and economic knowledge also trailing behind others (2.67). Meanwhile, English language proficiency remarkably scores the highest at 4.17.

Figure 7.10: The skills proficiency level of current high-qualified employees by types of skills in other high-tech manufacturing in Penang



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

Positions where skills need the most improvement – Engineering

Engineering positions (which include R&D Engineers, RF Debug Engineers, FPGA Engineers, PCB Design Engineers, Manufacturing Engineers, E&E Engineers, etc.) are often mentioned by employers in response to skills needing that the most improvement. Both hard and soft skills need to be improved. Employees are required to enhance hard skills such as RF knowledge, Cardence Allegro, PLC automation and Auto CAD tool, while soft skills include problem-solving, organisational and communication skills.

7.2.5 Moving forward: Future skill requirements

Acquiring new skills due to newly emerging tasks

- All respondents to the survey indicate that current employees need to acquire new skills in anticipation of newly emerging tasks in the next 12 months. "The development of new products and services" is expected to lead to emerging of new tasks followed by "the introduction of new technologies or equipment".

Ability to meet future needs – selected specific hard skills

- The prospective skills needed in the future on gravitates towards generic hard and specific hard skills but not soft skills. Generic hard skills include electronic skills, root cause analysis, data automation and predictive maintenance, which are expected to meet future needs whereas hardware design, CAD, Cardene Allegro mentor graphics, RF sustaining, RF debug and electrical design are not expected by employers to meet future needs. Additionally, high-demand positions in the next two years include **Software Engineers, QA Engineers, CNC Technicians, Process Engineers, Mechanical Engineers, System Analysts and Electrical Design.**

7.3 Precision engineering, machining and automation

7.3.1 Industry overview

A solid locally grown industry with foreign and large local companies support

- The precision engineering, machining, and automation industry has made an attempt to develop beyond a position as support industry to MNC establishments with varying success. It continues to play an important role in making manufacturing processes more efficient and sustainable. With more than 150 companies operating in this industry, the majority of them are small and medium enterprises (SMEs).
- This industry constitutes the second-largest capital investment after E&E products. It contributed about 7.2% of Penang's total investment and created 5,440 jobs from 2011 to 2016.
- Unlike high-tech manufacturing, this industry is primarily driven by local companies where in 2016 alone, approved domestic capital accounted for over 90% of investment. However, a number of locally established companies in this industry have been taken over by foreign firms.

New cluster development – Penang Automation Cluster (PAC)

- To support local SMEs, three large local companies (LLCs) – ViTrox, Pentamaster Technology and Walta Engineering – are jointly investing RM63 million to develop the Penang Automation Cluster (PAC) on a five-acre piece of land in SME Village in Batu Kawan by 2019. Being marked as the first in Malaysia, the automation cluster aims to support local SMEs in precision metal fabrication, and to turn the SME Village into a one-stop metal component supply hub. [61]
- PAC plans to accommodate 18 SME companies equipped with state-of-the-art machinery and world-class metal component supply chain management, which will benefit the semiconductor, electronics, aerospace and medical devices industries.
- Some 500 skilled jobs will be created by the cluster, with qualified employees given the opportunity to attend German Dual Vocational Training – or Meister Programme.

Industry composition and nature of operations

This industry is divided into two sub-industries – precision engineering, tooling & machining and Automation the details of the sub-industries are presented in Table 7.7.

[61] Invest-in-Penang (2017, February 8). Penang announces RM63 million Penang Automation Cluster. News and Events. Retrieved from http://www.investpenang.gov.my/news-detail.php?group=2017&sub_group=February&pid=31

Table 7.7: Description of sub-industries of precision engineering, tooling & machining and automation

Sub-industry	Key industry players	Business activities	Operational activities
1. Precision engineering, tooling & machining	Eng Technologies, Sam Engineering, UWC Group of Companies, Uni-Vessel Engineering, AT Precision Tooling, Kobay Technology, Rapid Precision Technology	Manufacturing of sheet metal; hard disk; machining & medical devices	Precision components & tool & die fabrication; Manufacturing of machineries & equipment; Research & development
2. Automation	ViTrox, Micro Modular System, Esmo Automation (M), BBS Automation, Pentamaster Technology	Advanced Automated Vision Inspection System; Industrial automation for LED & semiconductor	Research & development; Design & manufacture

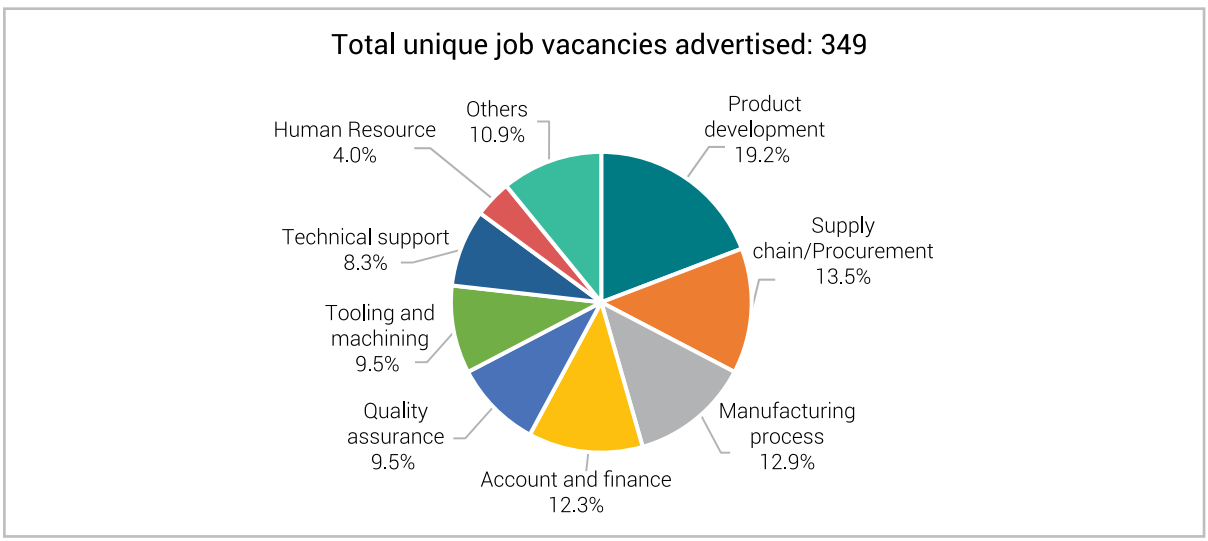
7.3.2 High-qualified labour demand

In the first half of 2016, this industry had the least number of job openings in manufacturing industries, accounting for 349 vacancies. ViTrox advertised the highest number of job vacancies in Penang (16.9%), followed by SAM Engineering (8.3%) and Mattel (6.9%).

Product development as the key high-qualified workers needed

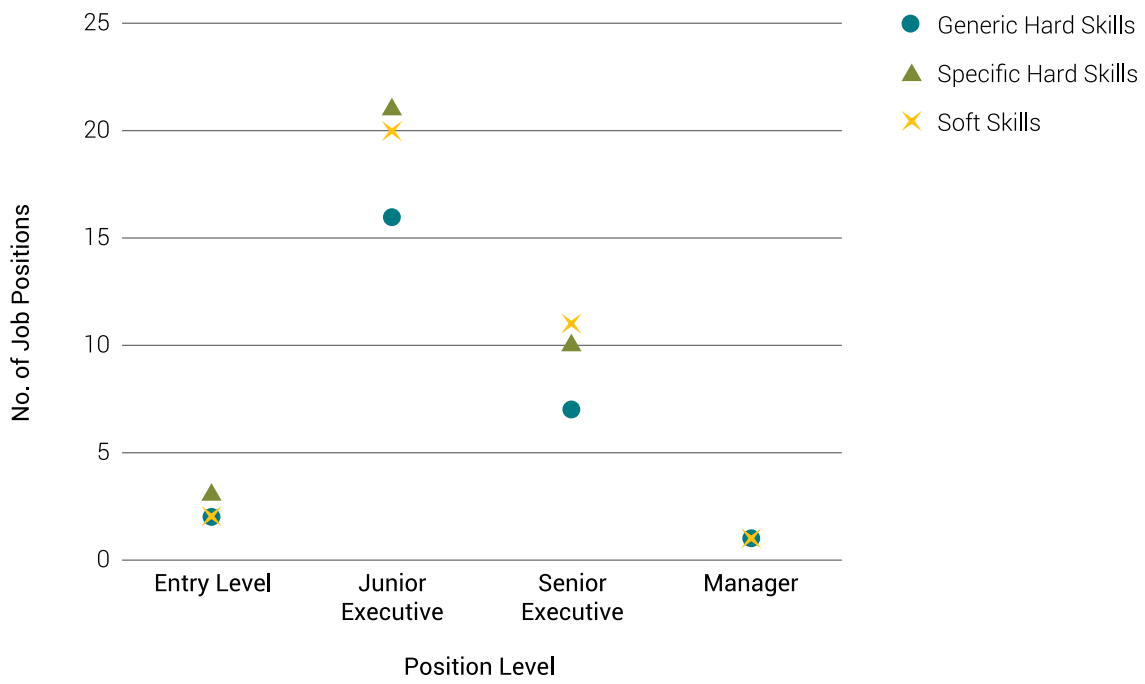
The hiring activity is largely seen in job functions of product development in the fields of machinery design and industrial system solutions. Out of 349 positions advertised, product development made up almost 20% of vacancies (Figure 7.11). R&D Engineers, Mechanical Design Engineers and System Control Engineers are the typical vacancies advertised in this area. This was followed by supply chain/procurement (13.5%), manufacturing process (12.9%), accounts and finance (12.3%) and quality assurance (9.5%).

Figure 7.11: Major job titles advertised in precision engineering, tooling & machining and automation



Source: Vacancy database

Figure 7.12: High-demand job positions by types of skills and position levels



Source: Vacancy database

Going by the frequency of advertising, nearly 13% of high-qualified vacancies can be considered as high-demand. The characteristics of these vacancies are illustrated as follows.

Position level: Junior executives

- Junior executive positions make up the largest proportion of vacancies advertised across all firm sizes; nearly 60% of the high-demand vacancies recruit junior executives followed by senior executives (26.7%).
- Recruitment for junior positions is slightly larger in the job functions of product development than in technical support, accounts and finance.

Skill-specificity: All job positions except technical support

- Over 80% of job positions in product development, accounts and finance, and tooling and machining require specific skills.
- For example, candidates who apply for a junior R&D Engineer in ViTrox must have specific skills in basic machine design, PLC programming, and motion control. A senior CNC Machining Programmer in Fourte International Technology requires experience in CNC programming.

Educational level: Diploma

- Unlike high-tech manufacturing, the highest education level required is a Master's degree. With the exception of product development and manufacturing process, all advertised vacancies look for candidates with a minimum of diploma qualification.

Highly sought-after skills: Specific and soft skills

- 75.6% of the high-demand vacancies require candidates who possess specific hard skills and soft skills.
- Specific skills are highly sought after at entry and junior levels of positions while soft skills are more sought after for senior executive and managerial levels (Figure 7.12).
- Soft skills include achievement skills such as self-motivation and result-oriented skills; while relationship and service skills include good communication and interpersonal skills.

Generic hard skills: Foreign language – Mandarin

- Positions in technical support highly require generic hard skills.
- In particular, a good command of foreign languages is predominantly required by companies.
- Within the high-demand vacancies, about one-third require a good command of Mandarin Chinese language.
- These job functions involve CNC machinists, Quality Assurance Engineers, Accountants, Material Planners and Mechanical Engineers.

Average length of job postings: Exceeding two months for high-demand vacancies

- On average, while firms advertise for 2.3 periods, high-demand vacancies advertise for 4.7 periods, which correspond to slightly more than two months.
- Junior positions in product development are advertised for an average of five periods, or more than two months, particularly for Project Engineers and System Control Engineers.

7.3.3 High-qualified labour supply

Supply characteristics

The supply source

- Labour recruitment primarily focuses on Penang, followed by other states in Malaysia.
- Firms target fresh graduates and applicants with more than two years of work experience in the high-qualified segment.

Horde of job applications

- The masses of applications do not necessarily represent the availability of high-qualified workers, due to the fact that first, one applicant can apply for multiple job vacancies, and second, in large part under-skilled entrants are attracted.
- On average, most firms receive close to 100 job applications for each job opening. One firm receives an average of over 300 job applications for a single opening.

Recruitment profiles

Reasons for recruitment: Firm's expansion

- Employer survey indicates that job openings are significantly attributed to the expansion of company activities. A number of firms state that recruitment of new employees is largely due to replacement of employees who have left the company.

Other recruitment channels: Employee network

- Apart from using JobStreet.com as an advertising platform, the majority of the respondents use employee network as an alternative avenue to recruit high-qualified employees, followed by unsolicited applications.

Partly prepared fresh graduates, and "bad" skill integration of experienced hires

- Respondents collectively indicate that not all advertised positions that had been filled fully match the job requirements in advertisements.
- Fresh graduates are only partly prepared for the offered positions. The reasons for this include poor attitude, lack of motivation and lack of practical experience.
- As for the integration of experienced hires in the establishments, employers highlight "bad" skill integration due to poor attitude and high demands in terms of salary and working hours.

7.3.4 Human capital issues and challenges

Quantitative supply constraints

The recruitment issues and challenges are examined using positions that require a longer duration to fill. In this industry, only 6.9% vacancies are persistent vacancies due to employers' hiring flexibility. The characteristics of hard-to-fill high-qualified vacancies are discussed below.

Position level: Junior executives

- Unlike high-tech manufacturing, junior positions require longer time to fill than other positions in this industry.
- Junior positions constitute about 62.5% and the majority of these positions require less than two years of work experience.
- This indicates that skill-equipped workers are scarce at junior level.
- However, according to MIDA Penang, the lack of supply happens not only at entry, but also at mid and experienced level of positions in the areas of machining, forging, surface engineering, and machinery and equipment.

Accounts & finance and quality assurance requiring specific skills take a longer duration to fill

- Accounts & Finance (Accountants) and quality assurance (QA Engineers, QA Technicians) requiring more specific skills than soft skills and generic hard skills (Figure 7.13) are identified as hard-to-fill positions.
- Compare with high-demand positions, persistent vacancies in technical support (Assembly & Field Service Engineers, Application Sales Engineers) require more generic hard skills than other skills; while those in manufacturing and supply chain require soft and specific skills to the same degree.

Most affected skills: Soft skills

- Among the persistent vacancies, 75% require soft skills, followed by specific hard skills (62.5%) and generic hard skills (50%).
- Within soft skills, positions requiring impact and influence skills (problem-solving, organisational, leadership, etc.) do not take as long to fill as positions requiring achievement skills (self-motivation and result-orientation), the latter constituting the largest share of positions taking a longer duration to fill, next to those requiring relationship and service skills (good communication, teamwork, etc.).

Most affected job functions: Product Development

- While product development encompasses the largest share of vacancies that are persistent, it takes marginally shorter time to fill compared with technical support. The former makes up 10.6% of the total vacant positions and is advertised for an average of five periods corresponding to 2.5 months, while the latter accounts for 10.3% taking an average of 5.7 periods (more than 2.5 months) to fill.
- Within product development, Senior Vision Software Engineer position is advertised for four consecutive months.
- Positions for Technical Sales and Application Engineers in technical support functions are advertised for three consecutive months (see Box 7.3).

Box 7.3: Employer survey of precision engineering and automation: Hard-to-fill vacancies

This industry appears more successful than high-tech manufacturing filling vacant high-qualified positions. Failure to fill vacant high-qualified positions is lower than high-tech firms. Firms cited that lack of high-qualified workers is primarily due to qualitative issues: positions require knowledge that is too specialised and applicants are too demanding in salary expectations.

Half of the employers cited that recruitment differentiates in terms of **length of time taken** to fill a vacancy. But those who responded otherwise provide the following information.

- Jobs requiring the least time to fill: Accountants and R&D Engineers.
- Jobs requiring the longest time to fill: CNC Machinists and Technical Support.

Hard-to-fill positions range from technical to non-technical positions across all position levels (Table 7.8). Specifically, CNC Machinists and Technical Support Engineers are hard to fill at junior and senior executive level while quality assurance, R&D, purchasing and sales are difficult to fill at managerial level. Interestingly, vacancies for R&D Engineers take the least time to fill in this industry, but R&D Managers are proven to be hard to fill over the past two years.

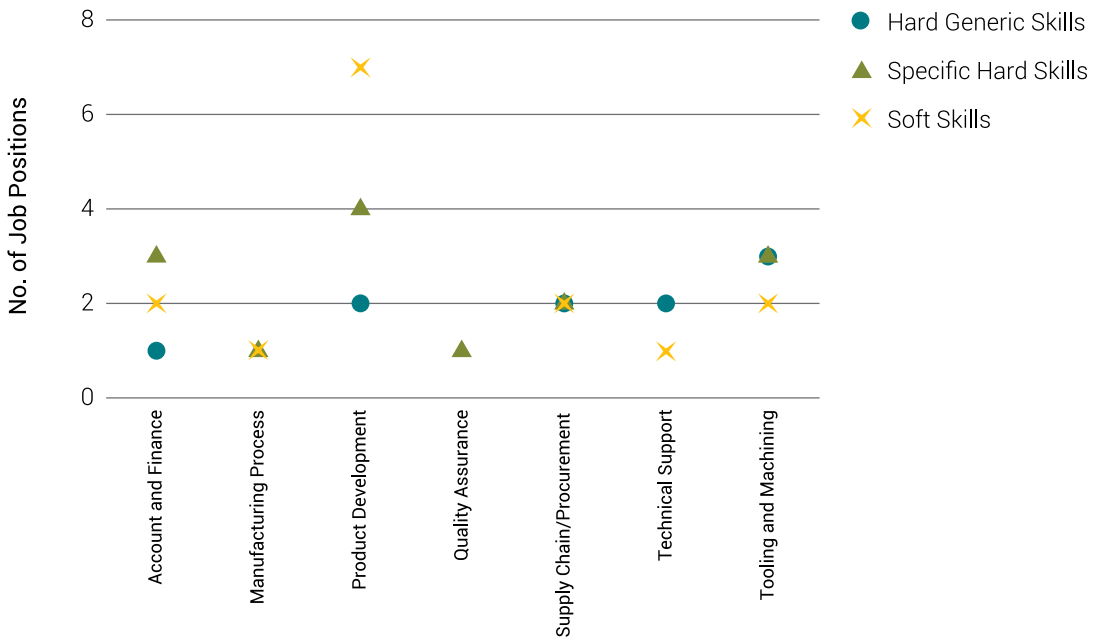
Table 7.8: Hard-to-fill job positions over the past two years

Hard-to-fill positions	Position level
Foremen	Senior Executives
Mechanical Design Engineers	Senior Executives
QA Managers	Managers
Technical Support Engineers	Junior & Senior
CNC Machinists	Junior & Senior
Purchasing Managers	Managers
R&D Managers	Managers
Mobile Crane Operators	Junior
Sales Managers	Managers

Source: Employer survey

Conclusion: Hard-to-fill vacancies are more likely to affect junior and senior positions in technical support and tooling & machining.

Figure 7.13: Persistent vacancies by types of skills and major job titles



Source: Vacancy database

Skill gaps

Skill deficiencies: Less satisfactory in generic hard than specific hard and soft skills

- Skill deficiencies are more prevalent in generic hard skills than specific hard and soft skills. In a scale of one to five with five being highly proficient, specific hard skills scored the highest (3.87), followed by soft skills (3.34) and generic hard skills (3.12).
- Specific hard skills seem to be sufficient for the needs of employers with industry knowledge. It is rated the lowest, scoring 3.6 while job-specific knowledge and technical abilities are rated at 4.00.
- As for generic hard skills, foreign language communication is rated the lowest at 2.33 with legal and economic knowledge second-lowest (2.60). Meanwhile, technical or science and technology knowledge scores the highest at 4.20.
- As for soft skills, teamwork is given the highest score at 3.80 while written & communication skills have the lowest score at 3.00. Improvement is needed for these skills.

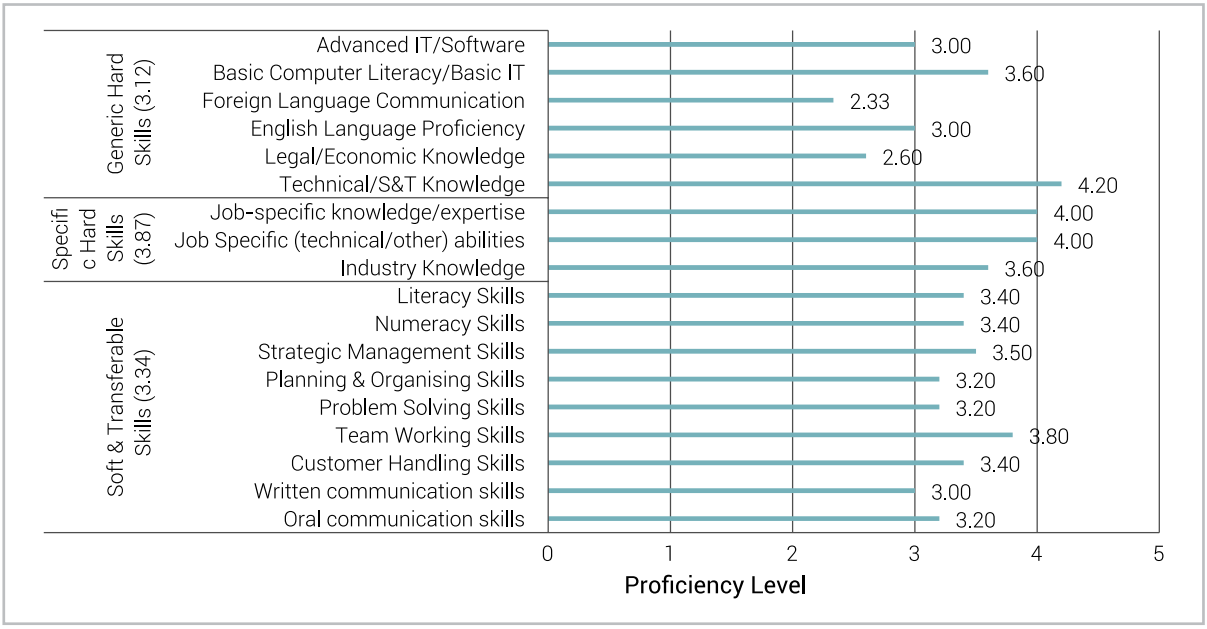
Positions where skills need the most improvement – Engineering and non-engineering

- Skill deficiencies are more evident in non-engineering positions. Technical Support Engineers and R&D Engineers are required to enhance their problem-solving skills; only 60% of employees in the positions meet the ideal skill requirements. Meanwhile, CNC Programmers/Machinists and Planners need to improve on CNC Programming skills and production planning skills respectively as half of the employees do not meet the ideal skill requirements. As for Software Development Engineers, System Control Engineers, Mechanical Designers, Draughtsmen and Vision System Engineers, at least 80% of employees meet the required skill-set.
- Two main reasons for the low level of proficiency: first, experienced and proficient employees leave the company to work in other companies; second, rapid technological changes, making it difficult to keep pace.

Applicants' perceived negative behaviour

- The less positive traits of high-qualified employees include: unrealistic salary expectations where expected salary does not align with experience and expertise; lack of passion and hands-on experience.

Figure 7.14: The skills proficiency level of current high-qualified employees by types of skills in precision engineering, machining and automation in Penang



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

7.3.5 Moving forward: Future skill requirements

Acquiring new skills due to newly emerging tasks

- A majority of employers state that current employees need to acquire new skills in anticipation of newly emerging tasks in the next 12 months. "New legislative or regulatory requirements" and "increased competitive pressure" are the reasons leading to the emergence of new tasks.

Ability to meet future needs – selected specific hard skills

- The skills needed in the near future will concentrate on specific hard skills. These include CNC Machining, machine learning and robotic welding. Employers predict that these requirements will likely be met. High-demand positions in the next two years include **R&D Engineers, Technical Support Engineers** and **Machinists.**

7.4 Life sciences and medical devices

7.4.1 Industry overview

Strengthening the presence of fast-growing industry

- The industry is now an emerging driving force for the Penang's economy despite its long historical presence. We see more medical device manufacturers setting up facilities. Of the global top 30 medical device manufacturers, Penang boasts the presence of five companies: Cardinal Health, Abbott Laboratories, Boston Scientific, B. Braun and St. Jude Medical. The majority of them are American companies.[62]
- Penang hosts the largest medical device manufacturers' manufacturing hub in Malaysia. It comprises more than 55 companies including support industries, accounting for one-third of total members of the Association of Malaysian Medical Industries (AMMI).

[62] Medical Product Outsourcing (2017). Top 30 Medical Devices Manufacturers. Retrieved from http://www.mpo-mag.com/issues/2016-07-01/view_features/top30-medicaldevice-manufacturers/

Table 7.9: Description of sub-industries of life sciences and medical devices

Sub-industry	Key industry players	Business activities	Operational activities
1. Biopharmaceutical	Agilent Technologies, Hong Kong Ban Kah Chai Medical Factory, Knowles, Abbott Laboratories, Boston Scientific	Life sciences; diagnostics & applied chemical; Chinese medicine; medical solutions	Research & development; sales & services; manufacturing;
2. Medical Devices	Abbott Laboratories, Boston Scientific, B Braun Medical Industries, Cardinal Health, Lake Region Medical, Haemonetics, Orthomedic Medical Devices, St. Jude Medical	Medical solutions	Manufacturing

Upswing of medical technology and its spillovers

- Manufacturing and exporting high-end medical device products become the next phase of development of this industry. These products include orthopedic implants, pacemakers, surgical instruments and intravenous cannula.
- The industry will generate high spillover benefits in other industries such as E&E, automation and IT industries in Penang. With the state-of-the-art digital technology, cloud-based solutions and connectivity will enter healthcare solutions in the future.

Industry composition and nature of operations

The industry can be divided into two main sub-industries. Table 7.9 presents the details of business activities and some industry players.

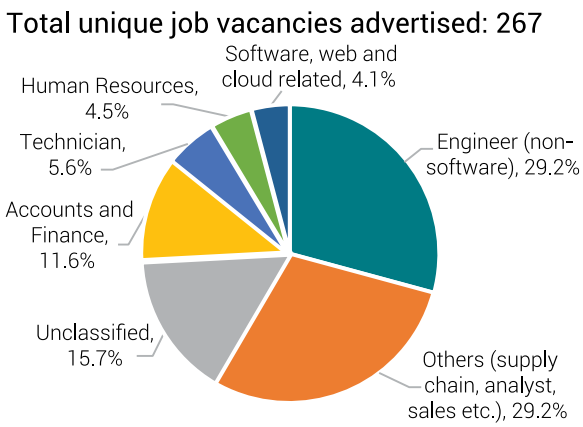
7.4.2 High-qualified labour demand

In the first half of 2016, one-third of 267 job openings were advertised by B. Braun followed by Agilent (20.6%), Knowles (12.7%) and St. Jude (9.4%).

(Non-software) engineers as the key high-qualified workers needed

Hiring is more aggressive in the areas of (non-software) engineers such as Automation/Tooling Engineers, Process Engineers and Quality Engineers. Out of 225 vacant positions, (non-software) engineers accounted for the largest share (Figure 7.15). This was followed by accounts and finance.

Figure 7.15: Major job titles advertised in life sciences and medical devices

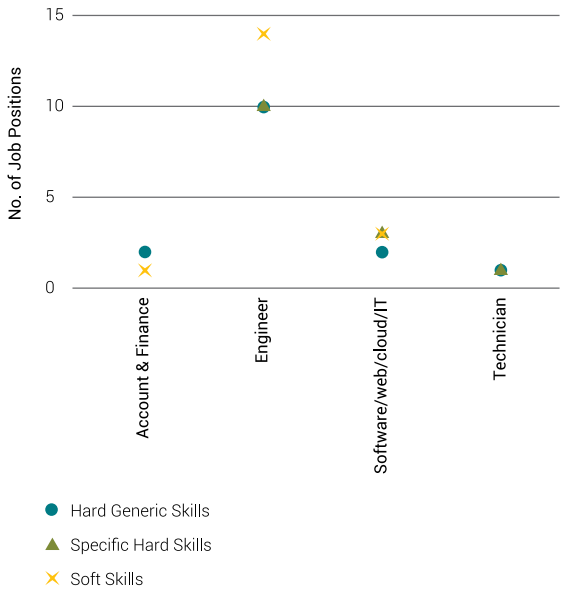


Source: Vacancy database

Figure 7.16: High-demand job positions by types of skills and position levels

Source: Vacancy database

Figure 7.17: High-demand of major job functions by types of skills



Source: Vacancy database

The characteristics of high-demand vacancies are depicted below.

Position level: Senior executives

- Senior executive positions account for more than half of the total job vacancies advertised in this industry.
- Senior positions are more prevalent in the job functions of engineers than technicians, accounts and finance, and human resources.
- 41.2% of the high-demand positions require candidates who possess at least five years of work experience.

Skill-specificity: Junior level in technician and software-related positions

- While the number of high-demand positions is small, skill- specificity is highly needed in software-related positions where all job openings require candidates with relevant specific hard skills.
- For instance, an R&D Embedded Software Engineer position advertised by Agilent Technologies requires candidate to possess good knowledge of C++ programming and modern programming language such as C# and XML.
- More than 70% of the total job vacancies for Technicians ask for specific skills.
- For example, candidates who apply for an IE Technician position must have specific skills in AutoCAD.

Educational level: Bachelor's degree

- A majority of high-demand positions require at least a Bachelor's degree except Technicians. Candidates must have a certificate or diploma with desired generic hard skills for Technician positions. The highest educational level for engineering positions in the field of R&D such as firmware and mechanical is PhD.

Highly sought-after skills: Soft skills

- Soft skills are highly sought after compared with generic hard and specific hard skills.
- They are highly sought after at entry-level, senior executive and managerial levels while specific skills are much needed in junior executive positions (Figure 7.16).
- As for soft skills, achievement skills are highly demanded followed by relationship and service skills.
- These skills are largely required in (non-software) engineering positions. For example, a position for Senior Machining Engineer in Knowles Electronics requires excellent verbal and written communication skills, including presentation, organisational and management skills.

Generic hard skills: Legislative and regulatory awareness – Accounts and Finance

- As for generic hard skills, 44% of the high-demand positions seek candidates with legislative and regulatory knowledge.
- The majority of positions in accounts and finance frequently ask for generic hard skills such as cost accounting process in compliance with GMP and SOX.
- Recruiters weigh foreign language skills as more sought-after than legislative and regulatory and English language skills particularly for engineers and human resources positions.

Average length of job postings: Exceeding two months for high-demand positions

- While firms on average advertise for 2.5 periods, high-demand positions post at five periods, which correspond to more than two months.
- Senior positions in software design post an average of 4.9 periods, or more than four months. This is the case particularly for Industrial Engineers and Process Engineers.

7.4.3 High-qualified labour supply

The supply source

- Firms prioritise the hire of high-qualified workers from Penang and other states in Malaysia. They receive an average number of 100 job applications for each vacancy advertised.

Reasons for recruitment: Firm's expansion and replacement of employees

- Revealed by employer survey, job openings are mainly attributable to the replacement of employees who have left the company and expansion of company activities. The latter coincides with the new capital investment announced by medical device manufacturers B Braun, Boston Scientific and Toshiba Medical Systems.

7.4.4 Human capital issues and challenges Quantitative supply constraints

The recruitment issues and challenges are examined using vacancies that require a longer duration to fill. In this industry, some 10.5% of vacancies can be defined as persistent. The characteristics of hard-to-fill high-qualified vacancies are described below.

Position level: Senior executives

- Senior positions take longer time to fill than other position levels.
- Junior positions constitute about 57.1% and a majority of these positions require more than two years' work experience.
- This indicates that high-qualified workers are scarce at senior level inducing significant employee mobility.
- According to MIDA Penang, critical occupations include Biomedical Researchers, Implants Researchers, Machinists, Regulatory Affairs, to name a few.

Generic hard and specific hard skills: Equally scarce for medical technology

- Persistent vacancies advertised by medical devices firms demand candidates to have generic and specific hard skills.
- Inadequate supply of high-qualified labour with relevant knowledge and training in medical technology constitutes a significant constraint for the industry to upgrade towards high value-added activities.

Most affected skills: Soft skills, then specific and generic hard skills

- Over 70% of persistent vacancies require soft skills, followed by specific and generic hard skills (both 67.9%).
- As for soft skills, positions asking for impact and influence skills (problem-solving, organisational, leadership, etc.) do not take as long to fill as positions asking for achievement skills (self-motivation and results-orientation).
- Positions asking for achievement skills account for the largest proportion of those requiring longer time to fill followed by those that ask for relationship and service skills (good communication, teamwork, etc.).

Most affected job functions: Software-related positions

- Talent shortage occurs at the high-skilled job functions. While the number of persistent vacancies is relatively small, software-related vacancies (e.g. R&D Web Developers) comprise a larger proportion of hard-to-fill vacancies compared with engineers and accounts & finance positions.
- For example, Agilent advertised R&D Embedded Software/Web/Cloud Developers vacancies for more than 2.5 consecutive months.
- In comparison with other manufacturing industries, the medical devices industry has fewer persistent vacancies. The analysis of vacancy database also shows that none of the job openings in accounts & finance and human resources are persistent, as they are filled after one month.

Box 7.4: Focus group discussion of life sciences: Recruitment difficulties

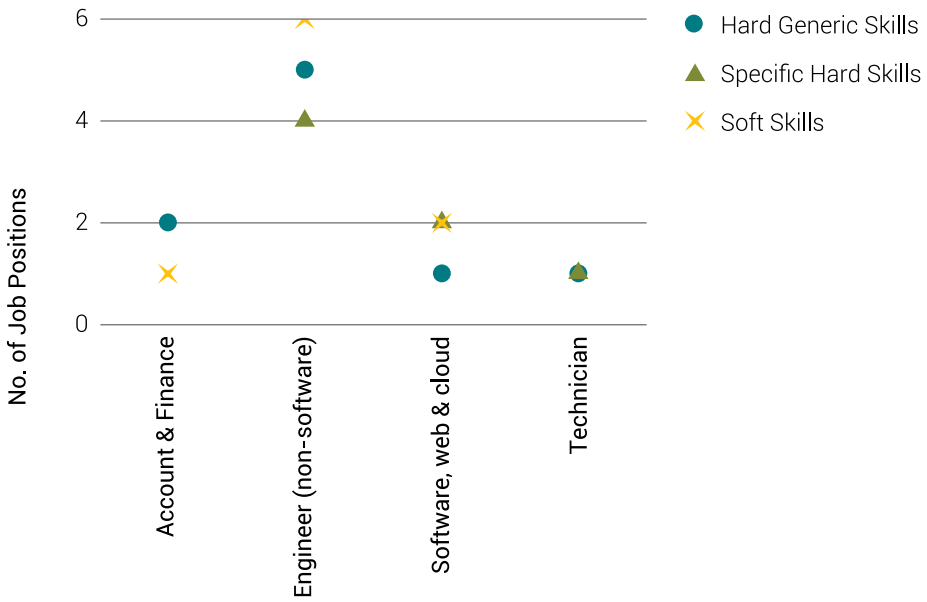
The recruitment challenges faced in hiring suitable persons for high-qualified positions are summarised below.

- Lack of relevant educational qualifications and work experience;
- Salary comparison between local jobs and jobs offered in neighbouring countries put Penang at a disadvantage;
- Lack of willingness to learn; and
- Unavailability of candidates with the right expertise in Malaysia.

As the industry upgrades towards more capital-intensive activities, Penang should have sufficient labour supply to fulfil the needs of employers in this industry.

Graduates are not sufficiently trained in colleges and universities. Studies in colleges and universities place too much emphasis on theory while neglecting practical knowledge, which is highly needed. Students should be exposed to programmes related to new technologies. Most importantly, the qualifications and professional development skills of lecturers should be upgraded in keeping pace with technological advancements.

Figure 7.18: Persistent job vacancies by types of skills and major job titles



Source: Vacancy database

Other recruitment channels: Other online platforms such as LinkedIn

- Apart from using JobStreet.com to advertise vacant positions, a majority of firms employ other online channels as an alternative avenue to attract high-qualified hires. These include LinkedIn and Glassdoor.
- Other recruitment methods used include employee network, unsolicited applications, recruitment agencies and internal transfer.

Well prepared fresh graduates; and "good" skill integration of experienced hires

- Not all filled positions completely meet the stipulated job requirements.
- Surprisingly, fresh graduates are rated well prepared for the offered positions.
- Despite the fact that the majority of the firms are satisfied with experienced hires, they still lack the required hard skills and soft skills. Fresh graduates are also considered too demanding relative to what they can bring as they lack practical experience.

Skill gaps

Skill deficiencies: Less satisfactory in generic hard than in specific hard and soft skills

- Skill deficiencies are more prevalent in generic hard skills rather than specific hard and soft skills. In a scale of one to five with five being highly proficient, specific hard skills score the highest (3.50) followed by soft skills (3.30) and generic hard skills (3.25).
- Specific hard skills seem to satisfy the needs of employers scoring at 3.5 parallel with job-specific knowledge and technical abilities and industry knowledge.
- As for generic hard skills, employees should put in more effort to improve their advanced IT/Software skills and foreign language communication and English language proficiency. Basic computer literacy, legal and economic knowledge, and technical knowledge are less problematic. The former scores at 3.00 for hard skills while the latter is valued slightly higher at 3.50.
- As for soft skills, employees need to improve on oral communication skills as employers on average rate proficiency low with a score of 2.00 only. The same applies to written and communication skills and problem-solving skills.

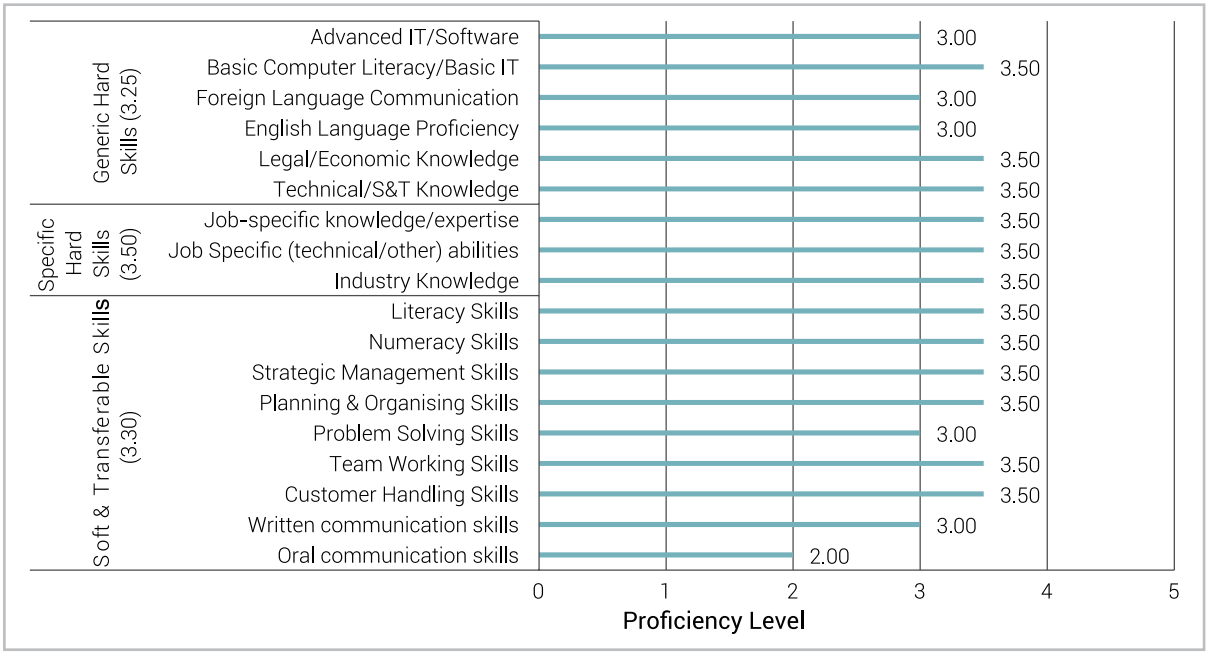
Positions where skills need the most improvement – Engineering and managerial positions

- Engineering and managerial positions were mentioned by employers in response to deficiencies in soft skills. Engineers should improve on written and spoken English, while managers are required to improve on coaching and mentoring on top of critical thinking and problem-solving skills.
- Two main reasons for low levels of proficiency: first, proficient and experienced employees leave for other companies; and second, rapid technological changes, making it difficult to keep pace.

Applicants' behaviour

- The less favourable behaviour of high-qualified employees is similar to that of employees in high-tech manufacturing industries, which include: demand for high salary and a high-level position. Firms also comment that higher wages offered by newly established MNCs result in applicants and existing employees expecting higher salaries.
- Experienced jobseekers are mature. They value career advancement, growth, and stability. As they are experienced and confident with their skill-set, a higher compensation is expected. Some employers cannot afford this.
- Fresh entrants on the other hand lack basic knowledge and practical experience. They also lack the willingness to learn or work more, self-motivation and responsibility. Poor attitude is also caused by low job satisfaction.

Figure 7.19: The skills proficiency level of current high-qualified employees by types of skills



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

7.4.5 Moving forward: Future skill requirements

Acquiring new skills due to newly emerging tasks

- Current employees need to acquire new skills in anticipation of newly emerging tasks in the next 12 months. "The development of new products and services", "the introduction of new technologies or equipment", "new legislative/regulatory requirements" and "increased competitive pressure" are areas that will lead to newly emerging tasks. High-demand positions in the next two years include **R&D Engineers, Production Planners** and **QA Engineers**. Further, product markets are shifting as new technologies are integrated; future vacancies will involve biomedical engineers and digital imaging talent.

7.5 Comparative analysis across core manufacturing industries

7.5.1 High-qualified demand structure

Penang's manufacturing sector still generates the largest number of high-qualified job vacancies with 71.5% of the total. Within the sector, semiconductor and electronics remain the largest industry in employee recruitment (41.2% of the total) followed by other high-tech manufacturing (16.3%), precision engineering & automation (7.8%), and medical devices & life sciences (6.2%). As far as high-demand vacancies are concerned, the majority of these are advertised by large companies with at least 1,000 headcounts, except precision engineering & automation. Firms in semiconductor and electronics have vacancies far above the average of all firms; medical devices and precision engineering & automation firms contrast with this.

Only high-tech manufacturing and medical devices & life sciences considerably recruit senior executive positions. For such positions, companies prefer applicants with at least five years of work experience. It is also interesting to note that precision engineering & automation recruit lower segment of high-qualified employees.

Across all manufacturing industries, product development dominates frequently advertised job vacancies. In this job function, the level of skill-specificity increases as products and operations upgrade. Demand in precision engineering & automation industry is characterised by functional specialisations, which is less prevalent in other manufacturing industries.

Corroborating with observations on mobility, recruitment is attributable to the expansion of operations and replacement of employees who have left the company. Among the core manufacturing industries, the former reason is more prevalent in other high-tech manufacturing, precision engineering & automation, and medical devices than in high-tech manufacturing. Finding the right candidates is a big challenge for all industries. Further, firms seeking to replace workers who have left are to a larger extent less reputable. At the same time, the diversity and complexity observed compel a refined view.

7.5.2 Supply characteristics

A large number of applications are received for each vacancy, amounting to 100. Although there is some variation between manufacturing industries, the pattern of application and supply conforms to a large extent to what has been outlined in Chapter 2.

Firm size and brand matter. Large reputable firms are able to attract a high number of applicants who are considered as relatively "good" and skilled. Less reputable companies receive a lower (yet still sizeable) number of job applications, and applicants on average have different characteristics. Skill profiles of ideal employees for key positions are critical to the execution of business plan as they determine the success rate in filling vacant positions. Semiconductor/electronics and medical devices companies are more successful in filling vacancies compared with other high-tech manufacturing and precision engineering & automation. Even so, most of these firms have difficulty filling positions according to skill requirements, primarily due to qualitative shortage.

7.5.3 Positions that require a longer duration to fill (hard-to-fill vacancies)

High-tech manufacturing such as semiconductors industry registers an above average percentage of hard-to-fill vacancies: 16% compared with the overall average of 13% as discussed in Chapter 5. In contrast,

precision engineering & automation firms encounter relatively less difficulties in recruitment, given the fact that only 7% of vacancies are hard to fill. As explained above, the lower segment of high-qualified vacancies appears relatively less critical to fill.

Circuit and software designers/engineers prevail in hard-to-fill job functions in semiconductor/electronics while software designers are also significant in medical devices. On the other hand, in other high-tech manufacturing and precision engineering & automation industries, quality assurance and product development respectively take the longest time to fill.

7.5.4 Skill gaps

There is little difference between manufacturing industries for skill in proficiency levels of existing employees. Generic hard skills are rated lower than specific hard and soft skills. Specifically, foreign language communication and legal/economic knowledge show by far the highest deficiency.

Specific hard skills achieve above average scores in all industries except in medical devices & life sciences. Most likely this reflects upskilling given to existing employees. However, a number of firms in some industries indicate the inability to train employees. The fact that job-specific skills are rated highest in precision engineering & automation probably reflects the operational level of firms where skill demand and intake are more flexible. It is implied that precision engineering and automation industry can apply the technical abilities and skills of current output of our education system.

In line with the trend noted above, proficiency in soft skills is better in high-tech manufacturing than in precision engineering & automation and medical devices & life sciences. Various professional training programmes are available in the market. Enhancing soft skills, which include leadership, management, planning, customer handling, communication, critical thinking and problem-solving, is very much given attention by firms that have the resources to invest in such skill development.

7.5.5 Future skill requirements and ability to meet needs

Given that the industries discussed in this chapter are subject to rapid technological changes, equipping employees to deal with changing times is imperative for an effective workforce. Business processes are highly dynamic with a high succession of products and services. Most industries and firms envisage new skill requirements in the coming years. Collectively, firms are more optimistic in meeting soft and generic hard skill needs than function-specific skill needs in the future. The latter though, is crucial to Penang's economic upgrading in manufacturing.

8

HIGH-QUALIFIED LABOUR AND SKILLS IN GROWING SERVICES INDUSTRIES

In this chapter, we discuss the characteristics of skill demand and supply in the services sub-industries. The pattern of job openings and the responses from firms offer evidence in regard to qualitative and quantitative human capital issues and challenges. How firms mitigate skill deficiencies and skill shortages are also described in this chapter followed by the future skill requirements. The key messages of each industry are provided below.

8.1 Advanced producer services

8.1.1 Industry overview

A fundamental value-added services industry

- Advanced producer services (APS) industry plays a fundamental role in business services of every economic activity. It provides a form of value-added services that streamline service delivery process. In other words, this process, which includes support services activities are contracted out to specialised service firms in the areas of accountancy, advertising, and law.[63]
- According to the 2016 Globalisation and World Cities (GaWC), Penang is ranked as a 'self-sufficient' city,[64] indicating a sufficient degree of services that are not evidently dependent on world cities. Kuala Lumpur is ranked as an Alpha city – a city that links major economic regions into the world economy.
- Penang's APS industry has grown immensely in the past 10 years. Corporate consulting and management firms who are in accounting, taxation, risk management and law are also predicted to grow steadily as all firms – regardless of business activities – would require such business solutions. Four of the top global accounting, audit, and advisory firms have also expanded their operations, with some shifting their facilities to new premises.

Industry composition and nature of operations

The industry can be divided into two main sub-industries as follows.

8.1.2 High-qualified labour demand

In the first half of 2016, recruitment in APS recorded the second lowest in the services sector. Grant Thornton and Sew & Lee Management Services advertised the most vacancies with each firm contributing 6.6% to the total. This was followed by KHC Chartered Accountant (4.9%), Key Secretarial Services (4.1%) and PKF Malaysia (4.1%).

Audit and tax – the largest job openings in APS

While this service industry is large, only 97 job openings or 2.2% of the total number of high-qualified positions are advertised in Penang. The recruitment situation is rather stable. Audit and tax make up over half of the job openings while legal-related positions have nearly one-fourth of the total job vacancies advertised. This suggests that management and consulting firms are more active in job recruitment than legal firms.

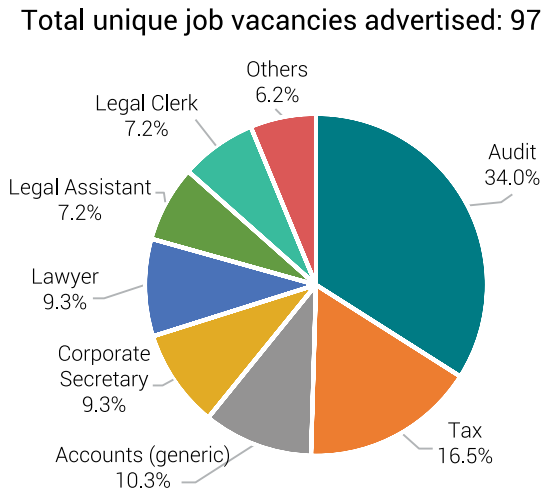
Table 8.1: Description of sub-industries of advanced producer services

Sub-industry	Key industry players	Business activities	Operational activities
1. Financial Services	Ambank, Bank Islam, Affin Bank Berhad, Bank of China, Bank Muamalat, UOB Bank	Financial institutions, Islamic financial services	Financial institutions, Islamic financial product research & development
2. Professional Business Services	Lexi Consulting (M), EPS Consultants, Boardroom Corporate Services, Penang PwC, Ajmer, Sandhu & Ong, KPMG Chartered Accountants	Software & consulting, Outsourcing accounting services, Consultancy, Recruitment firms, Legal, Corporate secretarial, Taxation	Contract staffing, Recruitment process outsourcing, Accounting, Software research & development, Litigation, Conveyancing, Audit services, Tax advisory

63 According to the International Standard Industrial Classification (ISIC) Rev. 3, producer services include business and professional services, financial services, insurance services, and real estate services. In this study, we cover only financial services and professional business services, which include recruitment, legal, secretaries, taxation, accounting, and consulting firms, accounting for a total of over 200 firms based in Penang.

64 Globalisation and World Cities (2016). The World according to Globalization and World Cities (GaWC) Research Network 2016. Loughborough University. Retrieved from http://www.lboro.ac.uk/gawc/world2016t.html

Figure 8.1 Major job titles advertised in advanced producer services



Source: Vacancy database

Customer relations – more prevalent at managerial level in financial services

Financial services sub-sector on the other hand sees a large number of vacant positions at the managerial level. Assistant Sales Managers, Relationship Managers and Branch Managers are commonly advertised by banks in Penang. Of the 130 job openings, more than one-quarter are recruited for managers and senior managers. This trend is rarely exhibited in other industries. Critically, out of the 16 high-demand vacancies, approximately one-third concern managerial positions. The educational qualification requirements are less stringent in this sub-sector, where a certificate regardless of field of study is sufficient for a Sales Manager position. Soft skills, however, are the most significant criteria to be considered for these positions, specifically in relationship and service skills such as strong communication and interpersonal skills; a strong inclination towards a sales-driven culture; and result-driven with strong commitment.

The characteristics of high-demand vacancies in APS are summarised as follows.

Position level: Senior executives

- Despite the majority of job recruitment hinging on junior executive positions, the high-demand vacancies in fact linger at senior executive positions.
- Out of the 24 high-demand vacancies, 41.7% are recruited for senior positions with half requiring 2–5 years of work experience.

Skill-specificity: Generic accounting and legal vacancies

- Nearly 63% of high-demand positions require specific hard skills.
- Accounting requests relatively higher skill specificities compared with other job positions. This includes relevant audit work experience and the ability to handle full set of accounts.
- Meanwhile, candidates for lawyer positions must have specialisation in law or legal services experience.

Educational level: Bachelor's degree and professional certificate

- This industry primarily looks for candidates who possess Bachelor's degree and professional certificate in accounting and law such as ACCA, CPA and MAICSA.

Highly sought-after skills: Soft skills

- As many as 87.5% of the high-demand vacancies require candidates who possess soft skills.
- Specifically, relationship and service skills such as excellent communication skills and good team player are classified as the most sought-after soft skills.
- Soft skills are particularly important for vacancies at entry level, senior executives and managerial positions (Figure 8.2).

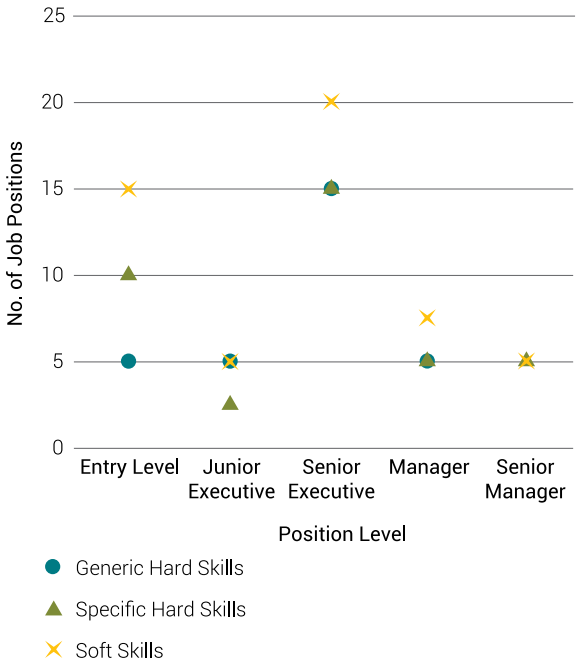
Generic hard skills: English and non-English languages are equally important

- About 37.5% of the high-demand vacancies require English and non-English languages.
- Proficiency in the English language is widely required by foreign firms. Local firms, however, request candidates to be well-versed in non-English language, namely Bahasa Malaysia and Mandarin.
- This is more prevalent in audit, tax and accounting positions where candidates have an added advantage to be considered for such vacancies.

Average length of job postings: Slightly over two months

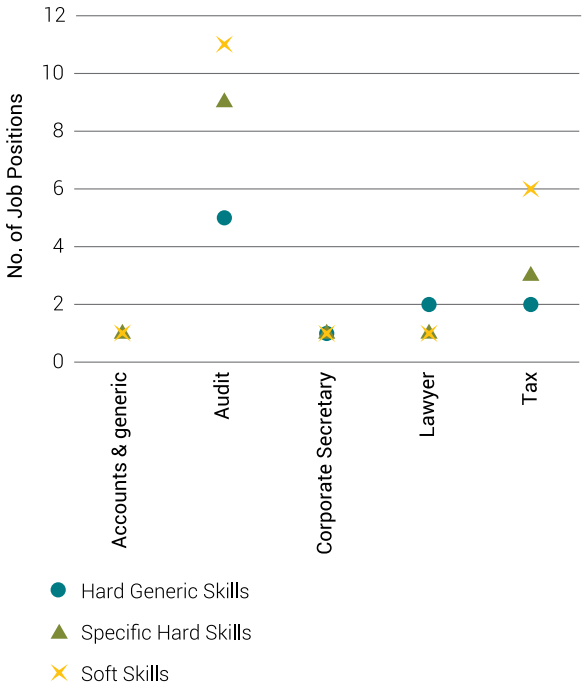
- On average, APS has the shortest duration of 2.5 periods – slightly over one month while high-demand vacancies persist slightly over two months.
- For example, senior executives in the functions of audit take an average posting of nearly three periods. This includes Senior Audit and Senior Associate Audit.

Figure 8.2: High-demand jobs by types of skills and position levels



Source: Vacancy database

Figure 8.3: Top jobs advertised by major job titles and educational requirements



Source: Vacancy database

8.1.3 High-qualified labour supply

Supply characteristics

The supply source

- Firms focus on recruiting candidates in Penang and other states in Malaysia. Primary and secondary supplies of workers are recruited by APS companies. Given a substantial number of private institutions of higher learning in Penang offering programmes in corporate management, accountancy, and audit – firms are expected to have better access to labour in such specialisations through university engagement and career fairs.

Abundance of job applications

- The abundance of job applications coincides with the average number of job applications presented by JobStreet.com, where firms in Malaysia have 107 job applications for each job opening in accounts and finance in 2016. According to the employer survey, firms receive close to 100applicants for each job opening, indicating the high ability to attract job applicants. However, the number of job applications received is also dependent on the reputation of recruiting firms. A reputable firm could obtain more than 50 job applications while those less reputable would receive less than 50 for each job vacancy advertised.

Recruitment profiles

Reasons for recruitment: Firm's expansion

- From the employer survey, job openings are mainly attributable to the expansion of firms. This involves small corporate management and consulting firms with a total headcount of no fewer than 30 employees. The recruitment of new employees in part is due to the need to replace workers who have left the companies. Meanwhile, only a number of firms recruit new employees as a result of new focus in company activities; this is more prevalent in banking and finance and legal firms.

Other recruitment channels: Employee network

- Apart from using JobStreet.com as a hiring platform, a majority of firms engage other methods such as employee network, internal recruitment and career fair at educational institutions to recruit high-qualified employees.

8.1.4 Human capital issues and challenges

Quantitative supply constraints

From the vacancies database, nearly 20% of the total vacant positions are defined as persistent. Holding all other assumptions constant, these vacant positions could potentially be hard to fill. On average, the persistent vacancies use about 4.63 periods or equivalent to 2.3 months to fill.

Corporate, business and sales positions require a longer duration to fill in financial services

In the financial services industry, about 12.3% of job openings are hard to fill. Sales positions at managerial level take a longer duration to fill, accounting for an average of 6.7 periods, which is equivalent to more than three months. For instance, Personal Financial Manager is advertised for as long as six consecutive months, implying that this vacancy takes a longer duration to fill. Again, having good interpersonal and communication skills, being independent and resourceful are some of the criteria set for this position. Thus, the shortage in sales-related managerial positions is more critical than other positions.

The characteristics of positions requiring a longer duration to fill in APS are described below.

Position level: Senior executives

- Senior executive positions have the highest level of persistent vacancies (42.1%) followed by entry level (21.1%) and managerial positions (21.1%).
- The majority of job positions require up to five years of work experience (68.4%).
- Among the senior positions, audit functions make up the largest proportion of persistent vacancies.

Hard-to-fill positions require more soft skills than generic and specific hard skills

- About 84% of hard-to-fill vacancies require soft skills while 68.4% look for specific hard skills and 47.4% require generic hard skills.
- Soft skills are highly required in all job functions except lawyers (Figure 8.4).
- In contrast to the high-demand vacancies, hard-to-fill vacancies require achievement skills such as proactivity, self-motivation and high integrity.

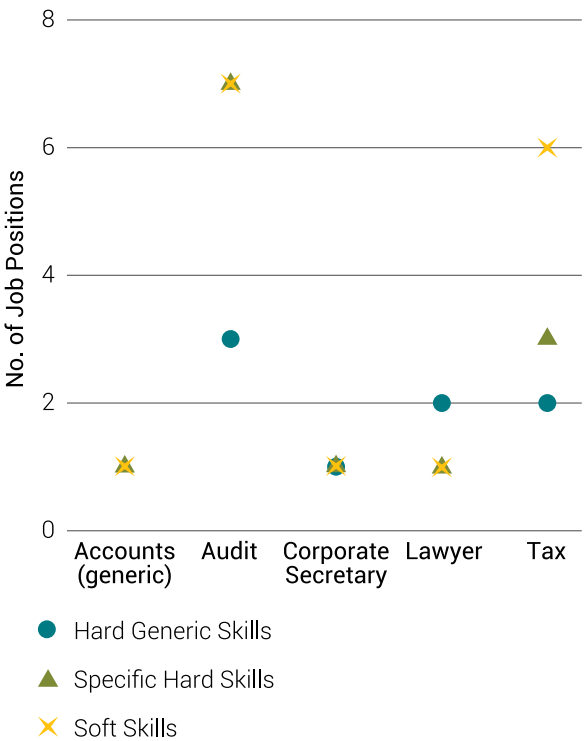
Job functions: Tax-related positions

- Tax-related positions have the highest level of hard-to-fill vacancies with 37.5% of them exceeding two months.
- This is then followed by audit (24%), lawyer (22.2%) and company secretary (11.1%).
- Audit functions take an average of 2.4 months while tax takes 2.2 months.

English language is the hard-to-fill hard skills

- Nearly 37% of hard-to-fill vacancies require a good command of the English language.
- English proficiency is a standard requirement for most job openings, while some firms demand fluency in other languages such as Bahasa Malaysia and Mandarin.

Figure 8.4: Persistent job vacancies by types of skills and major job titles



Source: Vacancy database

Partly prepared fresh graduates and "good" skill integration among experienced hires

- Most firms collectively indicate that not all positions filled fully meet the job requirements in advertisements.
- The majority of fresh graduates are partly prepared for the offered positions. The reasons contributing to this include lack of hard skills, soft skills and English language skills. Meanwhile, most employers cite 'good' skill integration among the experienced hires.

Box 8.1 Employer survey of APS: Hard-to-fill vacancies

About 47% of respondents do not opine that recruitment differs in the **length of time** taken to fill a vacancy.

- Jobs requiring the least time to fill: Accounts, sales, human resources, audit associate (fresh graduates), junior audit, junior staff and operations.
- Jobs requiring the longest time to fill: Senior auditors/audit managers, lawyers, company secretaries and sales.

The key **reasons** for the inability to fill vacancies are attributed to quantitative and qualitative issues where there is a lack of applicants due to stiff competition from other employers; positions are considered too specialised; or applicants are found to be too demanding.

Conclusion: The shortage is mainly from the accounting or taxation sector. Most vacant positions require senior and managerial level.

Skill gaps

Proficiency levels: Deficiency in generic hard skills

- In a scale of one to five with five being highly proficient, current employees, on average, are relatively more proficient in soft and transferable skills (3.67) than in specific hard skills (3.33) and generic hard skills (3.29). At the lowest average scores of skills proficiency, generic hard skills seem to be sufficient for the needs of employers in terms of foreign language communication and advanced IT skills. In contrast, basic computer literacy or IT has the highest average scores of skills proficiency among generic hard skills (3.74). This shows that while the higher education system is able to produce workers with high competencies in basic computer skills, they still lack competencies in other languages such as Bahasa Malaysia and Mandarin, and advanced IT/software.

Positions where skills need the most improvement – accounts, tax and sales

- Accounting positions need the most improvement in soft skills such as problem-solving and communication skills; only 60% of current employees are fully skilled. Specifically, sales and business developers rate hired employees as fully skilled at 80%, although employees are still required to improve on industry knowledge, communication skills, strategic management and negotiation skills. In contrast, skill proficiency of employees in Audit seems to meet employers' requirement.

8.1.5 Moving forward: Future skill requirements

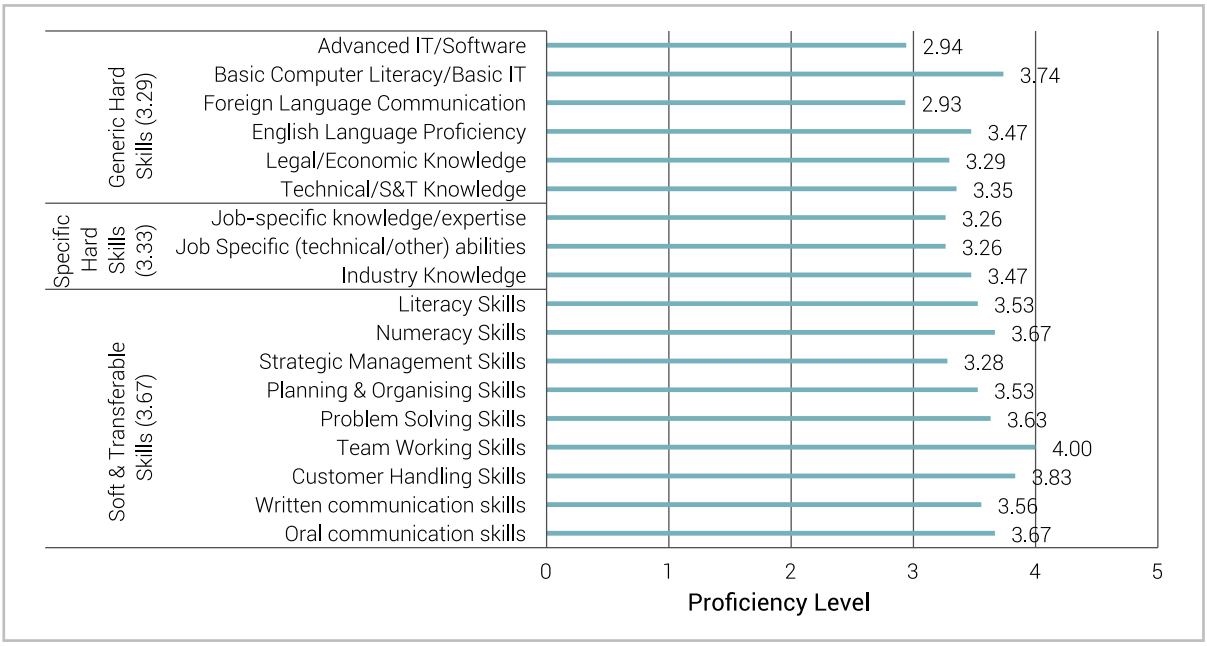
Acquiring new skills due to newly emerging tasks

- Current employees need to acquire new skills as a result of newly emerging tasks in the next 12 months. The emerging tasks are primarily attributed to "the development of new goods and services", "the introduction of new technologies", and "new legislative or regulatory requirements". Banking and finance services are likely to see new products and services emerging in the next 12 months. Meanwhile, new legislative and regulatory requirements are expected to influence corporate consulting, management and law firms.

Ability to meet future needs – soft and specific hard skills

- Most of the required soft skills will be met in the near future compared with specific hard skills. Specific hard skills include knowledge in Malaysian Financial Reporting Standard (MFRS)/Malaysian Private Entity Reporting (MPER), GST training, and legal knowledge, Real Property Gains Tax (RPGT) and big data analytics. Soft skills include problem-solving, communications, customer-handling and analytical skills. Additionally, positions in high demand in the next two years include **Programme Managers, Supply Chain Managers, Operations, Consultants and Senior Recruiters.**

Figure 8.5: The skills proficiency level of current high-qualified employees by types of skills



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

8.2 Global business services

8.2.1 Industry overview

Increasing presence in ASEAN market

- While Business Process Outsourcing (BPO) is still significant, Information Technology Outsourcing (ITO) and Knowledge Process Outsourcing (KPO) are the investment emphasis in the region, which target to create high value-added jobs.
- According to the 2017 Shared Services & Outsourcing Network (SSON), the global business services (GBS) establishments in Malaysia have grown more than three-fold since 2007. Specifically, Malaysia has the largest number of shared service centres (SSCs) in ASEAN, constituting about 36% of the total ASEAN SSCs. Philippines and Singapore come next, where they are respectively home to 32.8% and 20.6% of the total SSCs in the region.
- Malaysia leads in IT-related job functions, standing at about 46% of total SSCs in the ASEAN market. Within the functions, a total of 27.8% are located in Kuala Lumpur and 4.4% SSCs in Penang. This positive growth is attributed to the low cost of doing business, where utility costs are lower in Malaysia than Singapore and the Philippines.

A growing value-added shared services industry

- With MSC status, multilingual workforce and strategic location, Penang has attracted over 50 new GBS operations during 2005–2016, ranging from global knowledge management; finance, accounting and administrative processes to business analytics and IT system solutions. However, Penang remains far behind Kuala Lumpur as a GBS location of choice.
- As the second largest state contributing towards services investment after Kuala Lumpur, Penang's GBS industry has incrementally expanded in the past two years with approved investment projects proliferating from RM0.37 billion in 2015 to RM4.1 billion in 2016.

- Many firms build on competitive advantage of their existing manufacturing facilities by locating global shared services centres nearby. These include Citigroup Transaction Services, Intel, Jabil, Celestica and AMD. Third-party outsourcing is another form of GBS where third-parties provide services solutions to companies globally such as Thomson Reuters, IHS Markit and others.
- In April 2017, the state government announced the refurbishment of Mayang Mall in Bayan Baru into a GBS centre by January of 2018. Subsequently, "GBS by the sea" is the second phase of the project announced in May 2017. It is estimated to create at least 3,000 new jobs upon completion in 2020. The project is envisioned as an integrated centre for GBS, IT and R&D activities.

Industry composition and nature of operations

GBS can be classified into two sub-categories – shared services centre (SSC) and third-party outsourcing. The nature of business and operational activities are presented in Table 8.2.

8.2.2 High-qualified labour demand

GBS registers the largest number of high-qualified job vacancies advertised in the services sector. Out of 416 job vacancies, Dell Global Business Center has the highest number of vacancies in Penang (22.5%), followed by Jabil Global Business Center (15.4%), Celestica (11.5%) and Seagate IT Shared Resource Center (7.3%).

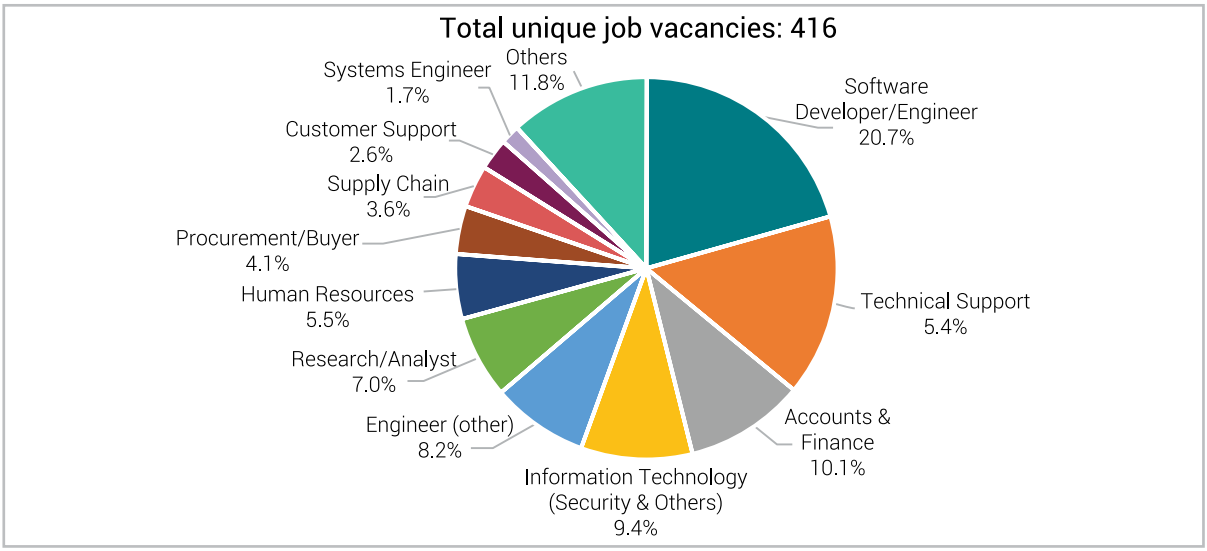
Software related functions – the key high-qualified positions

In tandem with the state's aspiration, GBS hiring pattern gears towards mid- to high- value-added business processes such as business analytics, system development and process management. Recruitment is widely concentrated in specialisations of BPO and ITO. Out of the 416 high-demand job vacancies, software developers/engineers constitute the largest share in this industry. This is then followed by technical support (15.4%), accounts and finance (10.1%) and IT (9.4%).

Table 8.2: Description of sub-industries of global business services (GBS)

Sub-industry	Key industry players	Business activities	Operational activities
1. Shared Services Centres (SSC)	AirAsia Global Shared Services, Atmel, Citigroup Transaction Services, Jabil (GBS), Wilmar Global Services, Dell Global Business Center, Seagate IT Shared Resource Centre, Celestica	BPO, GBS, Banking support & Processing	Transaction processing; IT; HR, Procurement; Refund operations; Credit control; technical support; call centre
2. Third-party Outsourcing	Thomson Reuters, Tricor Corporate Services, Resoft Synergy, Fusion Data, Mesiniaga Berhad	Risk management, corporate services	Scholar & scientific research, Risk management solutions, Payroll, Contenting, IT services, Infrastructure management

Figure 8.6: Major job titles advertised in global business services



Source: Vacancy database

GBS companies have the largest number of job vacancies across services sub-sectors. Out of the 416 vacant positions, 10.8% or 48 positions are high in demand. The characteristics of high-demand positions advertised are illustrated below.

Position level: Junior and senior executives

- Unlike other industries, GBS is recruiting heavily on junior and senior executive positions.
- Junior and senior executive positions make up 40% and 37.8% respectively of the high-demand vacancies, and the majority of the senior positions require at least five years of work experience.

Skill-specificity

- About 61% of high-demand job positions require specific hard skills.
- Candidates who apply for senior positions must equip themselves with specific skills.
- Software developers relatively need more specificity in skills and knowledge compared with other job positions whereas human resources require the least skill specificity.

Educational level: Bachelor's degree and professional certificate

- This industry primarily requires a minimum Bachelor's degree and/or professional certificate in the relevant fields of study specifically in accounts and finance, and software engineers/developers.

Highly sought-after skills: Soft skills

- In terms of highly sought-after skills, 82.2% of the high-demand vacancies require soft skills especially in relationship and services skills such as excellent communication skills and good team player.
- Soft skills are particularly important for junior positions (Figure 8.7).

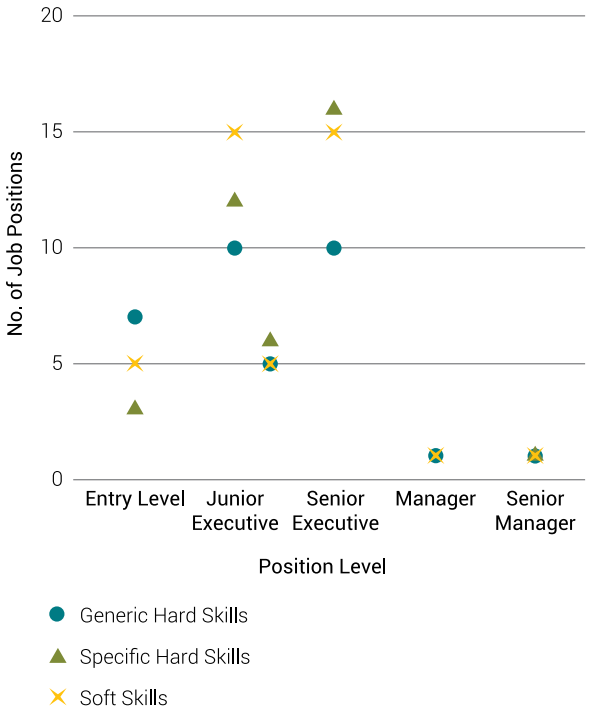
Generic hard skills: English language

- The majority of high-demand vacancies require proficiency in the English language.
- This is more prevalent in technical support positions.
- Additionally, legislative and regulatory awareness is highly required in research and human resources.
- Fluency in Mandarin and Bahasa Malaysia has absolute advantage in accounts and finance positions.

Average length of job postings: Exceeding three months

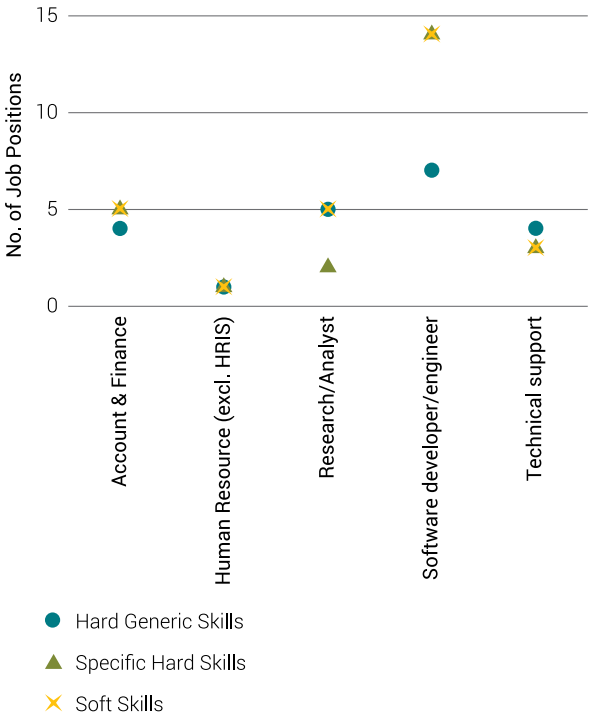
- For high-demand vacancies, GBS companies on average have the longest duration across manufacturing and services industries. The vacancies present as long as seven periods corresponding to 3.5 months.
- These vacancies include buyers, software developers and application management/business network analysts.
- This reflects business expansion in relation to demand, leading to continuous hiring.

Figure 8.7: High-demand jobs by types of skills and position levels



Source: Vacancy database

Figure 8.8: High-demand major job titles by types of skills



Source: Vacancy database

8.2.3 High-qualified labour supply

Supply characteristics

The supply source

- The labour recruitment activity is primarily focused on Penang, followed by other states in Malaysia. Recruitment encompasses primary, secondary and tertiary supply of high-qualified labour. Secondary supply – those who are employed – is relatively large, and tertiary supply is also needed when the required skills are not available in the domestic workforce. In general, firms focus on hiring fresh graduates and applicants with more than two years of work experience in high-qualified segments.

Abundance of job applications

- The majority of GBS firms receive close to 100 job applications for each job opening. Accounts and Finance vacancies have more than 100 job applications compared with IT-related vacancies (close to 50 job applications). Meanwhile, a small number of firms obtain as many as 300 applications per job opening.

Recruitment profiles

Reasons for recruitment: Replacement of employees and firm's expansion

- From the employer survey, the main reason contributing to job openings is replacement of employees who have left the company, followed by company expansion. This finding is consistent with the nature of high-qualified job vacancies advertised where about 47.8% of hard-to-fill vacancies are posted by existing companies to replace employees who have left; 17.4% of hard-to-fill vacancies are advertised by companies who are in the midst of expansion; and 34.8% are advertised by new companies.

Other recruitment channels: Employment agencies and employee network

- Apart from using JobStreet.com as a hiring platform, the majority of firms also use employment agencies and other online advertisements such as LinkedIn and employee network.

8.2.4 Human capital issues and challenges

Quantitative supply constraints

As for positions that require a longer duration to fill, 16.6% of vacant positions are open for more than two consecutive months; these are demarcated as persistent vacancies – or hard-to-fill vacancies. On average, the persistent vacancies take about 5.8 periods or equivalent to nearly three months. The characteristics of positions that require a longer duration to fill are described below.

Position level: Senior executives

- Nearly half of the persistent vacancies are constituted by senior executives followed by junior executives (33.3%) and entry-level (13%).
- The majority of job vacancies require at least five years of work experience (43.5%).
- Among the senior positions, software developers make up the largest proportion of persistent vacancies.

Hard-to-fill positions require more soft skills than specific hard skills but very little on generic skills

- About 87% of the hard-to-fill vacancies ask for soft skills while 76.8% require specific hard skills and 58% ask for generic hard skills.
- Soft skills are required in all job functions except technical support (Figure 8.9).
- In contrast to the high-demand vacancies, hard-to-fill vacancies mainly require relationship and service skills such as communication and interpersonal skills and good teamwork.

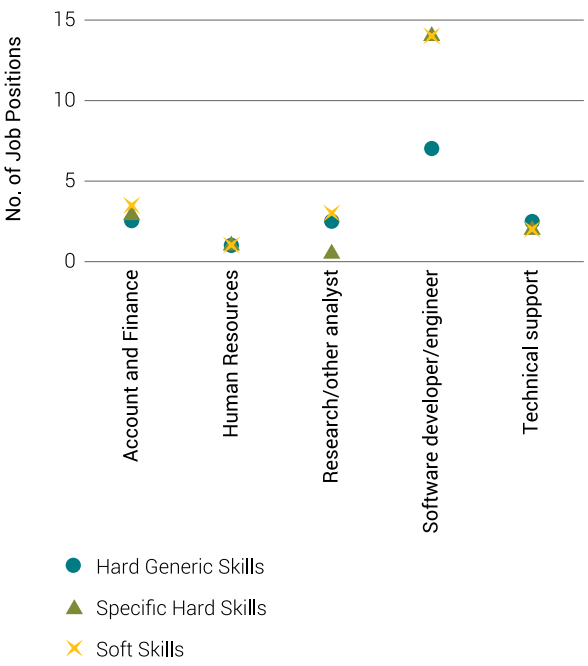
Job functions: Software developers

- Software developers form the largest hard-to-fill vacancies with about 33.7% taking 2.5 months to fill. This includes Software Developers – Google App Engine (GAE) Development and SAP PP and SD Functional Consultants.
- The top vacancies are then followed by accounts and finance (23.4%) with an average of nearly 3.5 months and researchers/analysts (19.4%), which advertise for 3.35 months.

English language proficiency

- About 41% of hard-to-fill vacancies require good command of the English language.
- In the GBS industry, most job positions require a higher degree of proficiency in verbal and written English.
- Software developers and technical support are the two main functions that demand a strong command of English.

Figure 8.9: Persistent job vacancies by types of skills and major job titles



Source: Vacancy database

Box 8.2: Employer survey of global business services: Hard-to-fill vacancies

A staggering 91% of respondents are of the opinion that there are differences in terms of the **length of time** taken to fill a vacancy.

- Jobs requiring the least time to fill: Junior accountant positions, finance, analysts, buyers, financial analysts, human resource, SAP (IT), workflow CRM (IT), infrastructure (IT), supply chain and other entry level positions.
- Jobs requiring the longest time to fill: Senior accountant positions, analytics, customer service, commercial cards, business command centre, risk & control/governance, product engineers, information technology, specialists in KYC, project management, finance (Thai and Japanese speaking) as well as maritime and trade.

Employers cite lack of applicants as of the key **reasons** for failing to fill vacancies as the positions are too knowledge- or skill-specific. Other reasons include unrealistic salary expectations and lack of experience. Due to hiring difficulties, employers are finding it challenging to meet the quality standards or customer services objectives.

Conclusion: High-qualified labour shortage is more likely to affect senior positions across all job functions, but IT-related functions concern junior and senior positions.

Partly prepared fresh graduates, and "satisfactory" skill integration among experienced hires

- Fresh graduates are partly prepared for the offered positions. Poor attitude is the reason contributing to this Most employers cite "good" skill integration among the experienced hires.

Skill gaps

Proficiency levels: Satisfactory in soft skills but not in generic and specific hard skills

- Unlike other industries, GBS shows a different perspective in skill deficiencies. In a scale of one to five with five being highly proficient, current employees are relatively more proficient in soft skills (3.28) than specific hard skills (3.15), and generic hard skills (3.19).
- While English language proficiency scores the highest at 3.27, higher skill deficiencies are found in foreign language communication than in English language and basic IT skills.
- Within soft and transferable skills, the ability to handle customers seems lacking, which is then followed by strategic management skills (3.1). Nevertheless, employers are satisfied with the teamwork skills, which are appraised at the highest score of 3.64.

Positions where skills need the most improvement – accounts and finance, research, and software programmers

- Data analysts/researchers need the most improvement in analytical skills where attention to detail and communication skills are lacking. Programmers need to enhance their skills in programming and IT such as SAP. Some employees in accounts and finance positions have to improve on soft skills such as communication, problem-solving, and teamwork skills.
- Two main reasons for low levels of proficiency: first, lack of experience/new to the company or business operation; and second, employees have inadequate on-the-job training.

Applicants' characteristics

- Some of the less favourable characteristics of applicants include: demand for high salaries and work flexibility, lack of preparation for interviews, lack of good communication skills and unwillingness to learn.

8.2.5 Moving forward: Future skill requirements

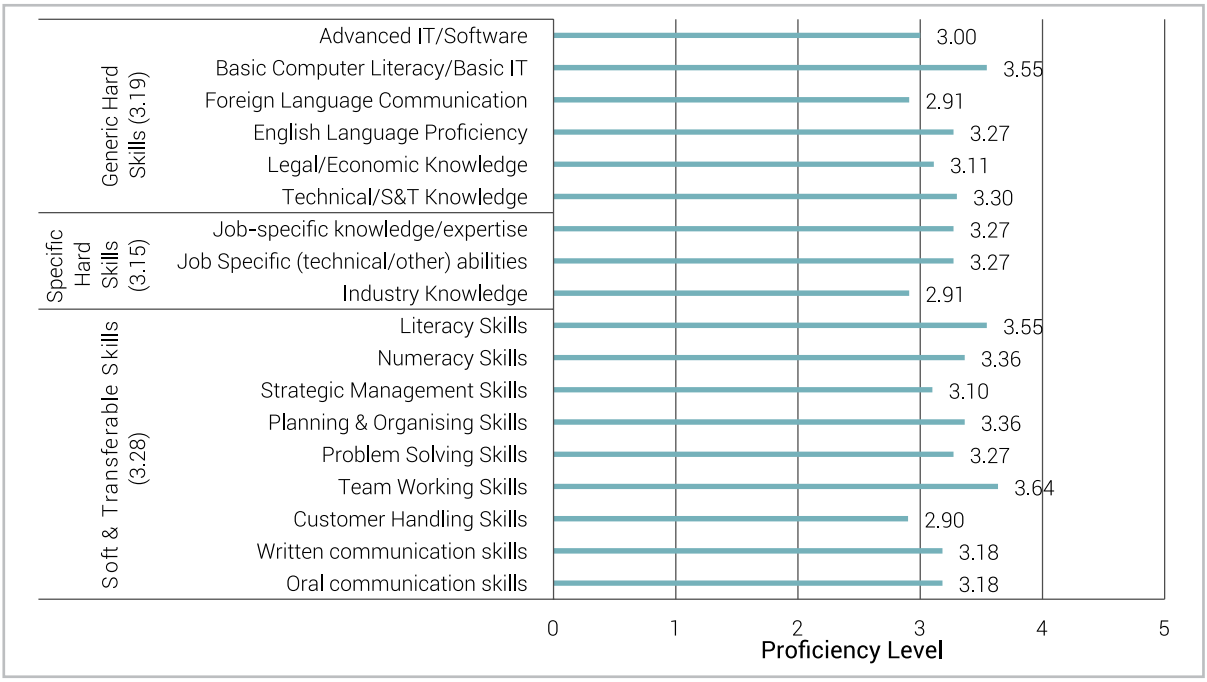
Acquiring new skills due to newly emerging tasks

- The main reasons for acquiring new skills, leading to newly emerging tasks in the next 12 months include "the development of new products and services" and "introduction of new technologies".

Ability to meet future needs – soft and specific hard skills

- The skills required can be classified into specific

Figure 8.10: The skills proficiency level of current high-qualified employees by types of skills



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

hard and soft skills. Specific hard skills include accounting, local interconnect network, advanced data analytics, system development, automation, process improvement, English language and ASP. Soft skills constitute communication skills, creative thinking, adaptability and public relations. All GBS firms are optimistic towards the ability to meet future skill requirements. Job functions that are in high demand in the next two years include **Analysts, IT Programmers and Finance (accountants)**.

8.3 Hospitality services

8.3.1 Industry overview

An industry that maintains income generation

- Penang continues to experience promising growth as one of the leading states in the tourism and hospitality services. This is evident during the financial crisis when the Malaysian economy suffers from currency depreciation. Domestic travels become more affordable.
- Based on the latest figures, Penang has received increasing attention from domestic visitors. In particular, the number of hotel guests in Penang grew by about 1.3% annually from 2011 to 2015 with domestic guests constituting more than half since 2013. By nationality, Indonesia, Singapore and China are the top three leading countries arriving via Penang International Airport during that period.
- Since the inception of Unesco World Heritage status, the number of hotel establishments have escalated from 2008 to 2015. The number of hotels doubled from 126 hotels in 2008 to 260 hotels in 2015 with the quantity of hotel rooms rising at 8.7% annually. This expansion offers more job opportunities in the hospitality services industry.
- Penang is also recommended by many international travel channels. These include CNN's "the second-best street food destinations"; Condé Nast's "The Best Places in the World to Retire", Yahoo Travel's "10 Islands to explore before you die" and many more.

Industry composition and nature of operations

Penang has nearly 200 hotels and resorts catering to a wide range of tourists and business travellers. Five star hotels include Eastern & Oriental Hotel, Equatorial Hotel and Shangri La Rasa Sayang Resort. Boutique hotels include Ren-I Tang Inn, Yeng Kang Hotel and The Campbell Times, to name a few. Budget hotels cover The Container Hotel and Kim Haus Loft. All hotels provide hospitality services along with food and beverages. Operational activities include accommodation, spa, entertainment, restaurants and banquet services.

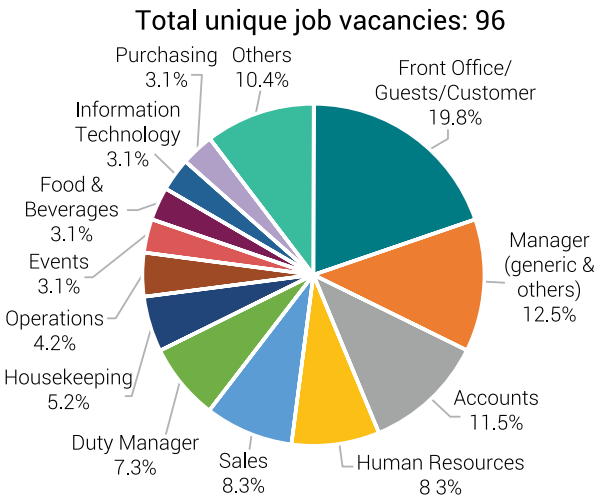
8.3.2 High-qualified labour demand

Out of the 96 job openings, Hotel Equatorial has the highest number of job vacancies in Penang, accounting for 15.7% of the total job vacancies in this industry followed by Glow Hotel (7.1%) and Clans Hotel (6.1%).

Customer-related positions – key functions recruiting in hospitality services industry

The hiring is in large part in job function of front office/ guests/customers. Customer service officers, front office assistance and hotel managers are the typical positions advertised in this function. These job functions make up nearly 20% of job vacancies advertised, with 12.5% constituting managerial positions. This is then followed by accounts (11.5%), human resources (8.3%), sales (8.3%) and duty managers (7.3%).

Figure 8.11: Major job titles advertised in hospitality services

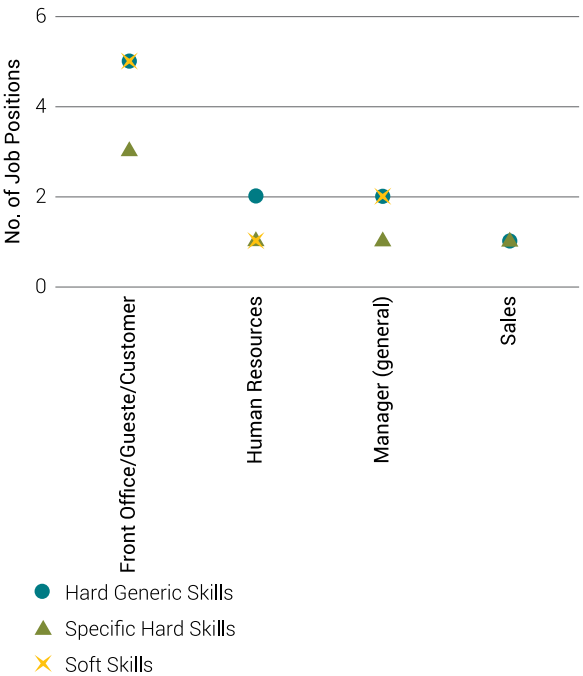


Source: Vacancy database

Figure 8.12: High-demand jobs by types of skills and position levels

Source: Vacancy database

Figure 8.13: High-demand jobs by types of skills and major job titles



Source: Vacancy database

About 18.8% of high-qualified positions are high-demand. The characteristics of these vacancies are illustrated below.

Position level: Junior executives and managers

- Recruitment in the hospitality services presents different perspectives where it is more prevalent at junior executives as well as managerial positions.
- Managerial positions are widely needed in sales and marketing, front office/customer services and human resources while junior positions are largely seen in accounts and finance.

Skill-specificity: Accounts and Finance

- Unlike other industries, specific skills are the least required skills by hotels in Penang.
- Among others, accounts and finance seeks specific skills in Opera System, cost accounting and revenue management system.

Educational level: Diploma and above

- This industry primarily shortlists candidates who possess at least a Diploma and above. Only front officers and customer service officers along with managerial vacancies require graduates in tourism, hotel management and hospitality services.

Highly sought-after skills: Generic hard skills

- Recruitment in the hospitality services places the importance of generic hard skills across all levels of job positions and job functions, registering a high 89% of the high-demand vacancies requiring generic hard skills (Figure 8.12 and Figure 8.13).
- Fluency in multi-languages including local dialects is highly demanded across all job positions except generic managerial positions.

Soft skills: Relationship and service

- A total of 78% of positions require fluency in communication, with including attributes such as keen learner and excellent team player.
- These are especially important for customer-related positions such as front office and guest relations.

Average length of job postings: nearly two months

- Hospitality services record the shortest length of job postings among the entire industries.
- On average, high-demand vacancies are posted for nearly two months. However, a typical job vacancy posts for only one month.
- The high-demand vacancies include Event Managers, Front Office Associates and Guest Relations Officers.

8.3.3 High-qualified labour supply

Supply characteristics

The supply source

- Hotel establishments aim to hire applicants with or without work experience. They recruit workers from Penang as well as other parts of Malaysia. Given the rise in the number of hotel establishments, some firms import foreign workers to fill job vacancies that have limited supply locally such as front officers and guest relations.

Relatively low number of job applications

- On average, the majority of hotel establishments receive not more than 50 job applications for each job opening advertised. While it is rarely encountered by hotel establishments in Penang, some prominent establishments would receive over 100 job applications for each job opening compared with their counterparts. According to JobStreet.com, the average number of job applications in the hospitality and F&B industry is 126 in Malaysia.

Recruitment profiles

Reasons for recruitment: Replacement of employees and firm's expansion

- From the employer survey, job openings are mainly attributable to the replacement of employees who have left the company. Company expansion comes next. This seems sensible when there is growing number of new hotels located in the region. As the labour market continues to tighten, employers are increasingly concerned about maintaining a stable workforce as they are vulnerable to competitive forces.

Other recruitment channels: Employee network

- Apart from using JobStreet.com as a hiring platform, hotels also recruit workers through employee network. Word-of-mouth advertising continues to be the most effective practice and the quickest method in recruitment.

8.3.4 Human capital issues and challenges

Quantitative supply constraints

Only front office takes a longer duration to fill (hard-to-fill vacancies)

The hospitality services industry has the lowest number of hard-to-fill vacancies. Only three vacancies are hard to fill, with advertisements posted for not less than six periods or three months. These positions include front office assistants, front office managers and guest relations officers. This also implies the lack of front officers in the hotel industry. In terms of required skill-set, candidates must have good written and spoken English and Bahasa Malaysia and able to communicate in multiple languages, namely Mandarin and Japanese.

Box 8.3: Employer survey of hospitality services: Hard-to-fill vacancies

A majority of the hotels believe that the **length of time** taken to fill a vacancy differs across job functions as following.

- Jobs requiring the least time to fill: Chefs and receptionists.
- Jobs requiring the longest time to fill: Sales including managers and marketing managers, as well as front office managers.

A large number of **hard-to-fill** vacancies come from departments that have high customer interaction. For example, food and beverage (F&B) managers, front office, duty managers, housekeepers, sales and hotel managers. The industry faces difficulty in filling various chef positions including sous chef, pastry and station chef.

Only a small 22.2% of employers succeed in filling all the vacant positions. Key **reasons** for the inability to fill vacant positions are attributed to lack of applicants; stiff competition from other employers, mismatch of educational qualifications, skill gaps, and lack of experience. As a **consequence**, 55.6% experience increased operating cost and have difficulties meeting quality standards. Besides these, other key implications cited are difficulties in introducing new working practices (44.4%) and increased workload for other staff (33.3%).

Conclusion: These hard-to-fill positions vary across job functions and job levels with the most common positions being senior executives.

Well-prepared inexperienced workers, and "good" skill integration among experienced hires

- Interestingly, a majority of hotel operators believe that inexperienced workers are well-prepared for the offered positions. However, only a small number of hotel operators cite poorly prepared inexperienced workers with poor attitude and lack the required English language skills. With reference to experienced hires, most employers are satisfied with their skills integrating into the establishment.

Skill gaps

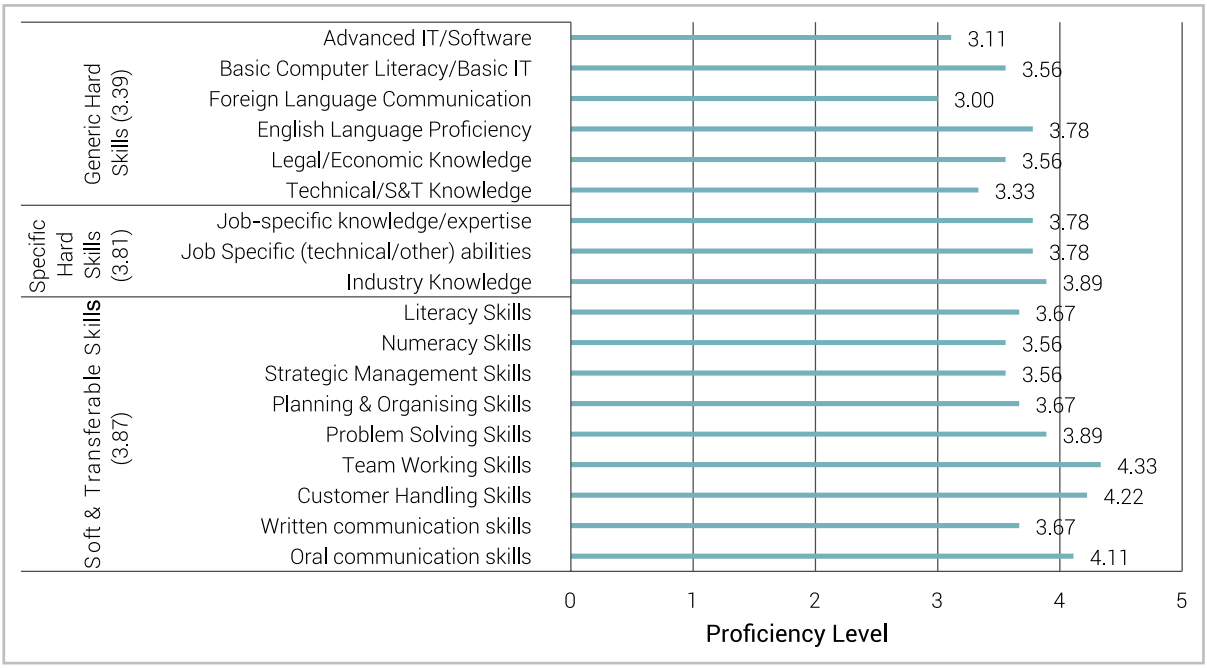
Skill deficiencies: Less satisfactory in generic hard than specific hard and soft skills

- Skill deficiencies are more prevalent in generic hard skills than specific hard and soft skills. Given the scale of one to five with five being highly proficient, generic hard skills score the lowest at 3.39 followed by specific skills (3.81) and soft skills (3.87).
- Among the generic hard skills, foreign language communication and advanced IT literacy are less satisfactory compared with English language proficiency, basic IT and economic knowledge.
- All specific hard skills seem to be sufficient for the needs of employers with industry knowledge being rated as the highest, scoring at 3.89 while job-specific knowledge and technical abilities are rated at 3.78 by employers.
- Within the categories of soft skills, employers rate their employees beyond proficiency in teamwork, customer-handling and oral communication skills.

Positions where skills need the most improvement – managerial positions

- Skill deficiencies are more evident in managerial positions. Managers in general are required to enhance their knowledge in hospitality management skills, training, planning and problem-solving skills; about 70% of current employees are fully skilled. Specifically, human resource managers need to improve on problem-solving and communication skills; Food and beverages (F&B) managers have to enhance leadership and communication skills; and sales managers need to upgrade their persuasive communication skills. Two main reasons for the low levels of proficiency: lack of experience/ new to the company or business operation; and employees are not sufficiently motivated.

Figure 8.14: The skills proficiency level of current high-qualified employees by types of skills



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

8.3.5 Moving forward: Future skill requirements

Acquiring new skills due to newly emerging tasks

- A majority of firms indicate that employees should expect new tasks in the next 12 months due to "the development of new product and services" and "new technologies and equipment". Room reservation procedures may undergo upgrading process that will elevate operation efficiency. New promotional packages for room reservation may change over time and hotel employees are required to learn new policies.

Ability to meet future needs – hard and soft skills

- Soft and hard skills are the prospective skills needed in the future. Hospitality service providers project that prospective skills are able to meet future needs, which include hard skills (English, mobile reservation skills, IT skills, international standard services and technical skills) and soft skills (marketing skills, creativity, leadership and customer-handling skills). Besides that, jobs in high demand in the next two years include **Managers, Chefs and Technicians**.

8.4 Medical tourism

8.4.1 Industry overview

The most promising services industry in Penang

- Penang has emerged as the key medical destination in the region for decades. Despite the fact that it has about 10 private hospitals, it attracts nearly 80% of the total medical tourism in the country with Indonesians dominating the highest number of medical tourists, followed by Japanese, Britons, Americans and Australians.
- Penang tops the list in medical tourism as it has a complete eco-system in place: excellent hospitals, an end-to-end service and an active medical tourism association.[65]
- In addition, several expansion plans have been lined up. Sunway Medical Centre has announced plans to expand two new hospitals in Penang within the next five years from 2017.[66] Besides, a Syariah-compliant hospital is expected to be in operations by early 2020 in Bayan Baru. The Penang Islamic Hospital will cost RM280 million, and will be operated

[65] The Business Year (TBY, 2017). *Healthy Destination*. VIP Interview with CEO of Malaysia Healthcare Travel Council, Health and Education. Retrieved from https://www.thebusinessyear.com/malaysia-2017/healthy-destination/vip-interview
[66] The Star Online (2017, June 14). *Sunway to inject up to RM1billion healthcare business*. Business News. Retrieved from http://www.thestar.com.my/business/business-news/2017/06/14/sunway-to-inject-up-to-rm1bil-into-healthcare-business/

by the An-Nur Specialist Hospital in Selangor.

- Furthermore, Penang aims to reinforce its position as a medical city. Island Hospital has invested in an Island Medical City project worth RM2 billion in which it will expand its current bed capacity by double, thus making it the first 600-bed private hospital in Penang. The project is expected to take five years to complete and will create approximately 2,000 job opportunities for locals in addition to attracting local medical practitioners back to Penang to set up long-term practices.

Industry composition and nature of operations

To date, there are 11 hospitals in Penang. These include Adventist Hospital, Gleneagles, Island Hospital, Loh Guan Lye Specialist Centre, and among others Infokinetics. Most of these hospitals are private healthcare and clinical outsourcing. Operational activities may include clinical and non-clinical, healthcare and education (teaching hospital).

8.4.2 High-qualified labour demand

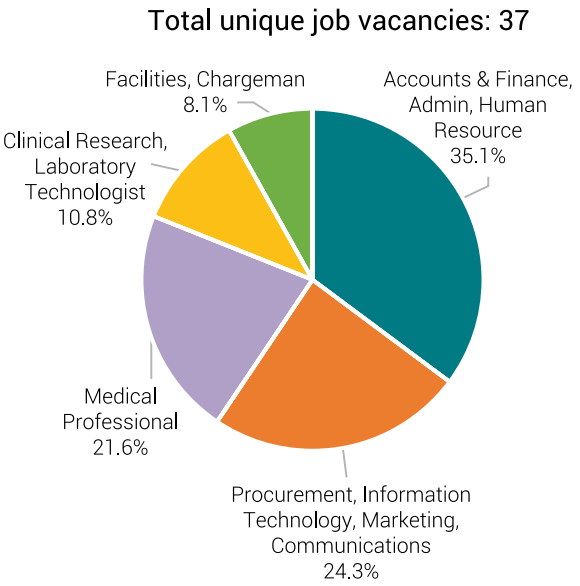
This industry has the least number of job openings across the services sub-industries. Out of 37 job openings, Bagan Specialist Centre has posted the largest number of job vacancies where it makes up 41.1% of the total job vacancies, followed by Island Hospital (31.1%) and Penang Adventist Hospital (6.7%).

Non-medical positions – key high-qualified workers needed

Recruitment in the medical tourism industry focuses mainly on non-medical positions pertaining to support services functions. These include accounts and finance, human resources, procurement, information technology and marketing, which represent nearly 60% of the total jobs advertised in this industry. Recruitment for medical professionals on the other hand constitutes nearly one-fifth of the total vacancies. These are Embryologists, Nurses, Sonographers, Optometrists and Medical Officers.

Meanwhile, clinical research and laboratory technologists are the next favourable medical-related positions advertised by hospitals in Penang. The functions involve Medical Laboratory Technologists, Clinical Research Assistant Managers and Clinical Study Coordinators.

Figure 8.15: Major job titles advertised in medical tourism

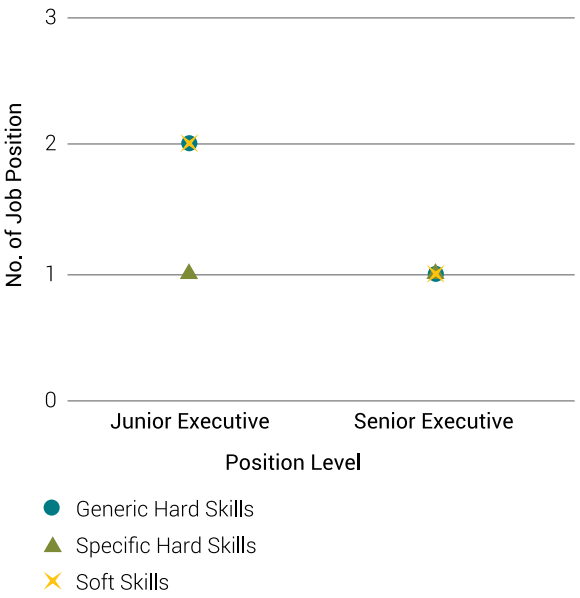


Source: Vacancy database

Human resources, nurses and pharmacists – high-demand vacancies

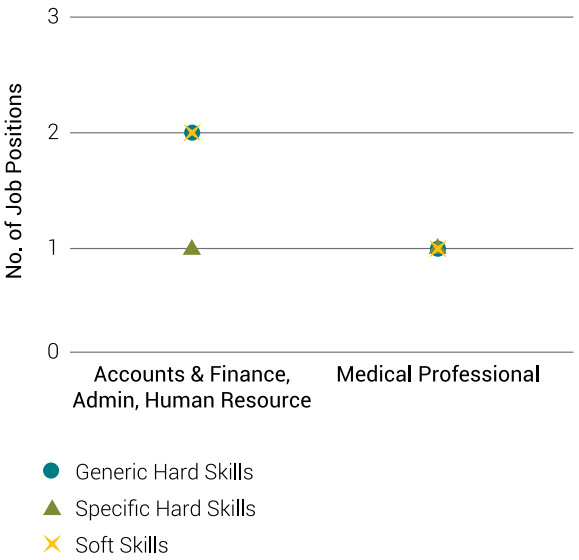
Medical tourism has the smallest number of job openings across all industries. A total of 37 job openings are advertised through job portal. Of this, only 10.8% or four positions are high in demand. These include medical and non-medical positions. Hospitals recruit medical positions (pharmacists and staff nurses) at senior level while recruitment for non-medical positions (human resources) involves junior level. Specifically, staff nurses require basic qualifications in ICU/CCU/Emergency and trauma care with at least two years of work experience. Meanwhile, candidates applying for non-medical positions must be familiar with current labour regulations in Malaysia as well as any regulations related to employment such as EPF Act, SOCSO, income tax and HRDF; must be able to communicate in Bahasa Malaysia and English, and have high tolerance for stress. These positions are posted for about two and a half months.

Figure 8.16: High-demand jobs by types of skills and position levels



Source: Vacancy database

Figure 8.17: High-demand major job titles by types of skills



Source: Vacancy database

8.4.3 High-qualified labour supply

Supply characteristics

The supply source

- The healthcare services firms prioritise their recruitment on local high-qualified workforce throughout Malaysia. While the high-qualified workers could be sourced directly from other countries, this is more prevalent in nurses than other medical professionals where the nurses are already trained within the healthcare services firms in Penang.

The lowest number of job applications

- Among all services sub-sectors, this industry receives the lowest number of job applications for each job vacancy advertised in which an average number of not more than 20 job applications are obtained for each job opening. In this relation, the low number of job applications could be due to the rise of brain drain where local nurses are recruited by healthcare services in the Middle East countries due to competitive remuneration package.

Recruitment profiles

Reasons for recruitment: Firm's expansion

- It is evident that job vacancies in firms are primarily attributable to the expansion of company activities. As we can observe, Adventist Hospital, Island Hospital, Loh Guan Lye Specialists Centre and Gleneagles have vastly expanded the physical facilities implying more jobs are created.

Other recruitment channels: Employee network and newspaper advertisements

- To speed up the recruitment process, healthcare services firms embark on various recruitment avenues. The majority of firms also use employee network, newspaper advertisements and employment agencies to source potential applicants. Newspaper advertisements are also more popular in this industry than many other industries.

8.4.4 Human capital issues and challenges

Quantitative supply constraints

Only human resources and pharmacists take a longer duration to fill (hard-to-fill vacancies)

The recruitment challenges plaguing this industry are less severe than other industries. From the job vacancies advertised, only two are found to be hard to fill with positions being posted slightly over two months. These two hard-to-fill positions are human resources and pharmacists at junior level. Besides being registered with the Malaysian Pharmaceutical Board, applicants for pharmacist positions must possess soft skills such as good interpersonal skills, computer literacy, and purchasing and inventory management skills.

Box 8.4: Employer survey of medical tourism: Hard-to-fill vacancies

A job vacancy can take a varying duration to fill compared with another job vacancy. Vacancies that take the shortest time and the longest time to fill are summarised below.

- Jobs requiring the shortest time to fill: Administrative clerks, physiotherapists, dieticians and pharmacists.
- Jobs requiring the longest time to fill: Management positions and nurses.

Hard-to-fill positions require some knowledge of technical know-how, indicating the need for specific skills and experiences. Some of the hard-to-fill positions are related to clinical operations, nursing (operations) and sonographers. It is to be noted, the position of sonographer cuts across both junior and senior positions.

Among the key **reasons** employers are unable to fill vacant positions include stiff competition from other employers, positions are considered too specialised, and applicants have unrealistic demands and expectations. It is observed that 75% of the respondents have not succeeded in filling such positions. As a **consequence**, 75% experience increased operational cost, increased workload for other staff, delays in developing new products or services and difficulties in meeting customer service objectives.

Conclusion: Shortages in medical tourism hover around the high skill nature of the industry.

Partly prepared fresh graduates and "good" in skill integration among experienced hires

- It is understood that not all filled positions completely meet job requirements in advertisements. Lack of English language skills and poor attitude are two reasons for the dismal work performance among fresh graduates. However, this is minimal. Experienced hires on the other hand integrate their skills relatively well in the establishment.

Applicants' characteristics

- The less favourable behavioural traits of high-qualified employees are similar to that of employees in many industries, which include: demand for high salary, request for time flexibility and unsatisfied attitude.

Skill gaps

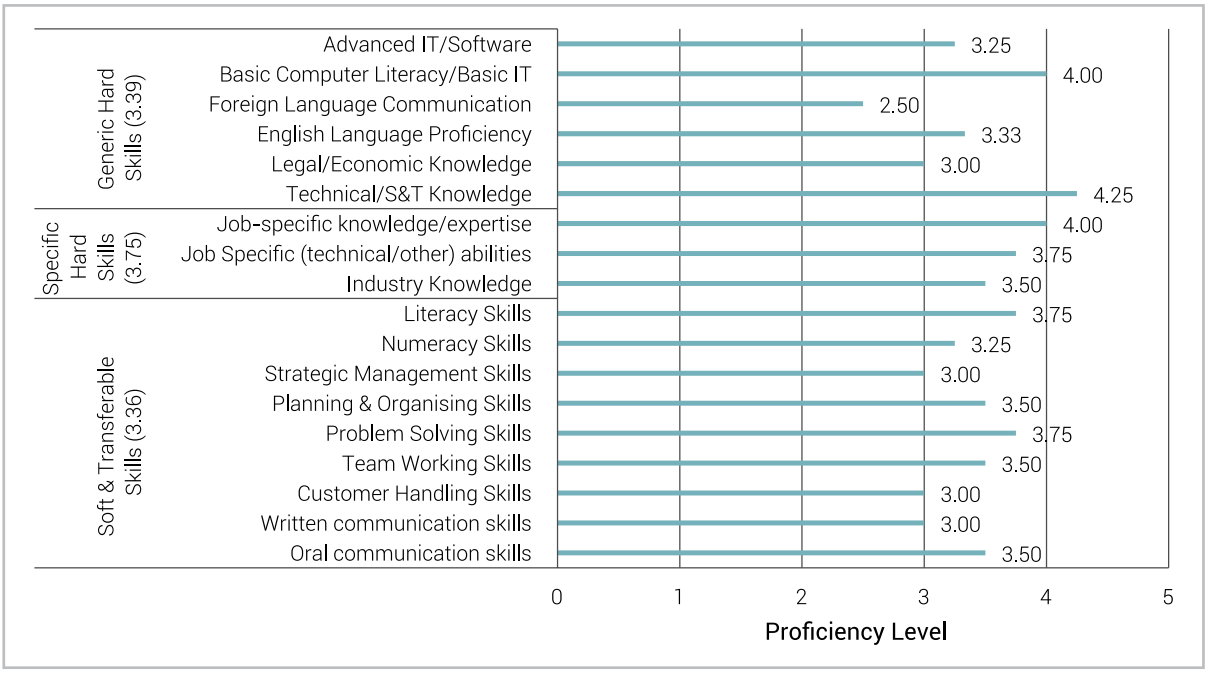
Skill deficiencies: Less satisfactory in generic hard skills than soft skills and specific hard skills

- Skill deficiencies are more prevalent in generic hard skills than soft and specific skills.
- All specific hard skills seem to be sufficient for the needs of employers with job-specific knowledge, scoring at a higher rate than industry knowledge.
- Among the generic hard skills, current employees should put in more effort to improve on foreign language communication, legal knowledge and advanced IT compared with basic computer literacy and technical knowledge being less problematic.
- In terms of soft skills, skill deficiencies in strategic management, customer-handling and writing skills are more prevalent than planning and organisational, problem-solving and communication skills.

Positions where skills need the most improvement – nurses, pharmacists and scientists

- Skill deficiencies in the medical tourism industry is in fact less prevalent than other industries. The employer survey reveals that at least 90% of current employees fully meet the ideal skill-set. This refers to nurses, pharmacists, chemists, scientists and research physicians. Nevertheless, employers state that some nurses would need to improve on soft skills, attitude and passion.

Figure 8.18: The skills proficiency level of current high-qualified employees by types of skills



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

8.4.5 Moving forward: Future skill requirements

Acquiring new skills due to newly emerging tasks

- Current employees need to acquire new skills in anticipation of newly emerging tasks in the next 12 months. Reasons for the emerging tasks are due to "the development of new products and services" and "the introduction of new technology". New pharmaceutical products and medical technology are certainly areas in which employees can acquire new skills.

Ability to meet future needs – soft and technical skills

- The prospective skills needed in the future concern soft and technical skills. These skills include leadership, lab testing skills and strategic management skills. Firms predict that the required needs will be met in the near future. Meanwhile, positions in high demand in the next two years include **Nurses and Clinical Operation**.

8.5 Information technology

8.5.1 Industry overview

Key economic catalyst gearing towards digital economy

- The Information Technology (IT or info-tech) industry is presently identified as the key economic catalyst in Malaysia. The 11th Malaysia Plan 2016–2020 has set to achieve the industry's GDP contribution of 17% by 2020, a 7% increase from the 10th Malaysia Plan 2011–2015.
- Industry 4.0 may become instrumental in shaping Penang's IT industry by bringing it to the forefront of the development of manufacturing technologies as the Internet of Things (IoT) and Big Data Analytics (BDA) stand out.
- The potential of IoT and BDA in the manufacturing sector is huge. It is forecast that by 2019, more than 40% of global devices and connections will be

contributed by machine-to-machine connections (MGI, 2016).

- The IT industry has the potential to grow global microenterprises through e-commerce (MGI, 2016). Taking note of this, Malaysia recently launched the world's first Digital Free Trade Zone (DFTZ), which will act as a clearing facility meant to boost e-commerce participation among small and medium enterprises (SMEs).
- Despite the potential and developments in this sub-sector, one major concern has been the lack of relevant local talent, particularly data scientists and programmers in relation to this subsector. The ASEAN Data Analytics Exchange (ADAX) is introduced by MDEC to address the shortage of data professionals. In addition, specific programmes are being tailored within the Malaysian education system. For example, the Penang Skills Development Centre (PSDC) has recently initiated certification programmes that aim to support companies to transition from Industry 2.0 to Industry 4.0.

Industry composition and nature of operations

This industry consist of four branches, which include information and communications Technology (ICT), multimedia production, advertising and graphic design, and web-hosting. The nature of business and operational activities are presented in Table 8.3.

8.5.2 High-qualified labour demand

Penang's IT firms post 278 job vacancies. Of this, Zebra Technologies has the largest number of job vacancies where it makes up 12.1% of the total job vacancies followed by Easibook (6.6%) and Toshiba Tec Malaysia (4.2%).

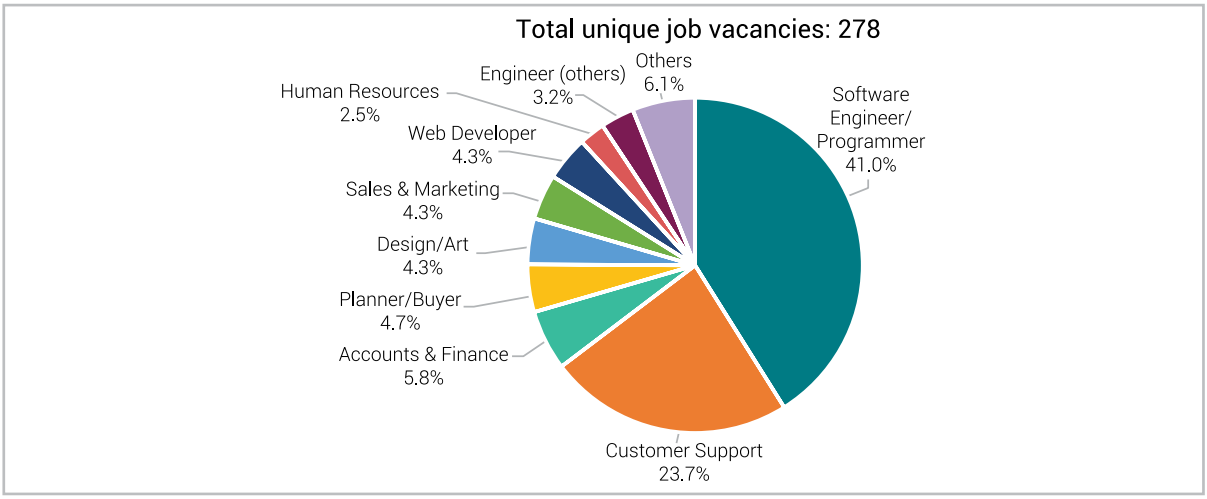
Software Engineers/Programmers – the key scarceness functions

IT industry is the services sub-sector that has posted the second-largest number of high-qualified job vacancies in the market after GBS. A total of 278 job vacancies have been posted from January to June 2016. Of this, software engineers/programmers constitute 41% followed by customer support (23.7%), and accounts and finance (5.8%). This vacancy composition also reflects the scarcity of skilled labour in the core IT-related functions whereas the recruitment for non-IT-related functions, which are related to business support services (accounts and finance, buyers, human resources, sales and marketing) are comparatively much smaller than core IT functions.

Table 8.3 Description of sub-industries of information technology

Sub-industry	Key industry players	Business activities	Operational activities
1. Information and Communications Technology (ICT)	Piktochart, Brightree Solutions, Weaver Orb, Green Room, MCSB Systems (PG)	Template service, Infographic software services, IT outsourcing, E-commerce software provider, Web & mobile apps	SAP consulting, Engineering, HTML-publishing, Training, Outsourcing, Software support, R&D Operation and support service, Programming apps
2. Multimedia Production	Image Farm Production, Akeetoons, Soundmaker Studio, Kakitoon Animation	Corporate video	Video editing, Video directing, administration
3. Advertising, Graphic Design, Media/Design	Emanon, J Print Studio, Shinaji, Aeiou Studio, Go Graphics, IS Eleven	Graphic design, Web design, Event management, Advertising, Branding, Design & printing	Graphic design, Web design, Service, Event management
4. Web-hosting & Other web-related services	SiteGiant, Rapidcloud (M), Eko Solution, Exabytes Networks, Operion	E-commerce platform (online shopping; connect to market access)	R&D activities

Figure 8.19: Major job titles advertised in information technology

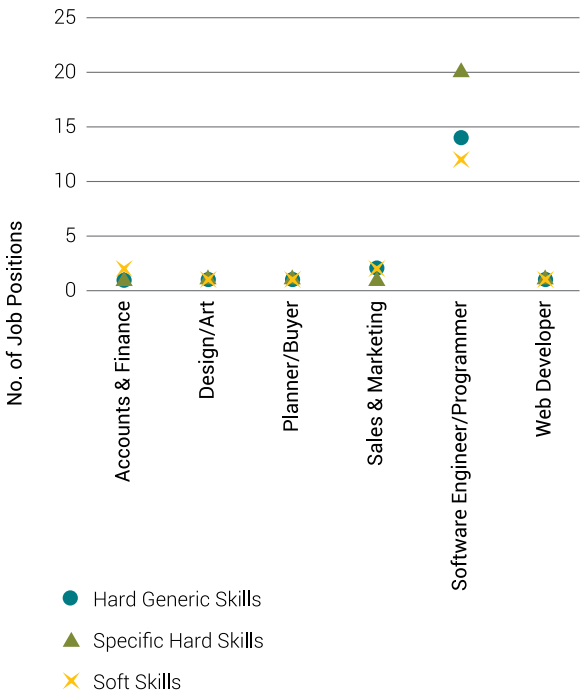


Source: Vacancy database

Figure 8.20: High-demand jobs by types of skills and position levels

Source: Vacancy database

Figure 8.21: High-demand jobs by types of skills and major job titles



Source: Vacancy database

As the second largest number of job openings in the services sub-sector, digital industry focuses on recruitment of junior high-qualified employees. Out of the 278 high-demand job openings, nearly 15% of the advertised vacancies are frequently posted by info-tech companies. The characteristics of these high-demand vacancies are illustrated below.

Position level: Entry-level and junior executives

- Over half of the high-demand job vacancies search for entry level and junior executive positions.
- A majority of these positions require no less than two years of work experience.

Soft skills: Achievement skills

- Nearly 57% of the high-demand positions require achievement skills.
- Similarly, soft skills are equally important as the position level goes higher.
- Candidates who are self-motivated, proactive and result-oriented are more likely to be considered for software programmers, technical support, accounts and finance, planners and buyers, and sales and marketing.

Educational level: Bachelor's degree for all positions except technical support

- The IT industry mainly focuses on recruiting candidates with Bachelor's degree except technical support.
- Computer Science and Information Technology are the typical educational qualifications required.
- Some job vacancies do not state the education required but emphasise more on relevant work experience.

Highly sought-after skills: Specific hard skills

- For high-demand vacancies, 78.6% require specific hard skills especially at entry-level and junior executive positions (Figure 8.20).
- For example, software engineers/programmers require more specific skills than the rest of the job functions. These skills include knowledge in programming language such as C#, Java Script, WebLogic and mobile operating systems such as Android and Windows CE etc.

Generic hard skills: Non-English languages are as important

- Although English language is a must-have skill across IT positions, fluency in Bahasa Malaysia and Mandarin is also important. These requirements are more evident in smaller local firms and MNCs.
- Nearly 60% of the high-demand vacancies prefer candidates who are able to communicate in Bahasa Malaysia and Mandarin.
- Meanwhile, few technical support positions require candidates who can speak Thai and Korean.

Average length of job postings: Exceeding two months

- The IT industry takes the second-longest time to fill high-demand vacant positions after GBS.
- While the industry itself advertises an average of 2.4 periods – slightly more than one month to fill the vacancies, the high-demand job postings can stay longer than two months.
- A few specific software developer positions take as long as four months.

8.5.3 High-qualified labour supply

Supply characteristics

The supply source

- IT firms recruit experienced and inexperienced hires through various sources of supply. For junior executive vacancies, inexperienced hires are primarily drawn from Penang talent pool, followed by talent from other parts of Malaysia. For senior executive positions, the majority of firms consider applicants from other states in Malaysia as well as abroad, if firms have sufficient resources.

Abundance of job applications

- On average, the majority of firms obtain over 100 job applicants for each job opening. Nevertheless, some prominent IT firms receive an average of over 200 job applicants. This result is consistent with JobStreet.com analysis, where the average number of job applications for computer and IT is 122 in Malaysia.

Recruitment profiles

Reasons for recruitment: Firm's expansion

- Company expansion turns out to be the main reason for the recruitment in most IT companies. Only a small number of them recruit new employees due to replacement of employees who have left the company. This implies that the job market in IT industry is relatively volatile.

Other recruitment channels: Employee network

- Similar to other firms, the majority of the firms embark on employee network as an alternative

avenue to recruit high-qualified employees. Some firms incentivise employees to disseminate information pertaining to available job vacancies. This could help employers to reduce the time taken for recruitment, and at times, the best candidates can be gathered through this channel.

8.5.4 Human capital issues and challenges

Quantitative supply constraints

A total of 12% hard-to-fill vacancies have been reported from the IT industry. On average, the persistent vacancies have taken about 5.5 periods – equivalent to more than two months. The detailed characteristics of hard-to-fill high-qualified positions are presented as follows.

Position level: Junior executives

- Recruitment is highly dispersed at junior positions and the majority of them are advertised by small companies with a headcount of no less than 50.
- Likewise, candidates with less than two years work experience are preferable.

Technical support takes a longer time to fill than others

- About 15% of the vacant positions in technical support and software developers have taken more than two months to fill.
- C# and ASP.Net Developer are advertised for three consecutive months while .Net Software Engineer takes about 4.5 consecutive months.

Most affected skills: Specific skills

- Due to the advent of digital technology, some skill requirements are rather job-specific. The skills could be new in the workforce, and expertise could be lacking given the stiff competition.
- Among the persistent positions, 76.5% ask for requirement in specific skills followed by soft skills (73.5%) and generic hard skills (67.6%).

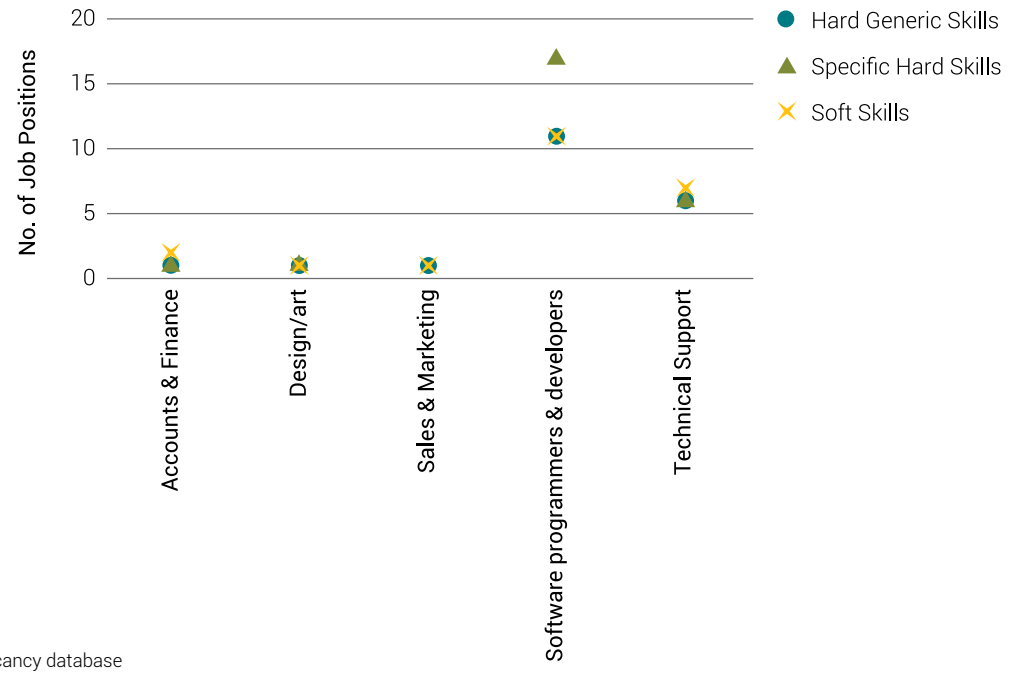
Foreign language is the hard-to-fill hard skills

- About 56% of the hard-to-fill vacancies require good command of foreign languages.
- In the IT industry, positions in technical support and software programmer look for English proficiency along with other languages such as Mandarin and Thai.

Partly prepared inexperienced hires, and "good" skill integration among experienced hires

- From the employer survey, not all advertised positions that have been successfully filled fully meet job requirements in advertisements. Specifically, fresh graduates are partly prepared for the offered positions. Lack of hard and soft skills are the reasons for this.

Figure 8.22: Persistent vacancies by types of skills and major job titles



Source: Vacancy database

- As for the integration of experienced hires in the establishments, most firms are satisfied with the skills brought by the experienced hires.

Skill gaps

Skill deficiencies: Less satisfactory in soft skills than hard skills

- Skills proficiency rate above average across all types of skills. Within the industry, skill deficiencies relatively concern soft skills rather than hard skills.
- All specific hard skills seem to be sufficient for the needs of employers who are more on job-specific knowledge and technical abilities than industry knowledge.
- Among the generic hard skills, it is reasonable to find basic computer literacy and advanced IT/ software skills outperform in this industry. Skill deficiencies are more prevalent in economic knowledge and English language proficiency.
- Within the categories of soft skills, team working skills have outperformed written and oral communication skills and customer-handling skills.

Positions where skills need the most improvement – software programmers

- Skill deficiencies are evident in software programmers. Employees are required to be alert to new technologies and be proactive to learn new programming skills such as JavaScript, ruby on rails, Angular2, web programming, etc. They also need to improve on project management and communications skills.
- Two main reasons for the low levels of proficiency: first, proficient and experienced employees leave for other companies; second, rapid technological changes, making it difficult to keep pace.

Applicants' characteristics

- The less positive traits of high-qualified employees include: high salary expectations, lack of passion, insufficient practical and industry knowledge, and undesirable attitude.

8.5.5 Moving forward: Future skill requirements

Acquiring new skills due to newly emerging tasks

- Current employees need to acquire new skills in anticipation of newly emerging tasks in the next 12 months. There are several reasons entailing the emerging tasks. This is mainly attributable to the "introduction of new technologies", followed by the "development of new products and services". This is sensible in this industry as digital technologies keep evolving and new products and services are expected to emerge within a short time.

Box 8.5: Employer survey of IT industry: Hard-to-fill vacancies

Only a small proportion of respondents has found the different **time length taken** to fill a vacancy.

- Jobs requiring the least time to fill: Sales and marketing, programmers and technical support.
- Jobs requiring the longest time to fill: Programmers, designers and UI developers or designers.

Most **hard-to-fill** positions require a certain extent of technical expertise or skill specificities. Vacancies for programmers and web designers cut across both junior and senior positions.

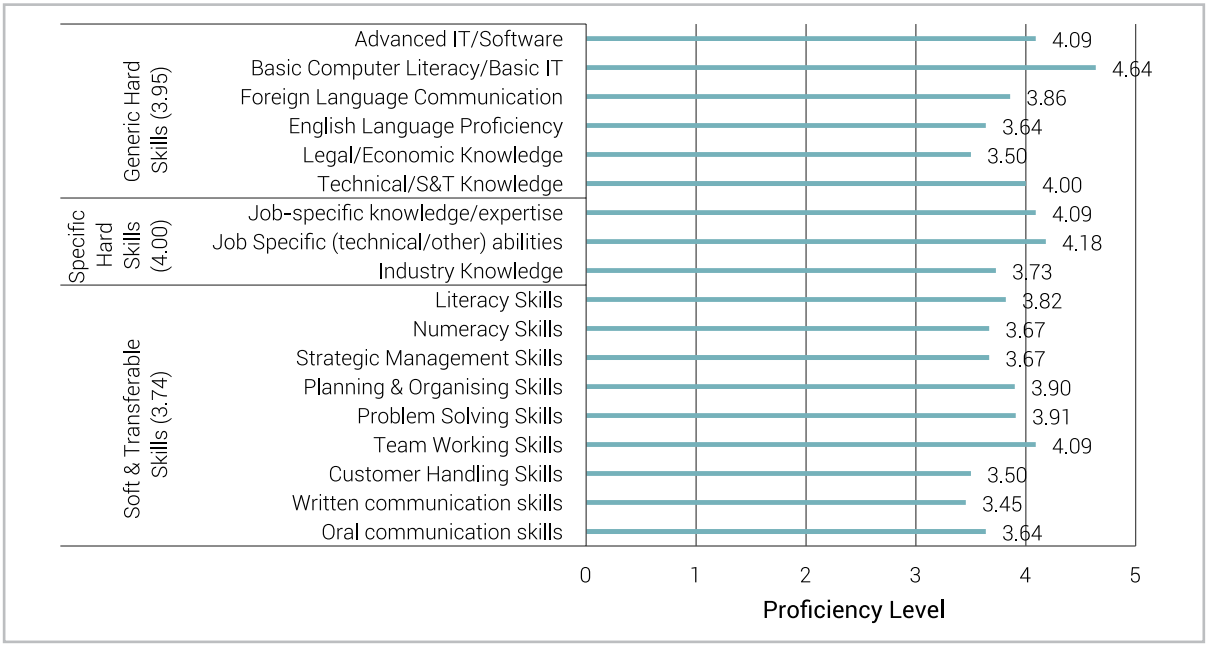
Over half of the respondents have been successful in filling the vacant positions. For those who do not succeed, they have cited lack of applicants due to stiff competition from other employers and lack of experience as the key **reasons** among others. **Consequently**, difficulties in labour recruitment lead to increased workload for other staff, difficulties in meeting quality standards, as well as the need to outsource workload.

Conclusion: The shortage of IT-related positions is prevalent where programmers and web designers cut across both junior and senior positions.

Ability to meet future needs – soft and specific hard skills

- The prospective skills needed in the future concentrate on specific hard skills and soft skills. Specific hard skills include cloud technology, industry know-how, web technologies, SAP-cloud ERP system, Angular2, data analytics, market awareness and new releases from Google on Android platform. Soft skills include learning, adaptability and communication skills. Employers predict that the requirements will be met except Ruby on Rails. Furthermore, the positions in high demand in the next two years include Data Scientists, Data Analysts, Web and Mobile Designers.

Figure 8.23 The skills proficiency level of current high-qualified employees by types of skills



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

8.6 Transport and logistics

8.6.1 Industry overview

Unwavering growth driver coupled with challenges

- The transport and logistics industry is an unwavering economic growth driver in Penang. It is a backbone for trade stimulation and business efficiency facilitation. In 2016, Penang Port recorded a 6.8% growth in gross registered tonnage while Penang International Airport saw a 0.1% growth in handled cargo – a huge improvement given the negative growth rate of 7.7% in 2015. Penang Port is fully equipped to handle all types of cargo such as containers, liquid, dry bulk, break bulk, and other goods and operates various terminals and facilities. In that respect, Penang Port remains an important gateway for logistics, handling 6% of total cargo in 2016.
- Despite its "limited channel depth and wharf length, inefficient cranes and limited direct sea connectivity", Penang Port should take advantage of its proximity to Indonesia and Thailand to gain access to raw materials and finished products.
- According to the 11th Malaysia Plan 2016–2020, the shortage of skilled human capital covers supply chain network design, sophisticated crane operations, and supply chain network design.[67]

Industry composition and nature of operations

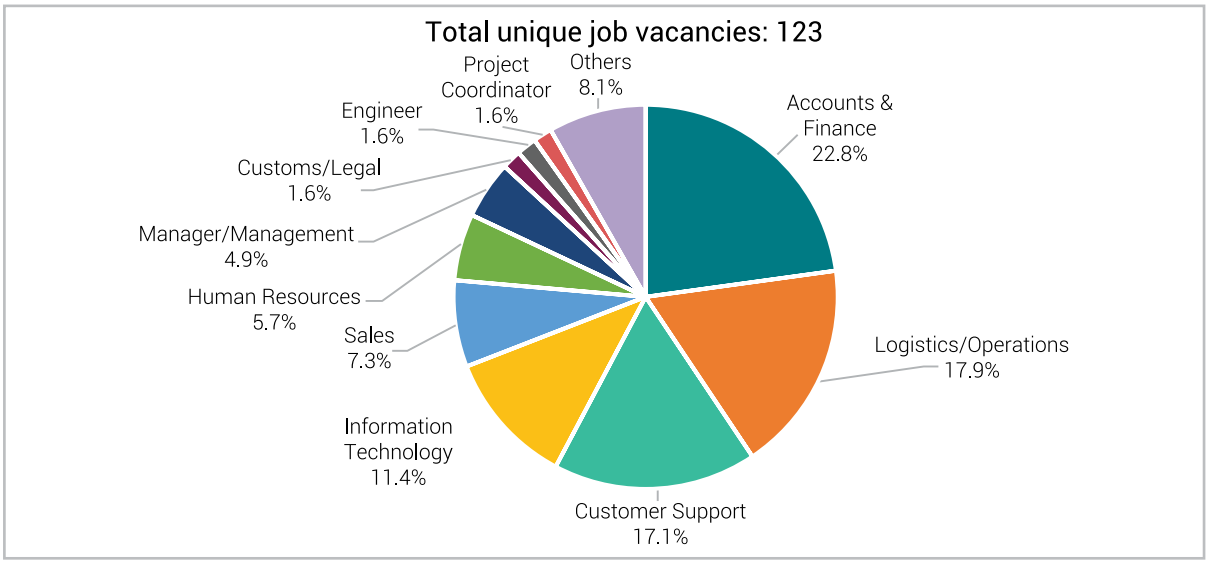
Some of the key industry players in this industry are Era Baru Business Systems, Citylink Express, Schenker Logistics, and TAS Shipping & Transport. These firms constitute courier services, logistics and supply chain management. Their operational activities may include but not limited to, warehousing, freight forwarding, business development and shipping.

8.6.2 High-qualified labour demand

A total of 123 vacant positions have been advertised in Penang. Of this, Penang Port has advertised the highest number of job vacancies in Penang, accounting for 7.1% of the total job vacancies in this industry followed by DHL Express (6.8%), Kerry Logistics (6.8%), YCH DistriPark (5.3%) and Agility Logistics (4.9%).

[67] Economic Planning Unit (EPU, 2015). Unleashing Growth of Logistics and Enhancing Trade Facilitation. Eleventh Malaysia Plan 2016–2020: Strategy Paper 14. Kuala Lumpur/Putrajaya: Prime Minister's Department.

Figure 8.24: Major job titles advertised in transport and logistics

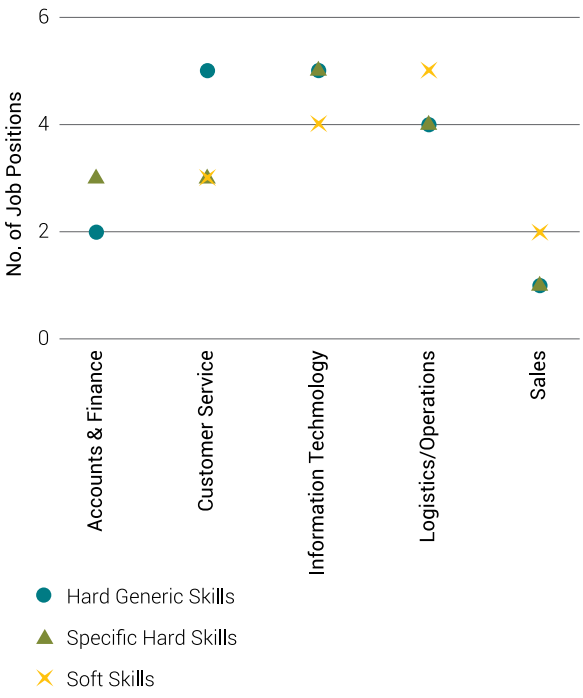


Source: Vacancy database

Figure 8.25: High-demand job positions by types of skills and position levels

Source: Vacancy database

Figure 8.26: High-demand job positions by types of skills and major job titles



Source: Vacancy database

Logistics/Operations – the core recruiting functions after accounts and finance

Similar to the recruitment in medical tourism, accounts and finance turn out to be the largest vacancies advertised in the transport and logistics industry. Logistics and related operations functions follow suit. These functions are shipping executives, logistics specialists and airfreight forwarding export operation executives, to name a few. Accounts and finance represents 23% of the total high-qualified positions posted in this industry. This is then followed by logistics/operations (17.9%), customer support (17.1%) and information technology (11.4%).

Customer relations and logistics – highly in demand positions

About 20% of positions are high-demand. Recruitment is largely scattered at junior positions, which account for 60% of the total high-demand vacancies. These positions include customer relations, logistics and operations where the majority of them require a minimum of two years of work experience.

Unlike the vacancies in other industries, this industry requires generic hard skills more than soft and specific skills where English language proficiency is a prerequisite. About 58.3% of the high-demand vacancies demand a good command of English along with half requiring their prospective hires to be able to speak other languages such as Bahasa Malaysia and Mandarin. Besides, basic IT skills such as computer literacy in MS Word, MS PowerPoint and MS Excel are also required. The needed generic skills cut across all levels with junior positions and managers requiring more.

In terms of soft skills, relationship and service skills have the greatest importance. Excellent interpersonal skills, customer-oriented and the ability to articulate are critical soft skills required in this industry. Personal effectiveness skills are also as important as the ability to work under pressure and under tight deadlines. A positive personality and approachable attitude are vital prerequisites for a customer service coordinator in this industry.

Although customer relations positions highly demand skill requirements, on average, they do not take as long to fill as positions in logistics, operations and IT. Specifically, the former position has posted about 1.5 months on the job portal compared with 2.5 months for operation officers and 3.5 months for system architect.

8.6.3 High-qualified labour supply

Supply characteristics

The supply source

- Transport and logistics companies recruit primarily workers from Penang and to some extent, also source workers from other parts of Malaysia. Recruitment in this industry largely focuses on a lower segment of high-qualified workers where a substantial number of job vacancies can be filled within the shortest time compared with other industries. This segment of workers may come without work experience.

Moderate number of job applications

- The transport and logistics firms obtain about 60 job applications for each job opening. While the number of job applications can be smaller than many other industries, the possibility of being hired is higher than other industries. Less specific skill requirements can also be attributed to this compared with skill requirements in the upper segment of high-qualified job vacancies.

Recruitment profiles

Reasons for recruitment: Replacement of employees

- In general, this industry relatively experiences stable growth where workers are recruited as a result of employees leaving the companies. There is little evidence to deduce that the purpose of recruitment is due to the expansion of existing companies or the arrival of new companies. To our best knowledge, Kerry Logistics Network is by far the only new logistics company landed in the region. However, this has not been raised as a major concern for skill shortages.

Other recruitment channels: Online advertisement and banners

- Transport and logistics firms engage in different ways of advertising job vacancies Apart from using online advertisement, they also advertise job vacancies using banners and boards. But this method is often used by companies to recruit the junior segment of high-qualified workers.

8.6.4 Human capital issues and challenges

Quantitative supply constraints

A mix of logistics and non-logistics related positions take a longer duration to fill (hard-to-fill vacancies)

In this industry, recruitment difficulties are less severe than other industries. According to the job advertisements posted, only five vacancies are found to be hard to fill with postings at slightly over two months. These vacant positions are customer service, operation executives, human resources managers, inventory assistants and system architects, which are advertised for about 5.6 periods, equivalent to nearly three months. Similar to the positions in ICT industry, IT-related positions have taken a longer time to fill compared with non-IT-related positions. In this industry, for instance, system architects, take about 3.5 months to fill. Apart from understanding the legislative and regulatory requirement for import/export operational (air/sea) and custom-related matters, operation executives must also be able to work independently with minimum supervision, have good analytical skills, and able to work well under pressure to meet tight deadlines.

Box 8.6 Employer survey for transport and logistics: Hard-to-fill vacancies

Interestingly, only 25% of employers opine that there are differences between specific functions in terms of **length of time taken** to fill a vacancy.

- Jobs requiring the least time to fill: Non-executives
- Jobs requiring the longest time to fill: Executives and above

As for **hard-to-fill positions**, this industry appears to face difficulty filling the position of senior operations. Failure to fill vacant positions has resulted in the increase of workload for other staff, difficulties in meeting quality standards, increased operating cost, delay in developing new products or services, difficulties in introducing technological changes, as well as difficulties in meeting customer services objectives.

Conclusion: Vacancies in this industry centre around junior positions. But the shortage is not as severe as other industries.

Partly prepared inexperienced hires, and "good" skill integration among experienced hires

- A majority of the inexperienced hires are partly prepared for the offered positions. However, firms opine that candidates need to upgrade their English language skills. Furthermore, most of the experienced hires are "good" in integrating their previous work experience with the tasks assigned by current employees.

Skill gaps

Skill deficiencies: Less satisfactory in generic hard than specific hard and soft skills

- Skill deficiencies are more prevalent in generic hard skills than specific hard and soft skills. Deficiency in written and oral communication skills are more evident than other soft skills, and economic and English language are more deficient than basic and advanced computer skills. These skills need the most improvement.

Positions where skills need the most improvement – customer service and operation management

- Skill deficiencies are more evident in customer service and operational management positions. Warehouse management skills, ability to "read customers' needs", people and IT skills need the most improvement.
- Main reasons for low levels of proficiency: proficient and experienced employees leave for other companies; lack of experience/new to the company; and rapid technological changes, making it difficult to keep pace.
- Skill deficiencies can potentially lower firms' productivity, making it difficult to upgrade business operations and diversify into new products and services.
- The less positive traits of prospective applicants include: unprepared for job interviews with no due diligence done on the company.

8.6.5 Moving forward: Future skill requirements

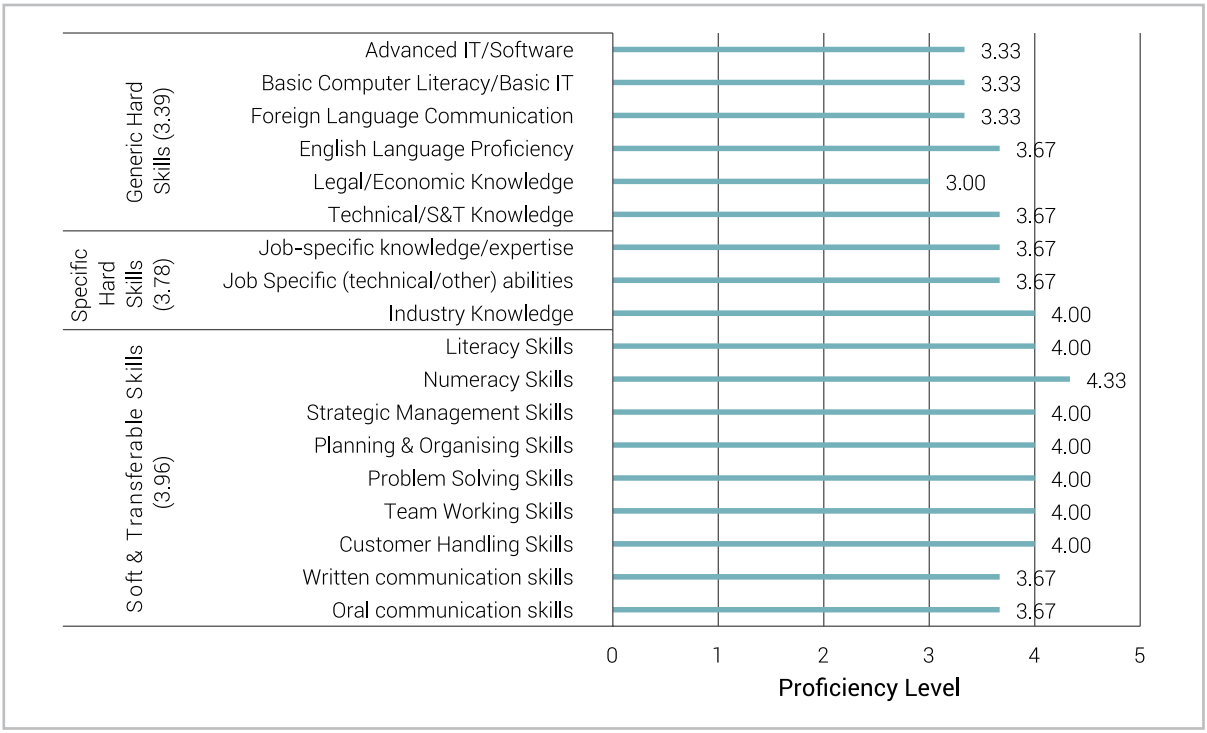
Acquiring new skills due to newly emerging tasks

- Among the new skills to be acquired in the next 12 months may include digital technological advances that smoothen service deliverables, and new rules and regulations introduced by customs.

Ability to meet future needs – selected soft and specific hard skills

- The prospective skills needed in the near future include soft and specific skills. Soft skills cover communication and performance management skills whereas specific hard skills include IT skills, SCM and logistics, and time management skills.

Figure 8.27: The skills proficiency level of current high-qualified employees by types of skills



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

Most firms believe that their employees can meet these skill requirements in the near future. Furthermore, positions that are in high demand in the next two years include Supervisors and Senior Operations.

8.7 Education and training services

8.7.1 Industry overview

A stable services industry with state promotion initiative

- Given that Penang is the second smallest state in Malaysia, it is home to many private and public educational institutions. As of 2016, it has 381 public schools, 11 international schools ranging from pre-school to secondary level, two public universities – Universiti Sains Malaysia (USM) and Universiti Teknologi MARA (UiTM) Pulau Pinang, six community colleges, three polytechnics, two teachers' training colleges and 34 private higher educational and training institutions.
- Public universities produce a total of 8,415 graduates in 2015, which is equivalent to 6.87% of total graduates from public universities in Malaysia. As high as 33.4% of the graduates in Penang are from engineering, manufacturing and construction fields.
- Given the ample opportunities for employment in hospitals, hotels and multinational manufacturing companies, Penang Centre of Education Tourism (PCET) plays a pivotal role to promote Penang as a centre of education excellence with world-class facilities as well as increase awareness and recognition in the education industry.

Industry composition and nature of operations

The industry is made up of public and private institutions of higher learning, private corporate and skills training providers. Examples of key industry players include Wawasan Open University, The Coding Shophouse, Penang Japanese School, Pelita International School and Dream Catcher Consulting. Operational activities include training services, distance learning, consultancy as well as facilitate learning or educational activities.

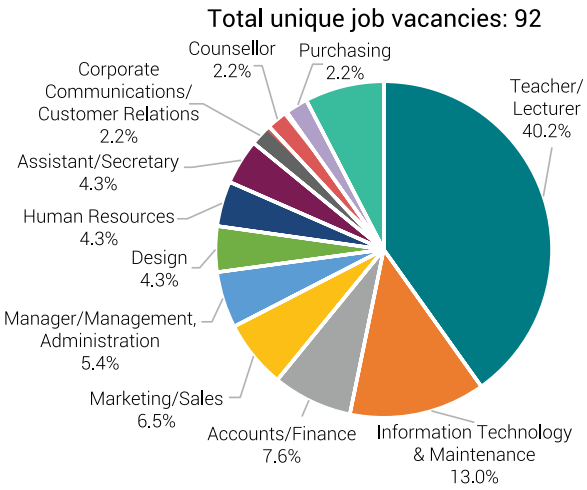
8.7.2 High-qualified labour demand

The education and training services industry has the second-smallest number of job vacancies among manufacturing and services industries. This industry has posted a total of 92 job openings in the first six months of 2016. Of this, SG Straits International Education has the highest number of job vacancies in Penang, constituting 15.2% of total high-qualified job vacancies followed by KDU University College (10.9%) and Disted Pulau Pinang (8.7%).

Teachers/lecturers – the core functions lacking in the education and training industry

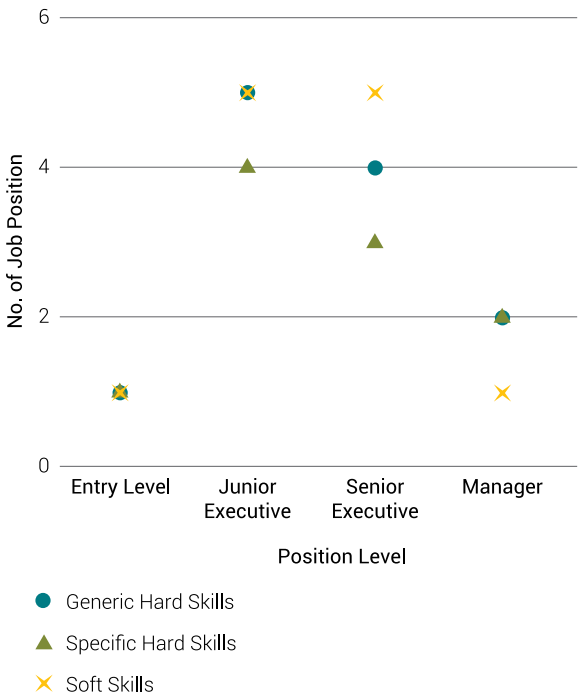
The recruitment for teachers/lecturers is relatively higher than the hiring of other job functions. This also means that this industry lacks teachers/lecturers in the areas of business studies, accounting, web design and creative media development, fashion design and public health medicine, to name a few. As can be seen from Figure 8.28, teachers/lecturers form 40.2% followed by information technology and maintenance (13.0%), accounts and finance (7.6%), sales and marketing (6.5%) and management (5.4%).

Figure 8.28: Major job titles advertised in education and training services



Source: Vacancy database

Figure 8.29: High-demand job positions by types of skills and position levels



Source: Vacancy database

Figure 8.30: High-demand job positions by types of skills and major job titles

Source: Vacancy database

Academic-related positions – high in demand

Given a total of 15 high-demand vacant positions, a majority of them stand at junior and senior executive positons. Higher educational institutions and private schools each make up 40% of the high-demand job vacancies. On average, these vacancies have been posted for about 4.7 periods, which is equivalent to over two months. The majority of the positions are academic-related, which include music teachers, lecturers in public health medicine, head of mathematics and lecturers/senior lecturers in general. Other high-demand vacancies are related to marketing and education advisory.

For academic positions, candidates are expected to deliver practical-oriented topics and be a team player, good communicator and computer literate with the highest educational attainment of at least a Bachelor's degree and preferably well-versed in English and conversational Bahasa Malaysia.

With reference to non-academic positions, candidates for marketing positions can possess any degree qualifications but must have the ability to plan, market and execute events, branding and promotional activities.

8.7.3 High-qualified labour supply

Supply characteristics

The supply source

- The academic and non-academic-related recruitment is sourced from all states in Malaysia. Candidates must be willing to work in Penang, with or without work experience depending on job categories. Institutions of higher learning have a greater range of labour supply in non-academic positions such as sales and marketing, corporate communications and IT, but it is not the case for academic-related positions. Non-academic vacancies can be filled by drawing the supply from other industries that require similar job experience.

A modest number of job applications

- On average, a majority of the institutions have obtained about 50 job applications per vacant position. However, the majority of applications do not meet the criteria. It is practical for institutions of higher learning to have some strict criteria for the advertised vacancies as the quality of academic persons is a determinant in the quality of skill supply.

Recruitment profiles

Reasons for recruitment: Replacement of employees

- It is reported that job openings are mainly attributed to the replacement of employees who have left the company. This means that employed teachers or lecturers may have left their employment for better remuneration package offered by another institution of higher learning, resulting in employers looking to fill the gaps.

Other recruitment channels: Employee network and newspaper advertisements

- Apart from using JobStreet.com as a hiring platform, the majority of firms use employee network and newspaper advertisements to recruit high-qualified employees. Employee network through talks and conferences is an alternative avenue to recruit lecturers and teachers from the same circles of specialisations. Although newspaper advertisements are rather conventional, universities and colleges are still recruiting employees through this channel.

8.7.4 Human capital issues and challenges

Quantitative supply constraints

Non-academic positions take a longer duration to fill (hard-to-fill vacancies)

- Only four vacancies appear to be hard to fill. Marketing executives cum education advisors are posted for seven consecutive periods, which is equivalent to 3.5 months, while geography teachers, swimming coaches and head of mathematics are advertised for about two months. Candidates for the positions must be enthusiastic, adaptable and highly committed to ensure the quality of teaching and learning is maintained. Excellent command of the English language is required.

Well-prepared fresh graduates, and "good" skill integration among experienced hires

- Despite the fact that it is rather difficult for successful candidates to fully fulfill the job requirements

Box 8.7: Employer survey of education and training services: Hard-to-fill vacancies

At 75%, the majority of respondents cite that recruitment can be different in terms of the **length of time taken** to fill a vacancy.

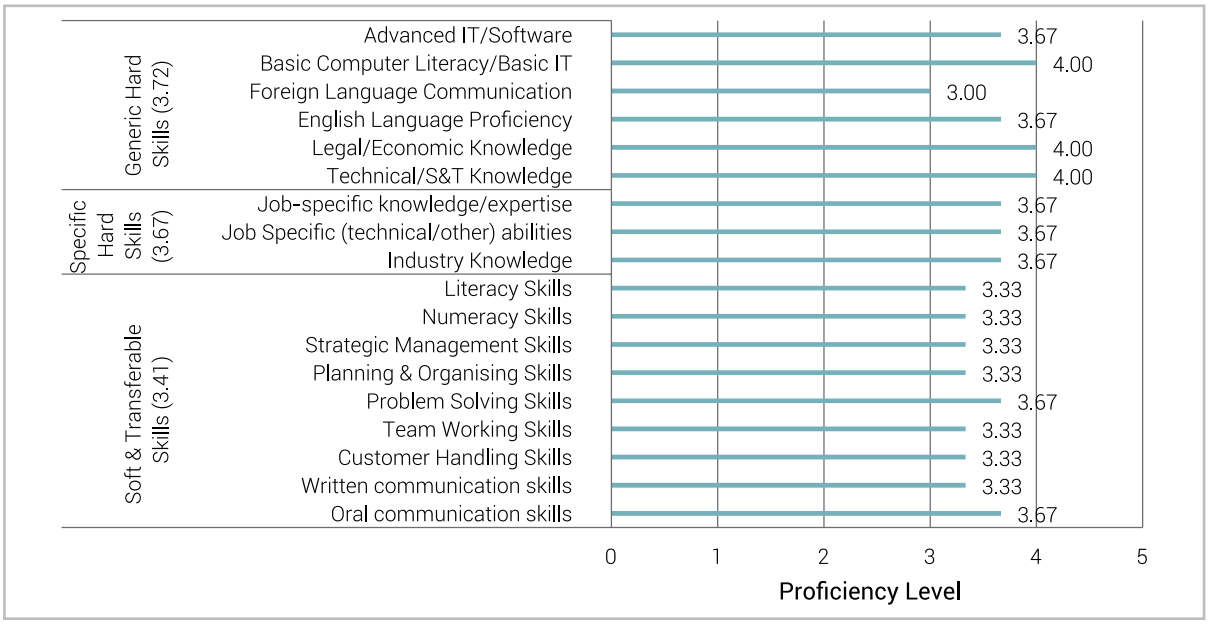
- Jobs requiring the least time to fill: Administrative positions and operations.
- Jobs requiring the longest time to fill: Academic and sales positions.

All the six **hard-to-fill positions** lean towards academic positions. They are deans, vice-chancellors, deputy vice-chancellors, professors, senior lecturers and lecturers.

As half of the employers succeed in filling all vacant positions, we do not have enough data to support the **reasoning** behind the failure to fill such highly qualified vacant positions. **Consequently**, difficulties to fill vacant positions have led to increased workload for other staff (75%), difficulties to meet standard of quality (50%) and delays in developing new products or services (25%).

Conclusion: Hard-to-fill vacancies are dispersed at academic related positions.

Figure 8.31: The skills proficiency level of current high-qualified employees by types of skills



Note: 1=Very low proficiency; 2=Low proficiency; 3=Satisfactory; 4=Proficient; 5=High proficiency
Source: Employer survey

stipulated in advertisements, the majority of employers believe that fresh graduates are relatively well-prepared for the academic and non-academic-related positions. Likewise, a large proportion of training and services providers are satisfied with the skills brought by the experienced hires.

Skill gaps

Skill deficiencies: Less satisfactory in soft skills than hard skills

- Foreign language communication is less satisfactory than English language proficiency, basic IT and advanced IT. Within soft skills, problem-

solving and oral communication skills outperform other skills. Therefore, strategic management, planning, along with organisational skills and teamworking skills need to be upgraded.

Skills that need the most improvement – soft skills

- Skills that require the most improvement include soft skills, which are communication, teamwork, customer-handling and project management skills.

8.7.5 Moving forward: Future skill requirement

Acquiring new skills due to newly emerging tasks

- "The development of new programmes" and "the introduction of new technologies or equipment" are two main factors leading to newly emerging tasks in the next 12 months. Digital technology is now a form of interactive learning tool used by higher educational institutions. It helps to improve learning process, and therefore access to this would require academicians to master the technology.

Ability to meet future needs – job-specific and non job-specific skills

- Non job-specific and job-specific skills are the prospective skills needed in the near future. Non job-specific skills include project management skills, administrative, sales, industry knowledge and new technology trends while job-specific skills include coding knowledge specifically in Ruby on Rails, JavaScript and mobile development (iOS. and Android). The providers predict that requirement for non job-specific skills will be met in the near future whereas requirements for job-specific skills will be more difficult due to the absence of trainers in Penang. Furthermore, positions that are in high demand in the next two years include **Lecturers, Senior Lecturers and Marketing**.

8.8 Comparative analysis across growing services industries

8.8.1 High-qualified demand structure

The growth of Penang's professional services sector has been gaining momentum in recent years. However, labour intake in high-qualified positions in the core sub-sectors is still smaller than core manufacturing industries. The growth of GBS industry is evident as it makes up the highest share of job openings (9.3% of the total). The growth of medical tourism is not as evident from job openings. The majority of vacancies in professional services are advertised by large companies with 100–500 employees[68].

With reference to the level of positions, the services sector presents a different picture compared with manufacturing. Junior executives are widely demanded in most services sub-sectors except in the advanced producer services sub-sector. Only in financial services and hospitality services there is a sizeable share of positions at managerial level. Furthermore, high-demand positions in GBS, education and training services, and advanced producer and financial services sub-sectors lean towards senior executives. In quite a few cases, this is associated with the recent establishment of firms.

8.8.2 Supply characteristics

The notion of more reputable (often foreign) companies attracting more job applicants appears to hold in these services industries. It is quite evident in advanced producer services (APS) and GBS companies. For each job vacancy advertised, more reputable management, corporate consulting and audit firms such as KPMG, Deloitte and PwC receive at least 100 job applications from all over Malaysia. However, GBS firms show a varying vacancy response across job categories. While an average of over 100 applications are received for functions such as accounts, finance, and human resources, more specialised positions such as IT and SAP draw significantly fewer applications. Firms here rely also on employees' referrals. Also in the services industries, the high number of job applicants is not a guarantee that all positions can be filled. Specifically, while firms in education and training services and medical tourism receive a substantial number of applications for each job position advertised, the majority of applications do not meet the requirements specified in advertisements. Vacancies often take a longer time to fill.

[68] Economic Planning Unit (2015). Unleashing Growth of Logistics and Enhancing Trade Facilitation. Eleventh Malaysia Plan 2016–2020: Strategy Paper 14. Prime Minister's Development. Putrajaya.

8.8.3 Recruitment profiles

A large number of positions advertised in medical tourism, IT, as well as advanced producer and financial services are derived from business expansion. While the necessity to replace employees who have left the company contributes to vacancies, in GBS and hospitality services the larger proportion is due to new establishments and expansion of operations. This result is consistent with the growth of the sector in Penang.

For critical positions (IT-related, managers and director positions), some companies engage recruitment agencies to accelerate the hiring process. Education and training services providers, however, still employ conventional methods.

8.8.4 Positions that require a longer duration to fill (hard-to-fill vacancies)

Notwithstanding their attractiveness, APS and GBS paradoxically show higher percentages of vacancies that are hard to fill compared with the overall average. In fact, of all industries, APS has the largest share of hard-to-fill vacancies, accounting for 19.6%. As noted, the share for GBS is 16.6%. Hospitality services, transport and logistics, education and training services, and medical tourism score relatively well in this regard. The paradox can be explained from several factors. One is the rather specialised profile of some of the positions. Illustrative is the fact that software developers/ engineers/programmers constitute the largest share of hard-to-fill functions in GBS and info-tech. Another factor is the competition among establishments within the same industry (illustrated by new establishments in GBS), stemming from limited quantitative and qualitative availability of specialised skills vis-à-vis demand. Furthermore, the arrival of GBS has made the situation more difficult for APS (especially accounting and audit) firms. Again, patterns and characteristics appear on one side to prompt and on the other side are largely in line with what has been postulated in Chapter 2. At the same time, the diversity and complexity observed compel a refined view.

8.8.5 Skill gaps

Skill deficiencies in the services sector show similarity to those in the manufacturing sector. Generic hard skills are limited compared with soft and specific hard skills in all services industries except info-tech, and education and training services. Foreign language communication and advanced IT are skills rated as most deficient in advanced producer and financial services, GBS and hospitality services. Probably again associated with training, specific hard skills score above average in all services industries, with the notable exception of advanced producer and financial services and GBS. In the above, some contributing factors have been given. Notable also, in GBS, medical tourism, and education and training industries, proficiency in soft skills is rated lower than in advanced producer and financial services, hospitality services, info-tech, and transport and logistics. Although professional training is available in the market, programmes may be inadequate to their needs. Additionally, info-tech achieves the highest score of proficiency across all types of skills. This indicates that this area skill, learning in education satisfies the needs of the industry. In contrast, GBS scores the lowest across all types of skills. This implies that also the secondary supply, qualitative cannot sufficiently satisfy the needs of GBS.

8.8.5 Future skill requirements and ability to meet the needs

"New technology development" is commonly mentioned by all services industries in anticipating the emergence of new tasks in the next two years. The next important reason for new tasks is "the development of new products/services". Advanced producer and financial services, and transport and logistics expect "new legal and regulatory requirements" to impact business processes, bringing about new tasks. Firms in all industries generally agree that new tasks will put pressure on skills, less on soft skills (project management, adaptability, communication and creative thinking) than specific hard skills involving technical skills. Firms, especially in GBS and info-tech, are neither entirely pessimistic nor confident about the local availability of these specific skills.

9

MOBILITY OF HIGH-QUALIFIED LABOUR

This chapter delves deeper into mobility in the Penang labour market. The analysis and discussion here take an experimental approach – as stated in the methodology – with a focus on emerging GBS activities. We cover:-

- Existing research on job mobility of higher-qualified labour in Malaysia;
- General labour mobility patterns in Penang, and those associated with GBS activities from employee and employer perspectives;
- Employees' drivers and experiences of mobility;
- Issues of labour turnover and retention from employer perspective; and
- Current approaches in effectively dealing with the issue of labour retention in firms.

9.1 High-qualified labour mobility in Malaysia

As noted in an earlier chapter, in Malaysia, the issue of brain drain has received considerable attention in recent years. Brain drain is considered as international mobility (border crossing) and implies a loss to the national labour force. It can be compensated by enhancing entry into the labour market by school-leavers (a larger turnout from educational institutions) and by inflow from abroad. The latter is currently receiving more attention (see Chapter 6). By now, the drivers of international graduate mobility are rather well known: (perceived) differences in opportunities, wages and employment conditions, self-assessed employability skill readiness, work and life experience/enhancement, personal traits and family concerns.

In- and out-mobility of higher-qualified labour also occurs in regional and local labour market areas, with similar drivers and effects as international mobility. The framework of this study is intra-regional labour mobility, inter-firm, and intra- or inter-industry; intra- or inter-occupational. Local mobility, so far, has received little attention in Malaysia. This can be understood from the significant obstacles in researching local labour circulation, with the unavailability of data sources being one of them.

The existing studies have generally two focus areas. They deal with (a) specific group(s) in the labour market, and also with mobility drivers rather than mobility patterns. Millennials or Generation-Y are a favoured group, while more sporadic talent group (such as MBA graduates or academicians) is singled out. Alternatively, these studies are also focused on examining two groups of issues as predictors, job-related and non-job-related. To our best knowledge, there is no comprehensive research looking into the context of Malaysia in examining patterns of mobility in Malaysia.

Career mobility in the workforce has become a key component of any organisation's talent management strategy. This is facilitated by employability, which contributes to an individual's "movement capital". To move from one position to another or from one industry to another, there is a positive relationship between employability and mobility because the higher the employability, the higher the chances for making intra- or inter-organisational movements.

Boundaryless careers are characterised by mobility not only across organisations, but also across boundaries of occupations, industries, geographic locations and employment forms in a non-linear and unconventional manner driven by employability. This places the responsibility for career management and development on the employees themselves. It paves the way for what is known as the new career, which is self-managed. Success in the new career is measured by employability, mobility and work-life balance. A positive relationship is found between employability and mobility, and this relationship is stronger when work-life balance is higher. Hence, the importance of work-life balance cannot be ignored to ensure success can be achieved, and also maintained for a long time. Organisations should draw up procedures and policies to enhance this balance among employees to allow for more adaptability and flexibility. This can drive retention even further.

Employability skills are the key to workplace success. First, some employers are disappointed by the apparent lack of employability skills in graduate applicants, leading to unequal access to favoured jobs and selection processes that work against the employees reaching their career goals. Second, mobility-based jobs are not favoured by most employers as they perceive a negative relationship between workforce productivity and mobility. This can be resolved through mutual understanding and assurance that there has to be a balance between personal and professional life if employers want their employees to remain productive and efficient. Other responses to skill shortage include under-skilling and risk of counterproductive if salary is perceived as low.

The above aspects frequently surface in debates on millennials or Generation-Y employees. In Malaysia, research has been focused on the aforementioned groups in the forms of turnover, and intention to quit in different industries, including global business services (GBS)[69].

Generally, this research confirms anecdotal evidence about the factors contributing to Generation-Y's frequent work changes in Malaysia: dissatisfaction with salary and fringe benefits, preference for work-life balance, low normative employer commitment and perceived availability of alternative jobs. Generation-Y employees in Malaysia (and elsewhere in the Asia-Pacific region) by far hold the shortest job tenure compared with other generations (Generation-X, baby boomers). This shows that job satisfaction coupled with good remuneration and fringe benefits, perceived availability of alternative jobs and job-hopping are positively significant to Generation-Y employees.

Dissatisfaction with pay and fringe benefits has been the most influential factor prompting the decision to quit. We found that this is a strong indication that Generation-Y employees prefer extrinsic rewards, and if these rewards are not sufficiently provided, it will have adverse consequences on employees' work fulfillment, ultimately driving them away in search of jobs with better extrinsic rewards. This contradicts the claim that Generation-Y employees seek intrinsic rewards over making money. While salaries have gone up in recent years, these increases have been modest. At the same time, Generation-Y workforce faces challenges coping with increased cost of living, seeing this generation has different lifestyles and expectations, leading to higher expenditure and financial commitments. Therefore, they will continue to shift from one job to another for better wages and benefits.

The decision to quit is not solely due to HR practices, as it is also influenced by economic situation and cultural factors expressed in job-hopping trends. These two factors are less within management control. The steady growth of the Malaysian economy may have created the perception among the new generation workforce that there are ample job opportunities in the market. Our research, however, observe an anomaly here, where the reality of the Malaysian labour market is just the opposite, and with many positions remain unfilled due to the gaps in skill demand and qualifications.

The model of compartmentalisation of the Penang economy and labour market combined with worker preferences suggest favourable attraction and retention characteristics in "favoured" compartments, lowering the quit-rate. The compartments of manufacturing and services sectors are still heterogeneous, thus leading to differential quit-rates. The research looking into global business services (GBS) confirms this. It also reveals specificity and/or overlap pertaining to the reasons employees in this industry quit, compared with the pattern observed in the research as reported earlier. GBS as our case study, will be analysed in further detail.

It is found that organisational commitment, lack of training, career planning and empowerment have direct effects on the intention to quit for Generation-Y employees in GBS. Lack of training and empowerment are the most influential effects on resignation, followed by organisational commitment and lack of career planning. The training factor counters the idea that out-mobility is positively influenced by employer-provided upskilling programmes. The reasoning for the latter is simple: upskilling enhances an employee's employability, which then induces the employee to move into bigger firms and better jobs to obtain monetary returns. Lack of training being the most significant predictor of the intention to quit may indicate that employees in the GBS sector rely heavily on receiving adequate training. Such reasoning fits the argument that Generation-Y workforce strives to increase their employability in an economy where a secure job is not guaranteed.

Organisational commitment is not the highest predictor of intention to quit among Generation-Y in GBS. On the other hand, contentment with salary and job stress are found to be insignificant predictors of intention to quit for Generation-Y GBS employees. However, those who express displeasure with their salaries are less committed to the organisations and will eventually leave. Furthermore, organisational commitment is mainly influenced by role clarity versus ambiguity.

69 See Queiri et al. (2015) and Queiri and Dwaikat (2016)

The relationship between organisational stress and intention to quit is not significant. However, this does not exclude the fact that stress has a significant indirect impact on job satisfaction.

In the following chapters, a number of observations and findings are discussed in regard to the mobility pattern of Penang's labour market. The next section presents findings on our observations of the Penang case by specifically taking GBS as a case study even though it is still exploratory.

9.2 Mobility I: Labour flow analysis in Penang

The higher-qualified employment flow between key sectors and key industries in the Penang economy (and labour market) can be regarded as either a change of employer, a change of sector, or industry (inter- and intra-sector/industry). In the dataset containing 20,494 profiles, 33,781 valid job moves have been detected from work histories. About 14.0% (or 4,712) are intra-company, inter-departmental moves, while the remainder (86% or 29,069 moves) are intra-industry or inter-industry labour flow.

In work histories, the earliest move occurred in 1972 and the latest is in 2016. The employment histories show the mobility of labour from 1972 to 2016. Employer-to-employer (E-to-E) mobility flow can be shown:-

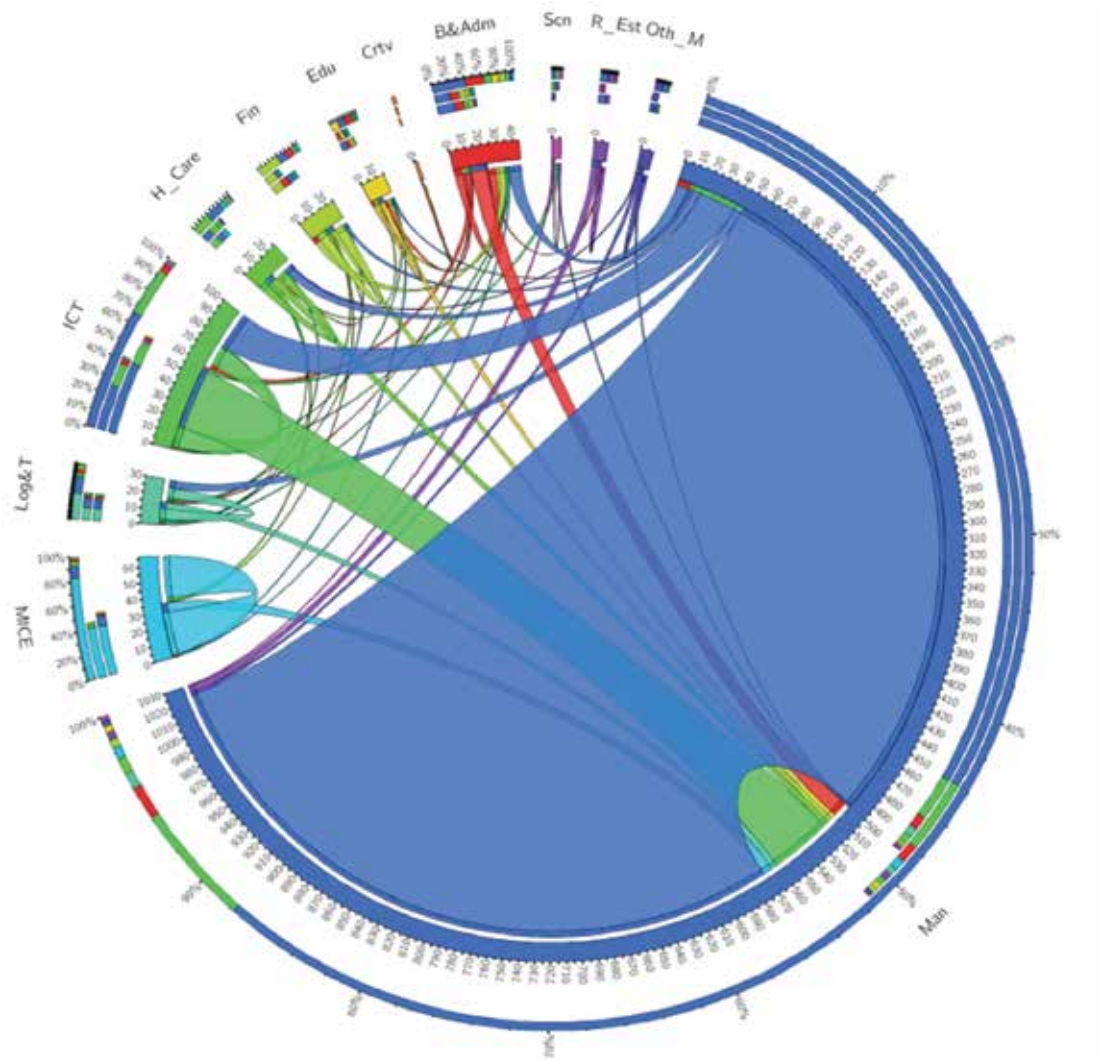
a) between defined sectors and industries. A classification has been adopted that is based on LinkedIn, yet also is in line with the key industries that this report deals. The classification is shown in Appendix G.
b) disaggregated in several periods, specifically 1972–2000, 2001–2005, 2006–2010 and 2011-2016. Such disaggregation allows a view of the development of mobility over time.

The size of the labour move to and/or within sectors and industries can be depicted using Circos diagrams, and the explanation of such diagrams is given in Technical Report: Annex 7. It should be noted that in the Circos diagrams, minor flows (small cell numbers) have been excluded from the analysis to maintain the clarity of the flows. As a result, the total number of moves for industries during the specified periods may (slightly) differ from the total number of moves depicted in the sector diagrams.

We omit the analysis of period 1972–2000 here as the total number of moves in the dataset is relatively small The following diagrams depict E-to-E labour flows in intra- and inter-sector, as well as at a more detailed level – inter- and intra-industry, for three periods: 2000-2005, 2006-2010 and 2011-2016. Several general observations are highlighted below corresponding to Figures 9.1 through 9.6.

- Over time, the pattern of moves shows increasing diversity and complexity; this is in line with the development trajectory of Penang's economy.
- It is evident that labour flows, in terms of sector/industry of origin, feed labour availability in different sectors and industries.
- This gives a first indication of skill-relatedness; as upgrading of the Penang economy over time appears evident.
- However, to hypothesise whether the moves bring about advancement for individuals and imply enhanced employability, subsequent moves in employment history have to be mapped out and compared in detail.

Figure 9.1: Sectoral moves between 2001 and 2005 (N = 681)



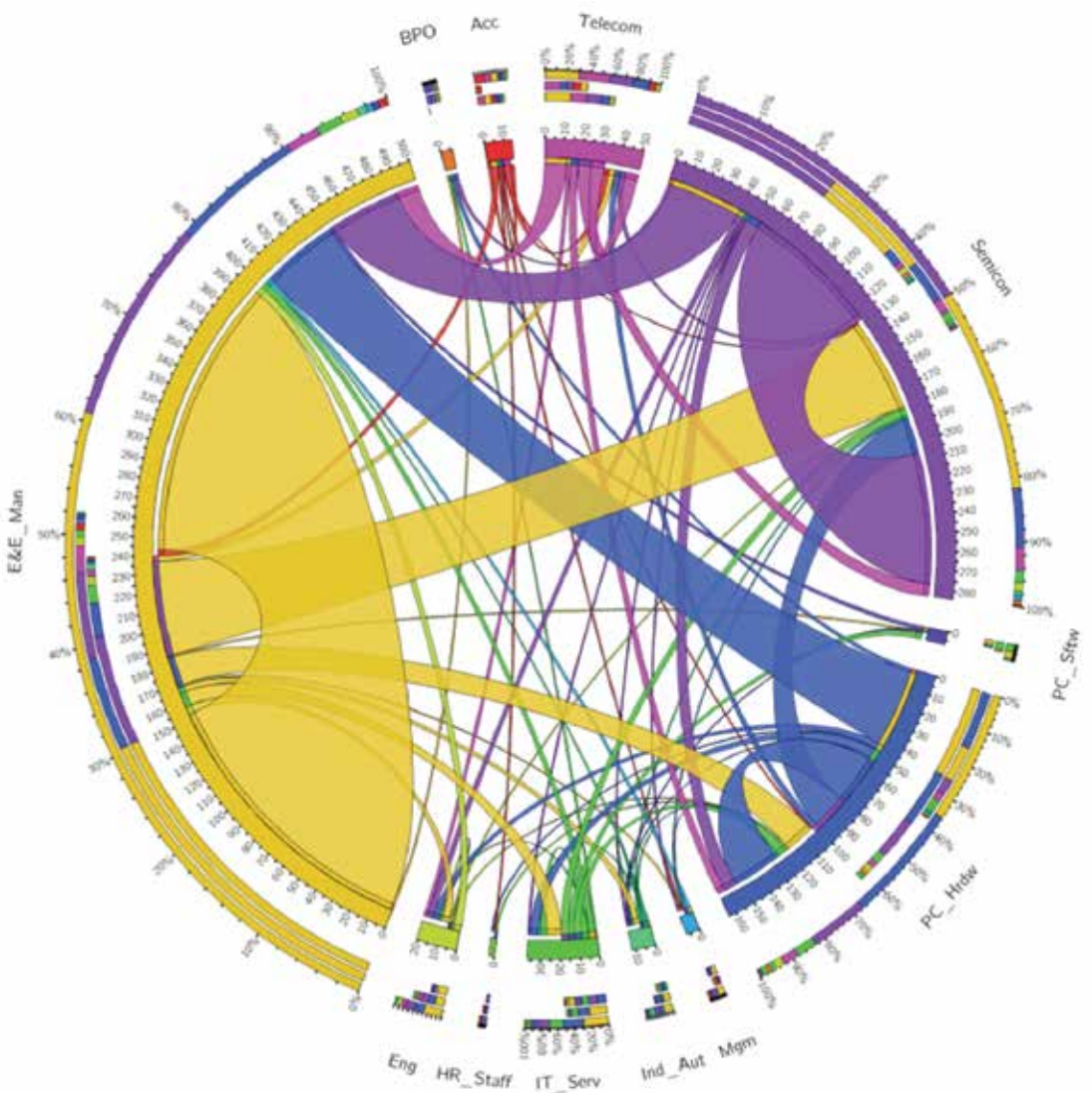
Legend: Man = Manufacturing; MICE = Meetings, Incentives, Conventions & Exhibitions; Log & T = Logistics & Transport; ICT = Information & Communication Technology; H_Care = Healthcare, Medical Devices, Biotechnology & Pharmaceuticals; Fin = Financial Services; Edu = Education; Crtv = Creative Industry; B & Adm = Business & Administration; Scn = Research & Scientific; R-Est = Real Estate; Oth_M = Other Manufacturing; Ret = Retail; PS = Public Sector; Env = Renewable Energy & Environment
Source: Own calculations based on LinkedIn

Labour flow: 2001–2005

- Manufacturing still dominates labour flow, as can be seen with substantial intra-sector mobility.
- Intra-sector mobility is also marked in a number of other sectors.
- Inter-sectoral mobility is dominated by flows between the ICT sector and manufacturing; switches to the manufacturing sector from the ICT-sector are not met with a return flow of equal size from the manufacturing sector (although the manufacturing sector was a substantial contributor to employees in the ICT-sector). A similar pattern can be observed with regard to the flow between manufacturing and business & administration. The patterns seem to reveal an upgrading of manufacturing operations.

- At the industries level, intra-industry, inter-firm moves are unmistakably notable in the semiconductor, electrical & electronics, and computer hardware. Given the nature of operations during this period, skill-relatedness appears to be reflected in sizeable bi-directional flows between these industries.

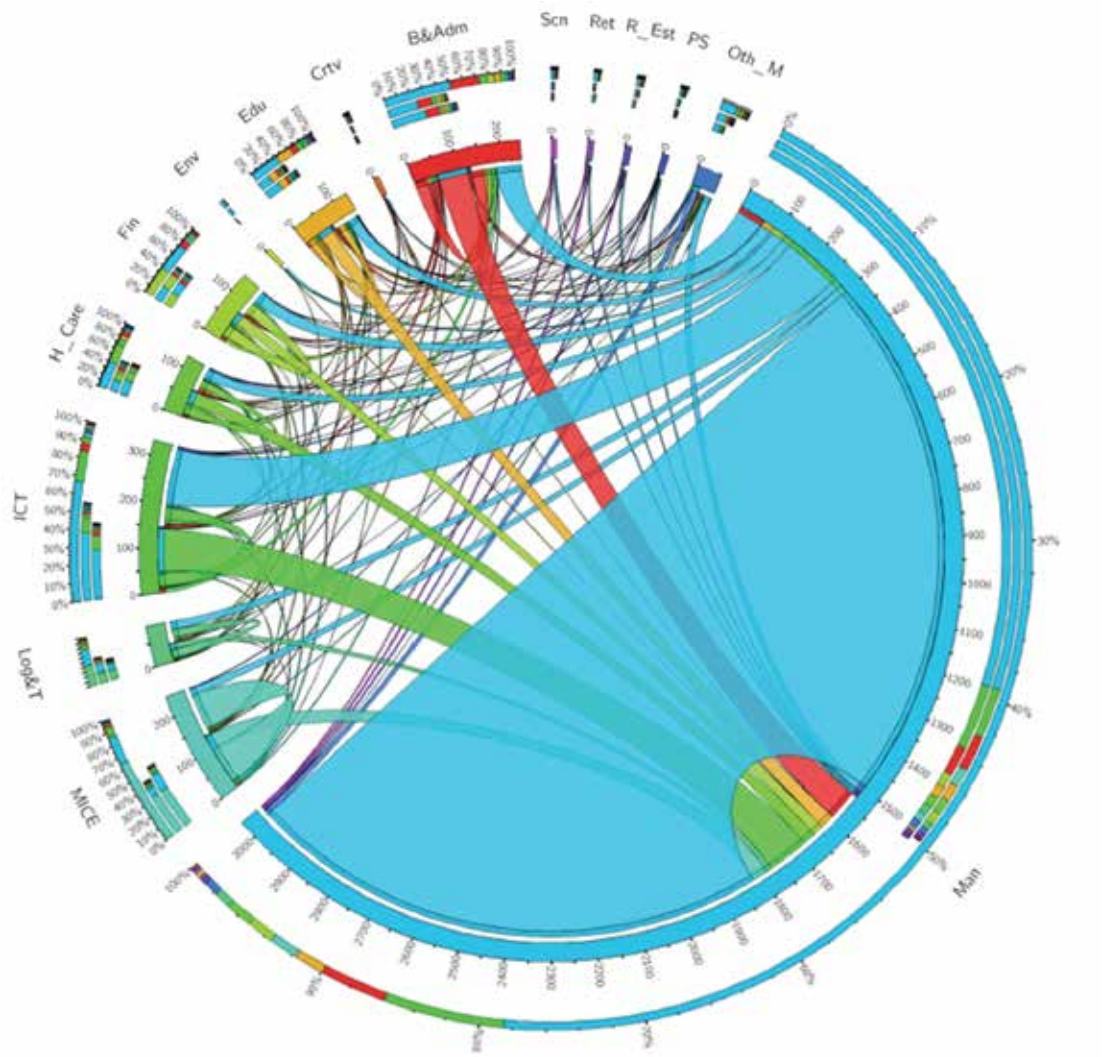
Figure 9.2: Labour flow by industry between 2001 and 2005



Legend: Semicon = Semiconductor; PC_Sftw = Computer Software; PC_Hrdw = Computer Hardware; Mgm = Management Consulting; Med_D = Medical Devices; Ind_Aut = Industrial Automation; IT_Serv = IT Services; HR_Staff = Human Resources & Staffing; Fin = Financial Services; Eng = Mechanical & Industrial Engineering; E&E Man = Electrical & Electronics Manufacturing; Bio_Ph = Biotechnology & Pharmaceuticals; BPO = Business Process Outsourcing; Auto = Automotive; Acc = Accounting; A&A = Aviation & Aerospace; Telecom = Telecommunications

Source: Own calculations based on LinkedIn

Figure 9.3: Sectoral moves between 2006 and 2010 (N = 2,237)



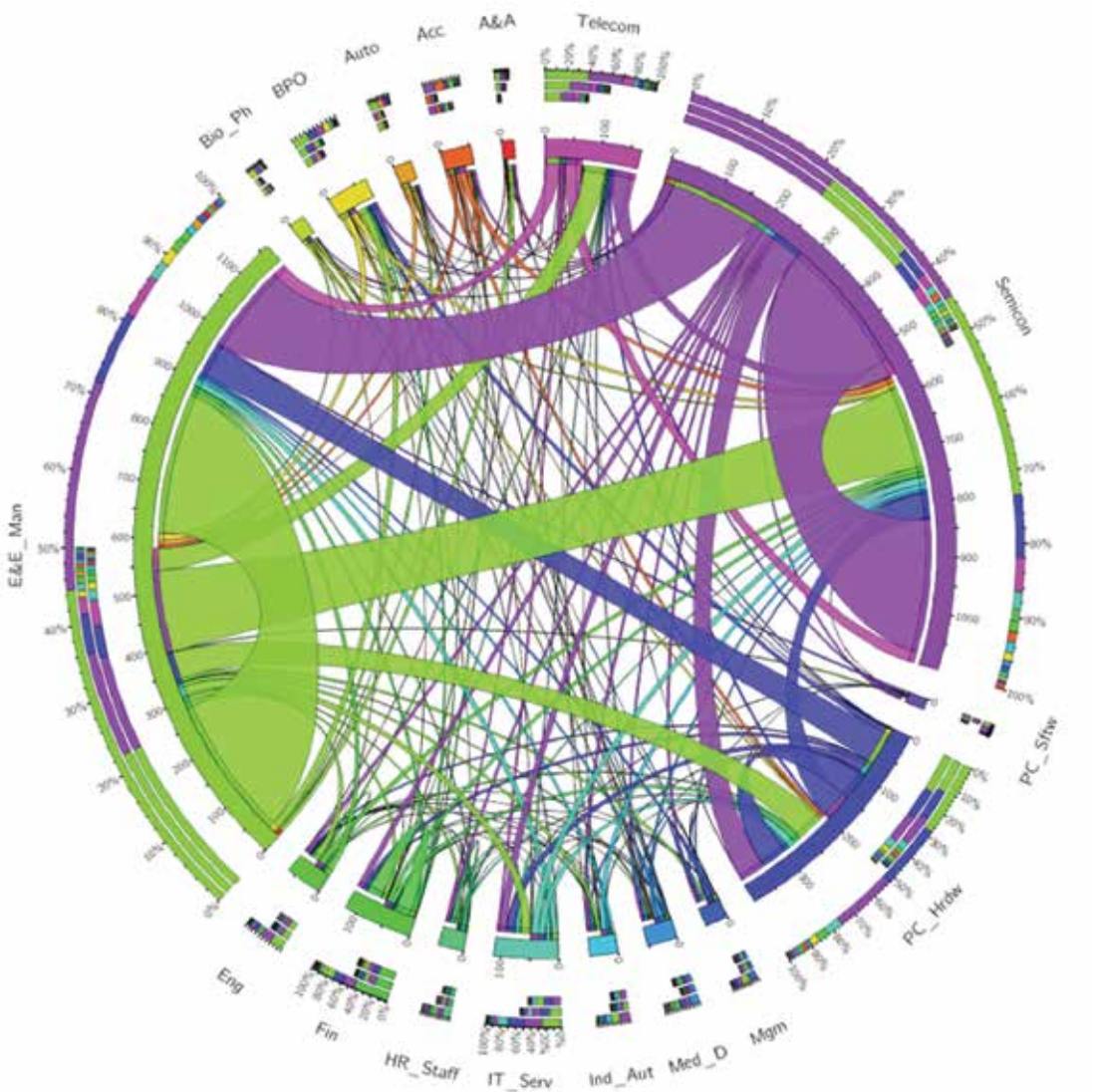
Legend: Man = Manufacturing; MICE = Meetings, Incentives, Conventions & Exhibitions; Log & T = Logistics & Transport; ICT = Information & Communication Technology; H_Care = Healthcare, Medical Devices, Biotechnology & Pharmaceuticals; Fin = Financial Services; Edu = Education; Crtv = Creative Industry; B & Adm = Business & Administration; Scn = Research & Scientific; R-Est = Real Estate; Oth_M = Other Manufacturing; Ret = Retail; PS = Public Sector; Env = Renewable Energy & Environment

Source: Own calculations based on LinkedIn

Labour flow: 2006–2010

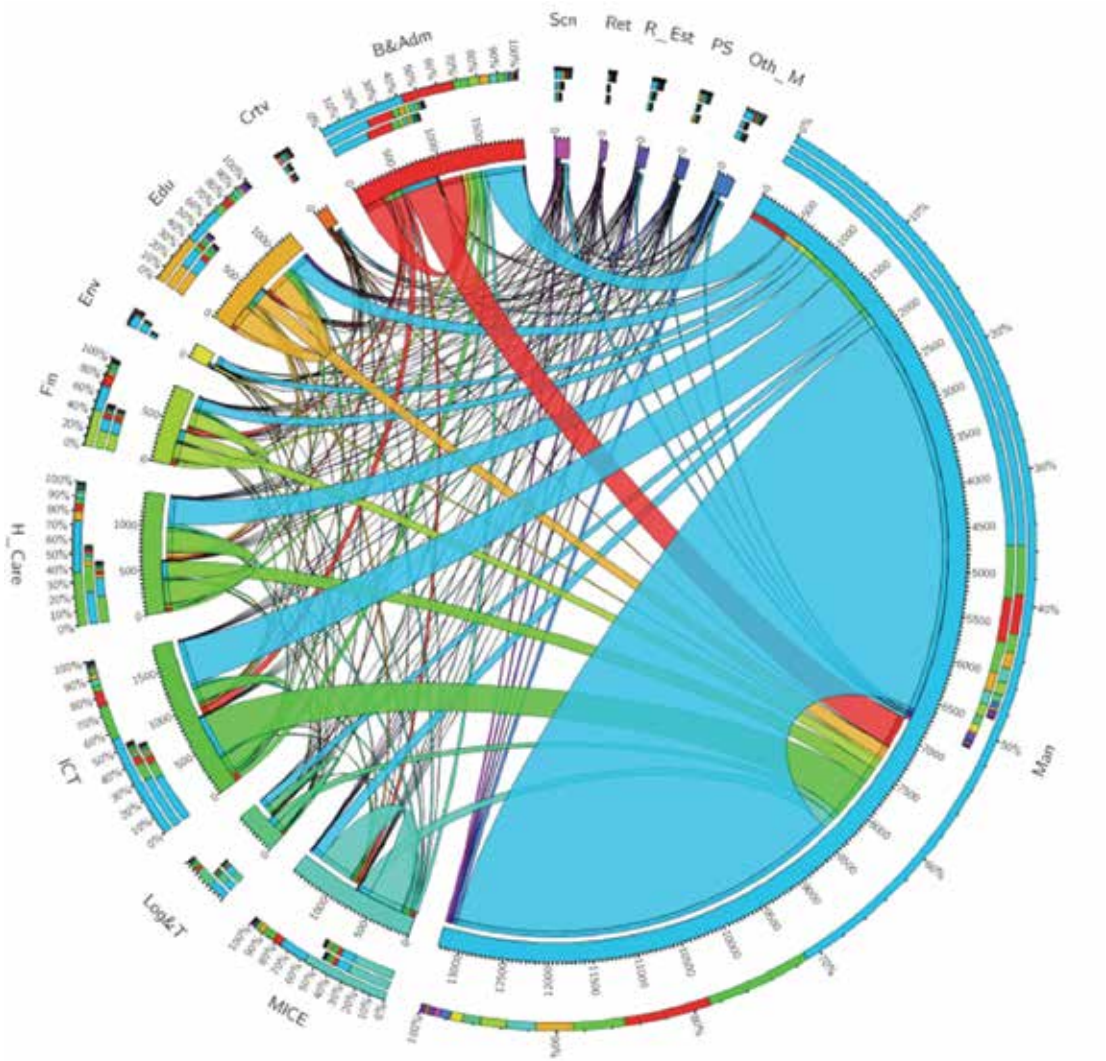
- Manufacturing still dominates labour flow, as can be seen with substantial intra-sector mobility.
- However, intra-manufacturing mobility starts to diminish in relative terms, while the share of inter-sector mobility increases.
- Intra-sector mobility is still prominently present in manufacturing and MICE sectors.
- Inter-sectoral mobility is dominated by flows between the ICT sector and manufacturing; however, in terms of direction, the volume of moves between the sectors is the opposite of the earlier period. In regard to the moves between manufacturing and business & administration, the pattern has remained the same, with a clear increase in volume.
- At the industry level, intra-industry, inter-firm moves as well as bi-directional flows in the semiconductor, electrical & electronics, and computer hardware industries remain evident.
- Newly emerging industries become visible in the industry diagram where medical devices, BPO and biotechnology/pharmaceuticals source labour from existing industries.

Figure 9.4: Labour flow by industry between 2006 and 2010



Legend: Semicon = Semiconductor; PC_Sftw = Computer Software; PC_Hrdw = Computer Hardware; Mgm = Management Consulting; Med_D = Medical Devices; Ind_Aut = Industrial Automation; IT_Serv = IT Services; HR_Staff = Human Resources & Staffing; Fin = Financial Services; Eng = Mechanical & Industrial Engineering; E&E Man = Electrical & Electronics Manufacturing; Bio_Ph = Biotechnology & Pharmaceuticals; BPO = Business Process Outsourcing; Auto = Automotive; Acc = Accounting; A&A = Aviation & Aerospace; Telecom = Telecommunications

Figure 9.5: Sectoral moves between 2011 and 2016 (N = 11,711)



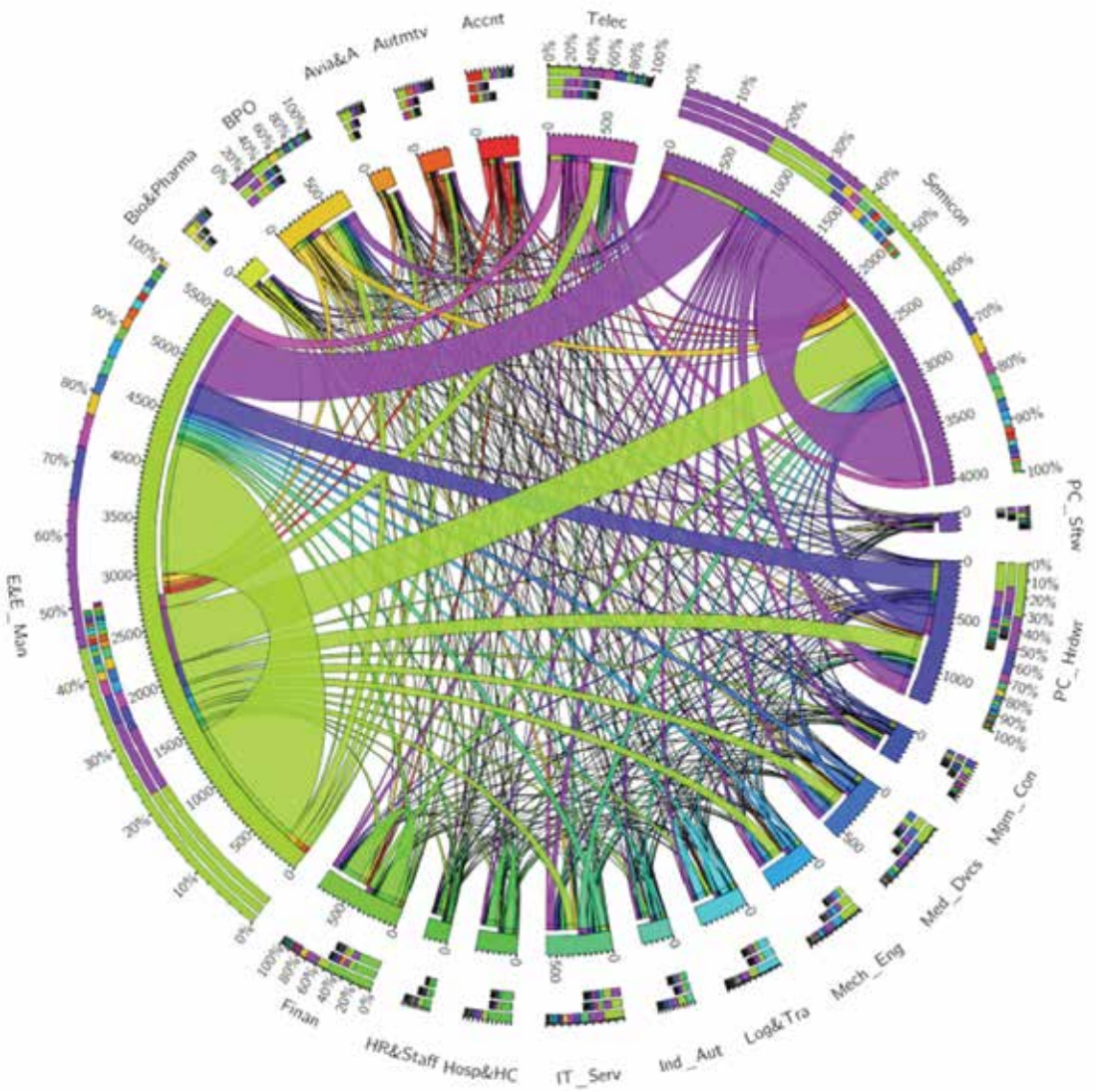
Legend: Man = Manufacturing; MICE = Meetings, Incentives, Conventions & Exhibitions; Log & T = Logistics & Transport; ICT = Information and Communication Technology; H_Care = Healthcare, Medical Devices, Biotechnology & Pharmaceuticals; Fin = Financial Services; Edu = Education; Crtv = Creative Industry; B & Adm = Business & Administration; Scn = Research & Scientific; R-Est = Real Estate; Oth_M = Other Manufacturing; Ret = Retail; PS = Public Sector; Env = Renewable Energy & Environment

Source: Own calculations based on LinkedIn

Labour flow: 2011–2016

- While the sectoral mobility pattern of earlier periods is still evident in the recent period, the increasing growth of other sectors also becomes significant.
- Intra-sector mobility continues to be important in absolute and relative terms; however, inter-sector mobility gains further significant, diverse and complex.
- As a result, in inter-sectoral mobility, the earlier dominance of bi-directional flows between the ICT sector and business & administration, and manufacturing is becoming less evident.
- At the industry level, intra-industry, inter-firm moves and bi-directional flows in the semiconductor, electrical & electronics, and computer hardware remain clear.
- The emerging industries are becoming quite significant in labour flows. The growth of the medical devices, GBS, financial and business services can clearly be discerned in a comparison with the industry flows in the earlier period. These growth industries continue to source labour from existing industries. This further indicates the role of the secondary labour supply to these industries. They are also marked by labour outflows, as they do not appear to be immune to turnover.

Figure 9.6: Labour flow by industry between 2011 and 2016 (N= 8,785)



Legend: Semicon = Semiconductor; PC_Sftw = Computer Software; PC_Hrdw = Computer Hardware; Mgm_Con = Management Consulting; Med_Dvcs = Medical Devices; Mech_Eng = Mechanical & Industrial Engineering; Log & Tra = Logistics & Transport; Ind_Aut = Industrial Automation; IT_Serv = IT Services; Hosp & HC = Hospitality & Convention; HR & Staff = Human Resources & Staffing; Finan = Financial Services; E&E Man = Electrical & Electronics Manufacturing; Bio_Pharma = Biotechnology &Pharmaceuticals; BPO = GBS; Avia&A = Aviation& Aerospace; Autmtv = Automotive; Accnt = Accounting; Telec = Telecommunications

Source: Own calculations based on LinkedIn

A more detailed analysis is necessary to establish the characteristics of the (out)flow referred earlier. As GBS becomes the focus in attracting new investment, it is relevant to scrutinise the impact of the emergence and growth of these operations in terms of labour market.

9.3 Mobility II: How growing GBS activities drive labour circulation[70]

This section analyses patterns of mobility related to GBS companies in Penang from an employee perspective. Individual job changes reveal the background of GBS employees in terms of occupation and industry. As the GBS industry is diverse, there is also a diversity in job-functions. In regard to work history, we discuss the linkages between mobility pattern and skill-relatedness in this section.

9.3.1 Mobility pattern

To study the employees' moves in GBS, a total of 296 employee work profiles of their last three (or less) job functions was compiled along with information on past employment such as employers, working period and current job title. As can be seen in Table 9.1, the move is active in internal mobility, where employees are switching from one position to another position within the firm. There are 130 job changes out of 546 total number of job change. Although a majority of employees are considered young – with age 35 years old and below, most of them had at least two employers before the current employer. On average, employees will stay with one employer for about five years. This testifies a moderate level of labour mobility in GBS.

Table 9.1: The characteristics of respondents' job changes

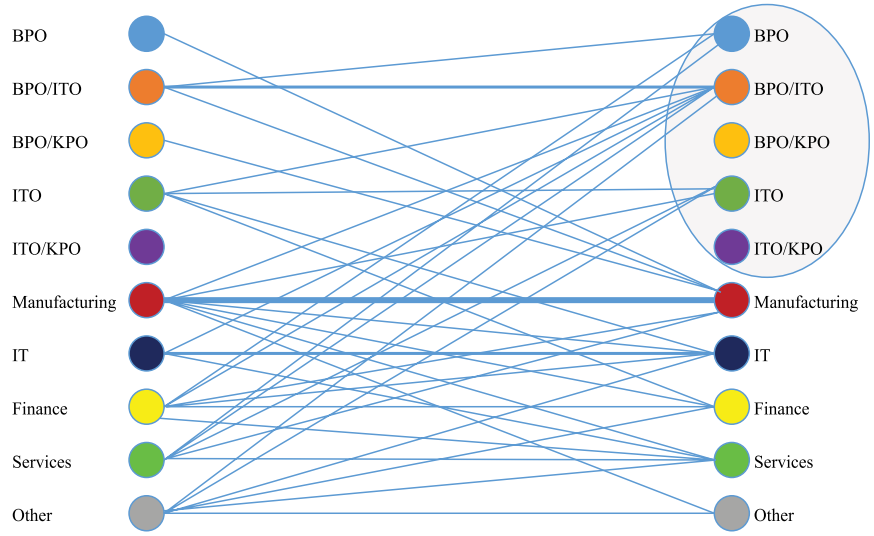
Total number of job change	546
Internal position change	130
First employer	46 (15.5%)
Second employer	65 (22.0%)
Third employer	74 (25.0%)
Fourth or subsequent employer	111 (37.5%)
Average years of experience	5.1

More than half of the job movement occurred in the past five or six years; there were 234 changes in the period 2010–2015. Of this, 156 cases had other employers other than the current employers; and 38 were new entrants. Specifically, 50 cases were the moves occurred within firms, while some 94 movements occurred between GBS companies within Penang, and four moved to/from a GBS company outside Penang. This indicates two phenomena: firstly, GBS experiences lateral (inter-firm) mobility; secondly, some of the companies face difficulties in retaining employees. The latter is likely attributed to the inflow of new GBS companies, or poaching from other GBS companies. This corroborates the role of the secondary labour supply in GBS.

Figures 9.7 through 9.9 show the mobility flows of 296 employees in Penang's GBS industry. The lines indicate the labour flows between industries and positions. Figure 9.7 depicts employees' job switching patterns from the third-previous employer to the second-previous employer. The subsequent job changing from employees' second last jobs to last job, and from last job to current job are respectively illustrated in Figures 9.8 and 9.9. The GBS sector is broken down into five sub-sectors (BPO, BPO/ITO, BPO/KPO, ITO, ITO/KPO) based on Penang's GBS focus. Most employees are currently employed in BPO/ITO (158), BPO (55), or ITO (45) services (BPO/KPO (23), ITO/KPO (15)).

[70] Based on Grunsven and Vos (2016)

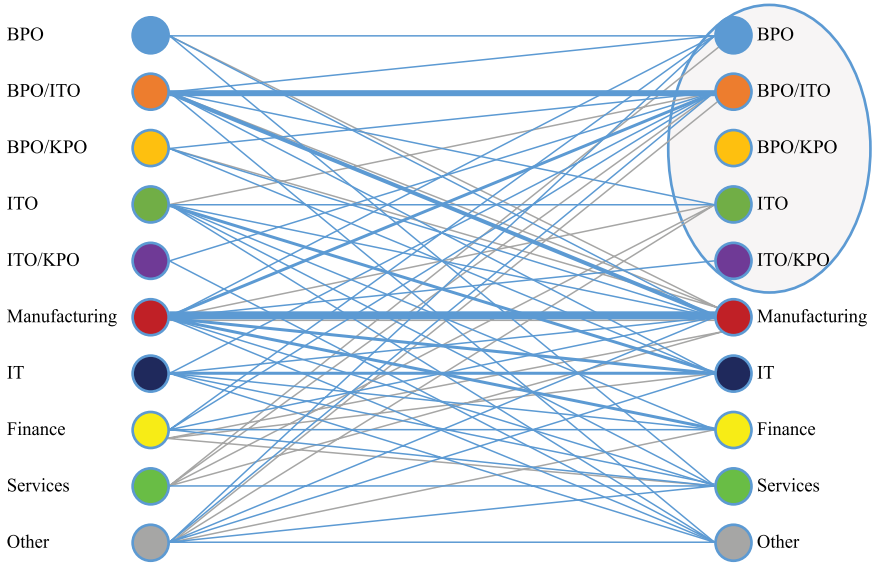
Figure 9.7: Labour moves from third-previous job to second-previous job



Source: Grunsven and Vos (2016)

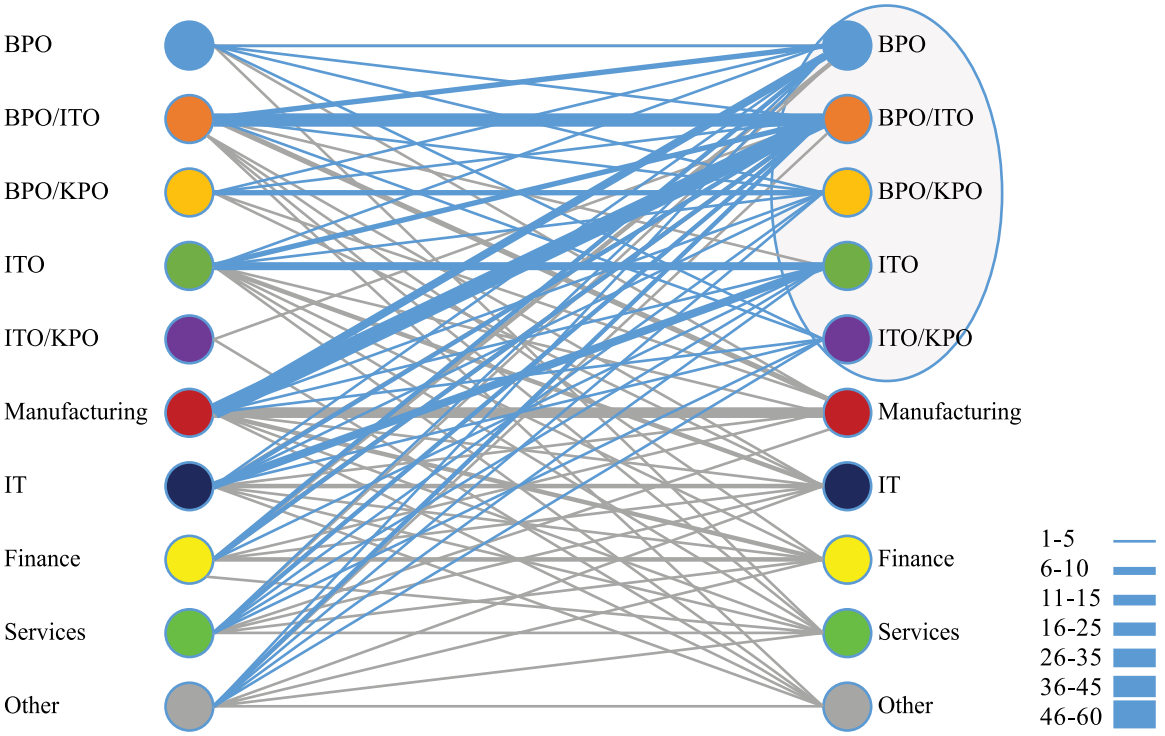
Looking at the labour mobility within similar industries and between different companies, there is a substantial mobility engaged in manufacturing and BPO/ITO. Many of these companies involved in the operations of BPO/ITO are manufacturing companies such as Intel, Dell, AMD and Jabil, to name a few. With regard to the movements from previous job to current job, three observations are dominant: first, the inter-departmental mobility in large companies that have expanded BPO/ITO as value chain activity; inter-industry moves from manufacturing and IT, and intra-ITO moves. Manufacturing companies often have an internal department for other functions for example, accountancy, finance, or Human Resources. Some manufacturing firms become more attractive as they centralise the regional services operations through the establishment of Shared-Services Centres (SSCs). This expansion not only increases labour demand, but it is also believed to offer a relative better remuneration packages (Jobstreet.com, 2015). Likewise, intra-company transfer from existing departments to a newly established SSC department is attractive as upskilling is provided.

Figure 9.8: Labour moves from second-previous job to former job



Source: Grunsven and Vos (2016)

Figure 9.9: Labour moves from former job to current job



Source: Grunsven and Vos (2016)

Tables 9.2 and 9.3 respectively describe characteristics of labour flows from manufacturing to GBS companies, and from manufacturing department to GBS department of the same company.

Table 9.2: Changes from former employment in manufacturing to current GBS employment

Former job			Current job		
Employer	Function	Since	Employer	Function	Since
Dell	HR executive director	2012	Agilent Technologies	HR sr. director	2014
Intel	-	2013	Agilent Technologies	HR representative	2014
Ansell	Plant controller	2013	Altera WS	Finance manager	2015
Pen Apparel	MS executive	2011	Citigroup Transaction Serv.	Transaction service analyst	2012
Intel	Network & telecommunication engineer	2011	Dell	Enterprise solutions consultant	2013
AMD	Equipment/process engineer	2013	IHS	Analyst (industrial automation)	2015
Dell	Finance director	2012	IHS	Finance director	2012
Southern Steel	Technical support	2011	Intel	IT support specialist	2013
Escatec Electronics	SMT supervisor	2012	Manpower Staffing Services	Client relationship manager	2013
Cincaria	Accounts receivable officer	2014	Osram GBS	Finance executive	2014

Source: Grunsven and Vos (2016)

Table 9.3: Shifts from an existing internal department to a (newly established) GBS department of the same company

Former job			Current job		
Employer	Function	Since	Employer	Function	Since
Osram Opto Semiconductors	Talent acquisition	2013	Osram GBS	Talent acquisition	2015
Intel	Career development council leader	2014	Intel	SSC Accounting senior manager	2014
First Solar	HR data centre admin	2011	First Solar	HRIS co-ordinator	2013
Dell	Technical training senior advisor	2010	Dell	Finance SSC	2014
First Solar	Principal engineer	2010	First Solar	Analyst SAP	2014
First Solar	Director of financial planning & analysis	2012	First Solar	Director of finance	2013
First Solar	Manufacturing planner	2011	First Solar	Training specialist	2013
Jabil	Regional IT manager	2011	Jabil	Global IT manager	2015
Intel	Global server monitoring analyst	2010	Intel	SSC payroll & benefits analyst	2012
Citigroup Software & Technology services	Vice-president	2014	Citigroup Transaction services	Southeast Asia Client On boarding Operations Head	2014

Source: Grunsven and Vos (2016)

Table 9.4 shows 14 cases of lateral mobility originating from AMD GBS to the current position in other SSCs, such as AirAsia, Wilmar and Citigroup, which are similar to AMD GBS, which offer high-order BPO services. There is high (skill) relatedness between the services of these firms, promoting mobility. Thus, these moves not only illustrate retention issues related to lateral mobility, but also looks at the contribution of secondary supply/market – in this case intra-industry – in filling vacancies in GBS operations.

Table 9.4: Mobility from AMD Global Services to other SSCs in Penang

Former job at AMD Global Services		Current job		
Function	Since	Employer	Function	Since
-	2008	Agilent Technologies	Global admin services	2012
-	2010	Agilent Technologies	HR programme admin	2014
Financial accountant	2012	AirAsia GSS	Finance executive	2013
Financial accountant 2	2008	AirAsia GSS	Intercompany accounts settlement team lead	2013
Financial accountant 1	2012	AirAsia GBS	Record to report team lead	2013
Sales operation manager	2011	Altera WS	Senior business planner	2014
Manager financial accountant	2006	Atmel	Senior manager	2011
HR analyst	2013	Atmel	Sr. HRIS analyst	2013
Financial accountant	2012	Citigroup	TS analyst	2014
Financial accountant 1	2009	First Solar	Accountant 3	2013
Senior payroll accountant	2004	PMC-Sierra	Senior payroll accountant	2010
Product development engineer	2011	Seagate	Applications analyst	2012
Financial accountant	2012	Wilmar GBS	Financial accountant	2013
Financial accountant	2011	Wilmar GBS	Accounts payable processor	2013

Source: Grunsven and Vos (2016)

The work history breakdown is summarised as follows: 27 employees work for the F&A department, nine for HR, three for the IT helpdesk, one for the manager, while the function of one employee is unknown (See Appendix O). Only 14 are fresh graduates, their current function at AirAsia is the first job. Average working experience – employees that might have more than three former previous employers exempted – is two years and eight months. Employees who had more than three former employers increases the average experience to around three years and a month. Of 41 employees, 10 had previous experience with GBS sector. Thus, almost a quarter of the employees had worked for another SSCs. A striking observation is the number of moves between SSCs (such as First Solar, Intel, Dell and AMD) to the SSC of AirAsia: ten of the 27 experienced employees moved directly from one of those companies. This again illustrates frequency of job change and corroborates the observations made.

9.3.2 Skill-relatedness

A relevant issue is to examine employees whose former jobs and current jobs at GBS companies are skill-related. Labour mobility is prevalent if skills and knowledge are transferable. This also means that mobility patterns mirrors skill-relatedness. Nonetheless, it is also possible that job positions in GBS sector also attract job seekers who do not possess required skills. Table 9.5 shows some cases of GBS employees whose current jobs are not skill-related with their former job functions and educations. A majority of employees, however, possess skills needed and related to their previous employment. The relationship between labour mobility and skill transferability is based on (expected) requirements and job functions. Labour mobility indicates skill-relatedness between occupations and industries. The pattern provides the scope of occupations and functions that can be assumed to constitute the relevant relatedness area of GBS positions. Thus, it indicates the catchment field, which is at risk of drainage as the GBS operations expand.

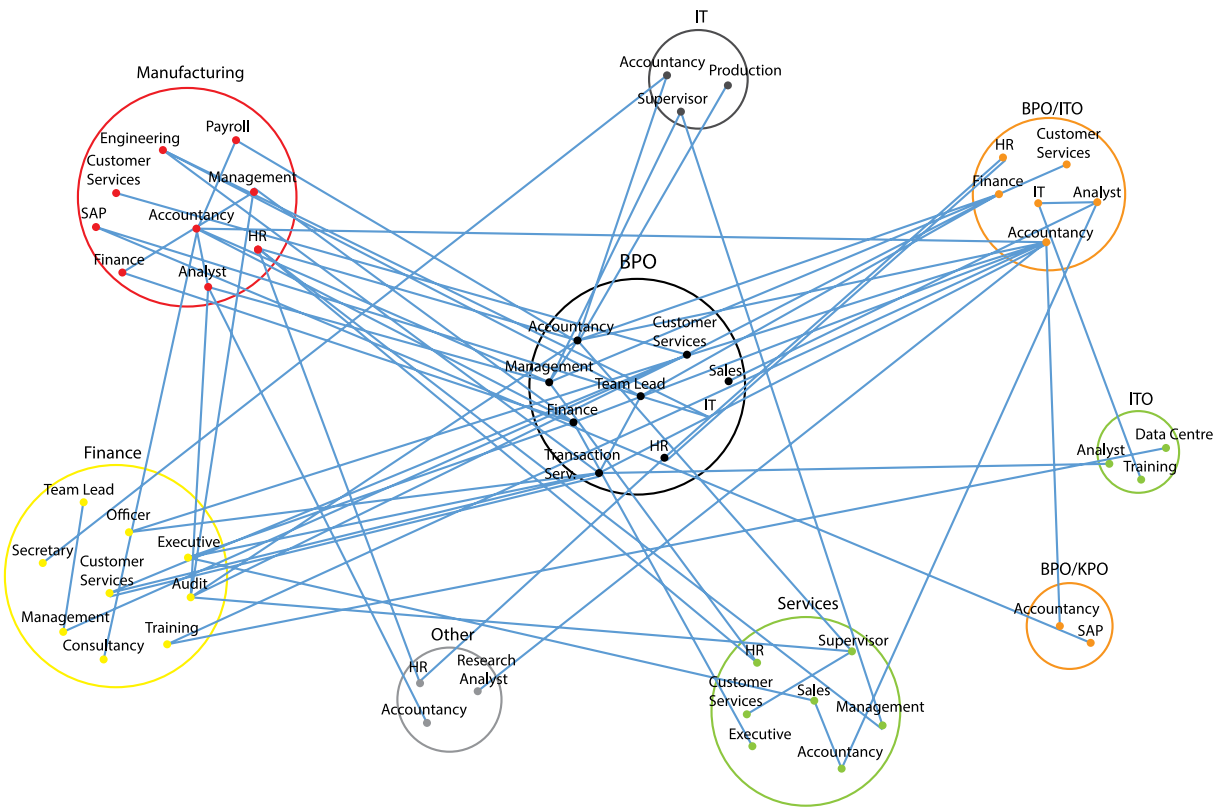
Every industry has a variety of job functions where inter-industry and inter-firm job switching is possible even when industries are radically different. At a lower level, similarity in occupational job-function matters across industries. The flows are not only differentiated by industry, but also by job-function and job-scope. Figures 9.10-9.12 exhibits the skill-relatedness of former and current functions of employees. Specifically, similar mobility pattern is observed for the movements of employees who currently work for GBS companies offering BPO/ITO services and ITO services (Figure 9.11 and Figure 9.12). The detailed work profile of current AirAsia SSCs employees are presented in Appendix O. Again, we assume that functional mobility across industries indicates actual skill-relatedness. Most of the employees in the ITO industry worked for an IT company prior to their current jobs. These industries are skill-related according to industrial classification. Skill competition can be deduced from this, where the growth of GBS will trigger the skill availability issues in the labour market.

Table 9.5: Some cases of employees whose current job is not skill-related with former job and education

Education	Former job		Current job	
Subject of education	Function	Employer	Function	Employer
Information Systems Engineering	Customer service advocate	Freescale Semiconductor	Staff financial analyst	AMD Global Services
Science & Technology Studies	MS Executive	Pen Apparel	Transaction Services Analyst	Citigroup Transaction Services
Computer Engineering	Technical Support Manager	Dell	Customer Care Manager	IHS Markit
Technical	IT support	Intel	Finance Executive	AirAsia GBS
Logistics	Financial accountant	Wilmar GBS	IT Service Desk	Intel
IT	-	Dell	Procurement Executive	AirAsia GBS
International Affairs Management	Public Relations	Malaysia Outstanding Youth Conference	Payroll Analyst	Agilent Technologies

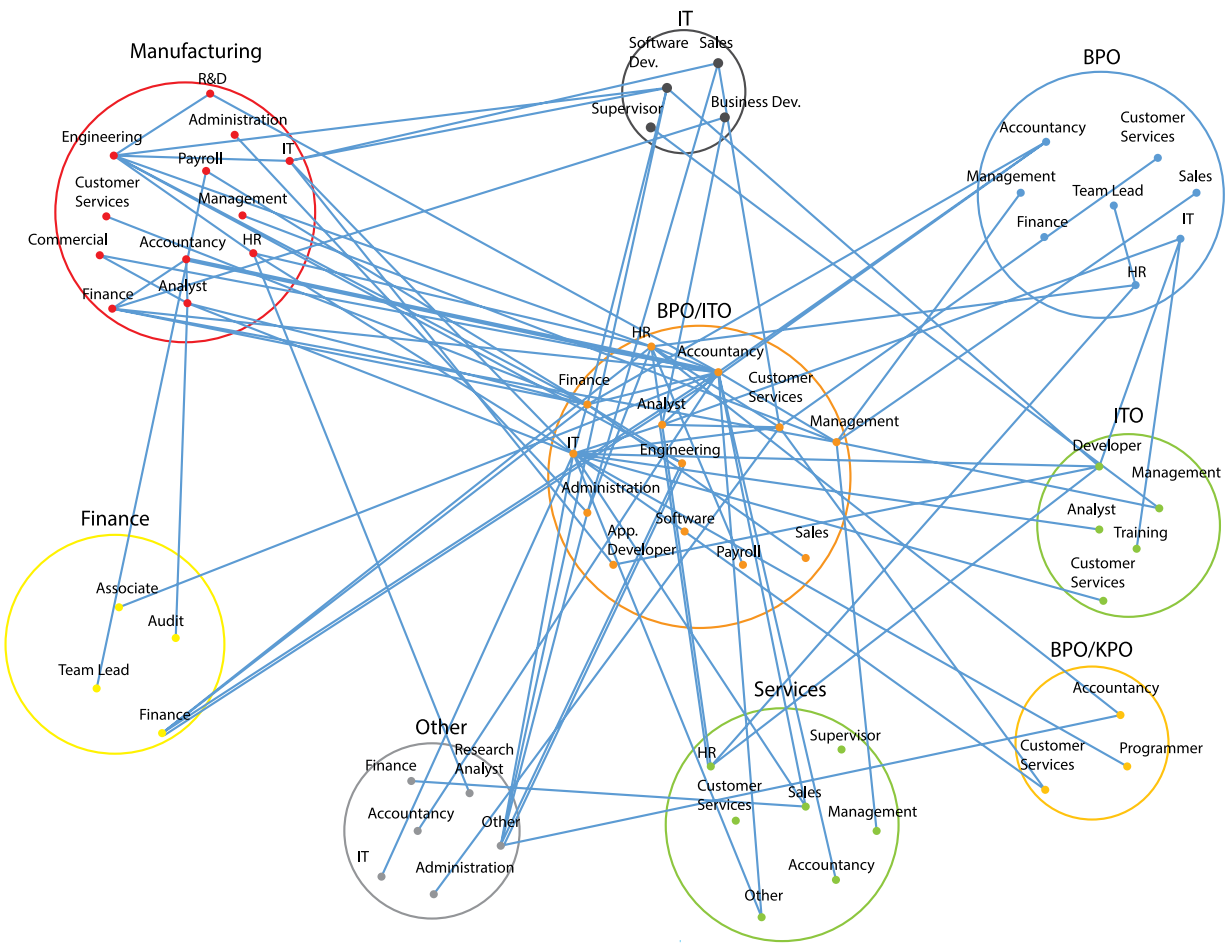
Source: Grunsven and Vos (2016)

Figure 9.10: Former function of employees currently employed in BPO



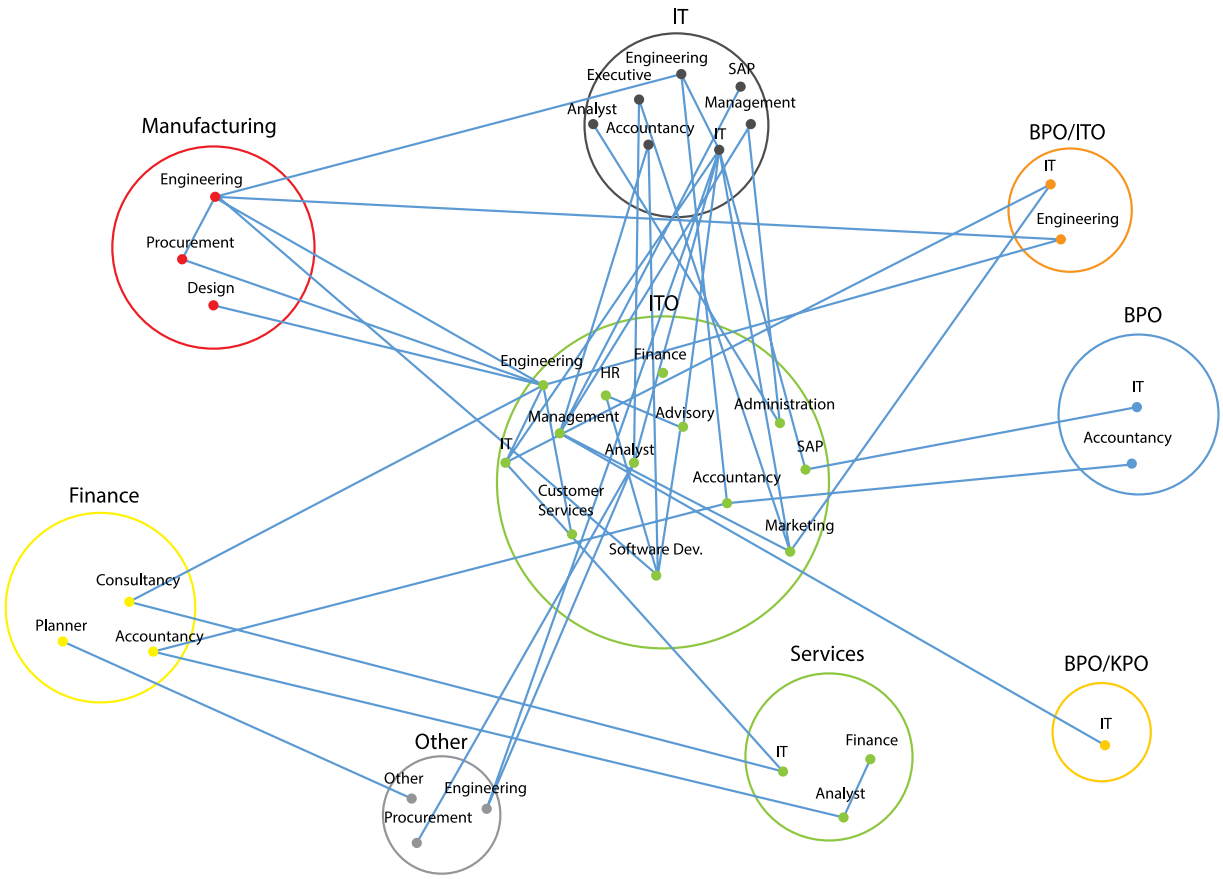
Source: Grunsven and Vos (2016)

Figure 9.11: Former function of employees currently employed in the BPO/ITO sector



Source: Grunsven and Vos (2016)

Figure 9.12: Former function of employees currently employed in the ITO sector



Source: Grunsven and Vos (2016)

9.4 Mobility drivers of GBS industry

9.4.1 Insights from LinkedIn employee profile

To identify the push factors that cause employees to leave their former jobs, respondents were asked to give the main reasons behind employees' decisions to quit their jobs. Of 296 respondents, about 12% of them involuntarily changed jobs due to company closure and operation reorientation. With regard to voluntary job change, three reasons dominate in employees' decisions; there are sub-optimal working conditions (31.5%), other lucrative job offers (28%) and unsatisfactory work arrangements including working hours and pay (21%). Other reasons include pursuing further studies, little career enhancement prospects, personal or family reasons (retirement, change of residence) and seeking new challenges.

9.4.2 Mobility motivations of GBS employees

Reasons for working in Penang GBS industry

Respondents cited several reasons for moving to GBS industry in Penang. These reasons are ranked by the order of importance (Table 9.6). All the reasons stated scored above neutral (>3) is regarded as "important" by respondents. Skill advancement emerged as the most important reason to shift to the GBS sector, followed by relevance skills and appropriate working hours. Lack of suitable jobs in other sectors scored lowest, which means that employees did not switch to the GBS sector because they were unable to find a job elsewhere, but rather GBS positions are intrinsically more attractive than positions in other industries.

Respondents were asked to select the most important reason for them to join the GBS sector. Skills and knowledge development, and gaining new and/or more experience were the main reasons. There were not many respondents stated higher wage as an important factor. This is, however, inconsistent with reasons stated for taking up other job offers. Reluctance of employees to state their true opinions may have played a role here.

The detailed reasons for employees shifting, and for leaving their former job are included in Appendix M. Wages, staff benefits and reputation of the employer are the most cited reasons to work in GBS firms. This corresponds with statements made by HR where the employees left their former job mainly because of better job offer and opportunity at current employment. These findings are consistent with the role of employer preferences in labour market processes.

Skill advancement is cited as the next most important factor for employees applying for positions within the GBS sector. Other factors include the employer's credibility and reputation.

Job satisfaction

Job satisfaction also impinges on the inclination to stay in the same job and company, or move to other job in other company. Table 9.7 presents the level of job satisfaction with one being rated as very dissatisfied and five being very satisfied. Respondents satisfied the most with "challenging work experience", followed by "learning of new skills". While wage and benefits are the main reasons for taking a job offer fringe benefits and bonus are still rated less satisfactory. This might explain the substantial occurrence of lateral moves.

Table 9.6: Reasons for working in the GBS sector ranked by importance

Reasons	Importance
Wage offered (higher in other sectors)	3.76
Relevant to my education	3.59
Relevant to my skills	3.94
Experience (compared with former jobs)	3.71
Skill advancement	4.08
Location of residence (Penang/near Penang)	3.86
Fringe benefits in the sector	3.80
Decent working hours	3.90
Lack of suitable jobs in other sectors	3.16
Social status of the job	3.45

Note: 5=very important reason; 3 = neutral; and 1 =unimportant reason
Source: Grunsven and Vos (2016)

Table 9.7: Levels of satisfaction of respondents with the following aspects

Aspects	Satisfaction
Wage earned	3.27
Bonus offered	3.08
Social status of work in GBS sector	3.41
Career progression in GBS so far	3.29
Career progression in this company so far	3.22
Future career opportunities	3.47
Challenging work environment	3.75
Learning of new skills	3.61
Fringe benefits offered	3.22
Daily work	3.37
Job security	3.59

Note: 5=very satisfied, 3=neutral and 1=very dissatisfied
Source: Grunsven and Vos (2016)

Prior to the current jobs in GBS firms, slightly more than half of the respondents did not actively searching for (other) job opportunities. They still decided to stay in Penang and work in GBS. However, nearly 30% of respondents do not plan to stay in their current job, confirming a mobile labour force. The employees named several reasons for the decision to leave their current job: lack of career advancement; gain new experience with new working environment; and low salary.

Employees who do not intend to stay in the current job are also looking for opportunities outside Penang. A higher salary is the main reason for this. The locations where they expect to earn a higher wage include Kuala Lumpur, Singapore and Australia. Of these numbers, 12 are single, whereas eight are living with their parents, while only three are married. It is not surprising that mainly single people are more able and willing to move (abroad) than married people with children.

9.5 High-qualified labour: Turnover and retention issues

9.5.1 Findings from the employer survey

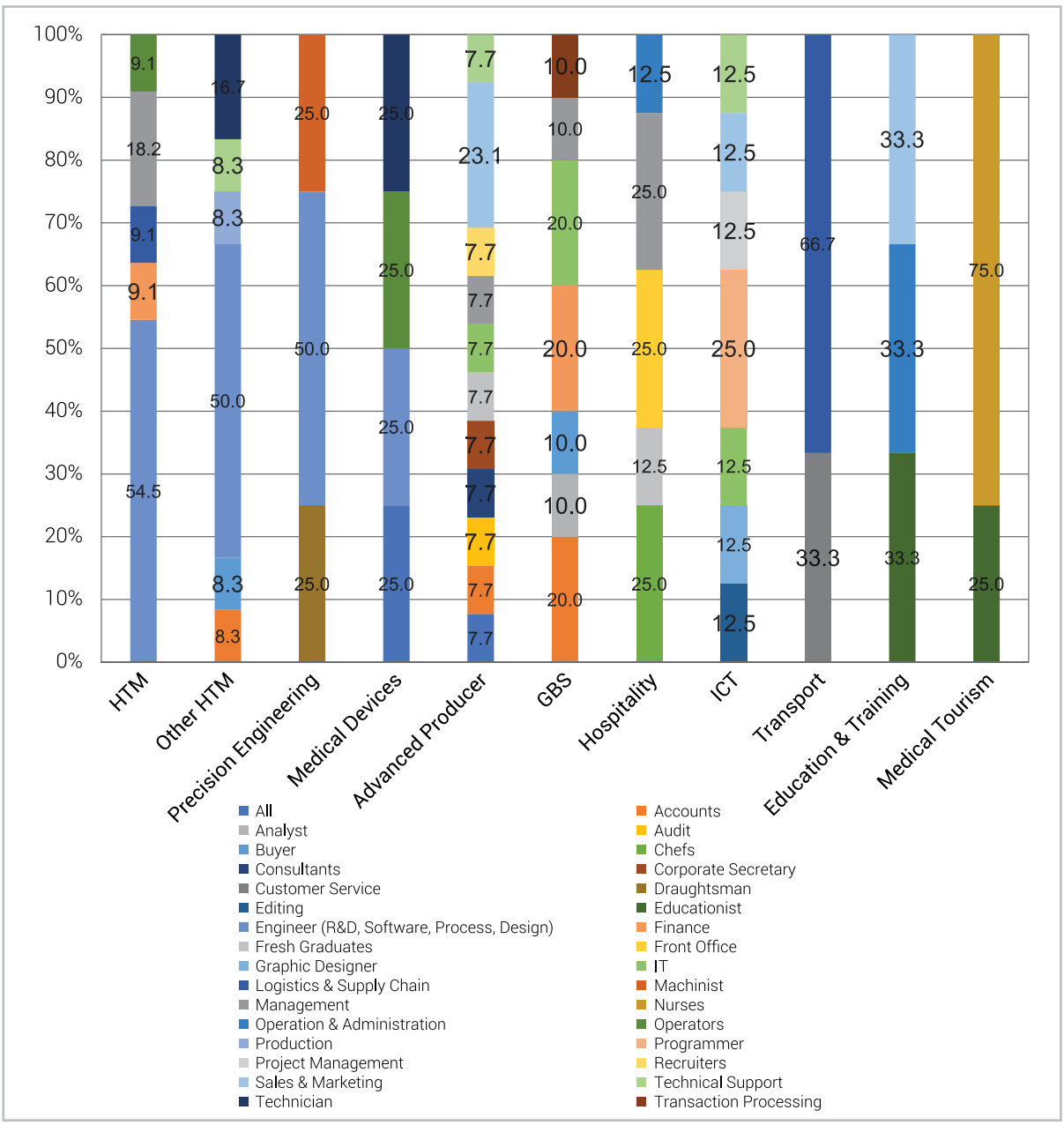
Individual mobility inevitably raises the concern of labour turnover at firm and industry levels. It lies on the ability of employers in retaining employees who are most proficient and skilled. Some employers give incentives to retain skill-proficient employees to resolve skill shortages. In this context, individual employees take into account of the availability of career opportunities as decision to stay with the firms.

Overall, labour turnover is substantial; it varies between industries and firms. Even employees' preferred industries and firms experience the retention issues. As expected, turnover also varies between job functions, inter-industries and within industries. The rate is in the range of 5% to as high as 30%, whereby the specifications of jobs and tasks in different industries will have to take into consideration. The variation in job functions is further depicted in Figure 9.13. Clearly, engineers are leading in hi-tech manufacturing and precision engineering in labour turnover. Furthermore, advanced producer services (APS), GBS, hospitality, medical devices and IT demontraste a fair distribution over a larger number of positions, unlike logistics & transport and medical tourism where there is functional concentration. It is quite apparent that in medical tourism where nurses dominate labour turnover.

The differences of labour turnover are also found between MNCs and SMEs. While almost 30% of MNCs indicate engineers as the function with the highest turnover rate, this goes for only 4.5% of SMEs. Meanwhile, 12% of MNCs indicate that management positions are particularly prone to labour turnover, with nil for SMEs. Almost 10% of SMEs indicate sales & marketing personnel, and another 10% indicate programmers as functions with high rate of turnover; but both categories score nil in the case of MNCs. Both MNCs and SMEs have a substantial distribution of turnover across functions.

Practically, all firms provide incentives to retain highly proficient employees. Financial rewards can be in the form of attractive salary package, annual bonus and a stake in the company through stocks/shares are most favourable measures used by firms to retain skill-proficient employees. Only in the hospitality industry are opportunities for (further) promotion offered more frequently (Figure 9.14). Non-material incentives, on the other hand, are also favoured by firms in most industries. A considerably large share of SMEs use bonus and flexibility working hours as non-material motivation compared with MNCs: 52% versus 33%. On the other hand, a substantial larger share of MNCs use promotion, recognition/award and stocks/shares as incentives: 44% versus 11%. This reflects the differences in the availability of financial and non-financial resources between MNCs and SMEs that in part underlies the distinction in enticing employees.

Figure 9.13: Job functions that are particularly prone to labour turnover by industry (%)



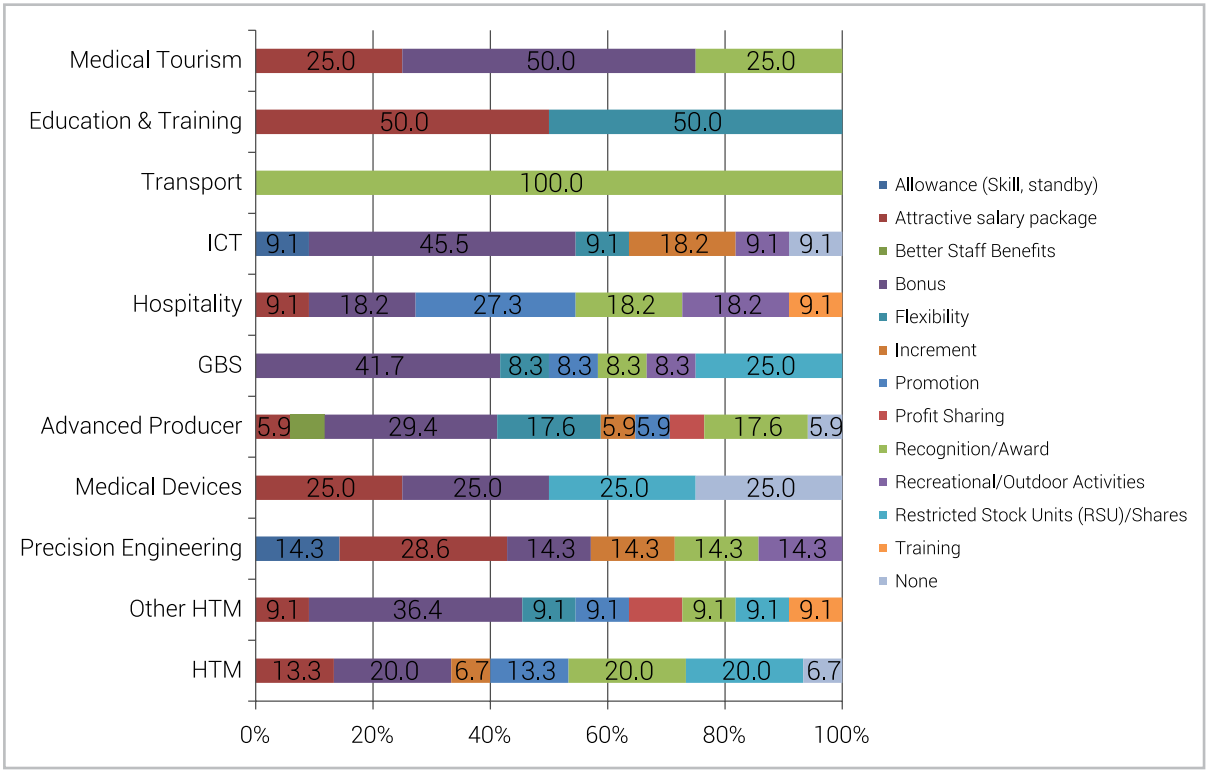
Source: Employer survey

The large majority of firms adopts strategies to retain employees in the face of skill shortage, although a small percentage confessed to have no strategy at all (13%); while another 13% did not want to disclose because of topic sensitivity. The majority of firms in most industries opt for a combination of measures. As incentives to retain proficient employees, remuneration and fringe benefits are often mentioned in the financial sphere (See Appendix N). Career development, including promotion, is also one of the key measures. While employees' bonding are important, it is less frequently adopted. As expected, there is little variation between industries. Likewise, there appears little variation between MNCs and SMEs, although remuneration may be less favourable in the case of SMEs.

The labour turnover and retention strategies show the mobility of employees as sticky, and firms respond this through a variety of measures. Responses in practice drive up the costs of labour, in all impinging on the operational competitiveness. Therefore, mobility causes burdens to companies.

Companies that do not provide career opportunities are in fact few, although it is still occuring. A clear majority of those that have explicitly incorporated intra-firm career advancement in their human resource management approach see promotion (65%) as the major avenue. Global mobility, that is opportunities to work in other establishments abroad is another significant avenue (Figure 9.15), while salary increment

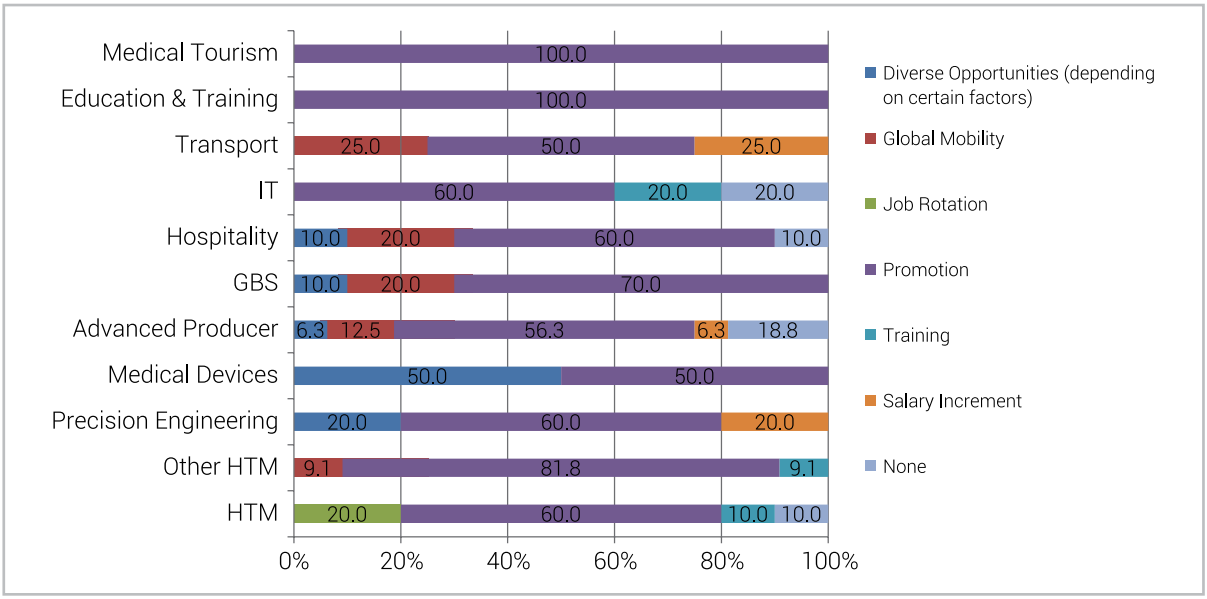
Figure 9.14: Incentives to retain existing highly proficient employees (%)



Source: Employer survey

is less prevalent (mostly such increments come with promotion). Differences between industries are not so evident, although advanced producer services (APS) and IT state their preferences not to offer opportunities for career advancement. There is a clear difference between SMEs and MNCs though, in that global mobility is a path almost exclusive in MNCs, while SMEs invoke salary increment more often. This is a simple reflection of SMEs, which are less exposed to globalisation. Box 9.1 illustrates retention issues and responses for GBS firms in Penang.

Figure 9.15: Career opportunities provided to employees (%)



Note: 5=very important reason; 3 = neutral; and 1 =unimportant reason
Source: Grunsven and Vos (2016)

Box 9.1: Turnover and retention in GBS firms

GBS companies experience different kinds of labour turnover. These include mismatches, forced resignation and voluntary resignation. A primary reason for mismatch is a poor fit between an employee's skills and interests, and the job requirements of the positions given that skills and attitudes may not keep pace with the job requirements over time. Forced resignation refers to an employer's decision to terminate the employment of an employee. Voluntary resignation occurs when an individual decides to pursue another career opportunity, relocates, or leaves the workforce for personal reasons.

It is sensible to most employers if a low-skill proficient employee voluntarily leaves the organisation. Employees could resign from the positions if the skills required are difficult to pursue. This discrepancy is still accepted by employers as it reduces the cost of training. However, this is not the case for highly proficient employees. Some financial and non-material incentives have been in place to retain these employees.

Moreover, some GBS companies found that the mind-set of Generation-Y and Generation-Z employees are different. They keep searching for better jobs to compensate for good and comfortable living. Some of them also perceive the "greener grass on the other side of the ground" by hopping from one job to another job. Therefore, mobile workers are essentially less desirable by many employers, as it will obstruct companies from retaining employees, especially those highly skilled ones.

The underlying reasons of turnover such as the decision to stop hiring or to quit are related to several factors: complexity of tasks; the level of work routine; demanding or challenging work versus remuneration; how a person exhibits teamworking skills with higher remuneration. Strategies to retain employees include: remuneration, fringe benefits, career advancement through promotion, change of job function, attractive working conditions, in-house or external training programmes for skills development, internal career advancement, suitable location, flexible work hours and posting to different regional offices. Companies are struggling with the fact that every function/position has a wage ceiling, and thus function shifts must be available to enable employees to advance their careers.

9.5.2 Retention drivers: Employee engagement

The data and findings so far appear to be consistent with the Penang labour market compartmentalisation model. While not fully in accordance to skill requirements, firms in high-profile industries, foreign MNCs and other new corporate operations are able to attract employees with a fair quality skill set.

Retention shows a diverse picture, with MNCs in high-profile industries not necessarily escaping the turnover conundrum. But their positions as preferred employers are expressed in the form of lateral moves rather than out-mobility. Employees of less attractive companies are more mobile and some continually seeking for better jobs. They are motivated by the specific skills in demand, salary and company reputation, and at the same time increase employability through skill accumulation. From the perspective of employees, this appears to be a logical and positive moves.

Notwithstanding the overall picture indicates complex buyer-seller conditions a constrained labour market. Increasing their selling capacity is a driver for employees' movements in view of the ubiquity of generic skills in the market. This indicates a surplus situation. Skill-relatedness is an important factor governing the direction of mobility. This direction signals where issues of retention, skill gaps, and shortages arise in the labour market.

There are also negative aspects in individual mobility attitude such as low worker's commitment, which has been lamented by many employers. It becomes a pressing issue when an employer faces with substantial turnover. This depletes the value proposition of an organisation's expertise and talent, resulting in continuous recruitment, skills gaps and shortages. The sense of low commitment is well expressed in employers' grievance about employees quitting because they always think that the grass is greener on the other side. The desire of employees to change job corresponds with the high number of applications per vacancy. GBS companies have already made this an integral part of their human capital strategies, which is a response to lateral mobility. Many others are following suit, and some employers involve in labour poaching.

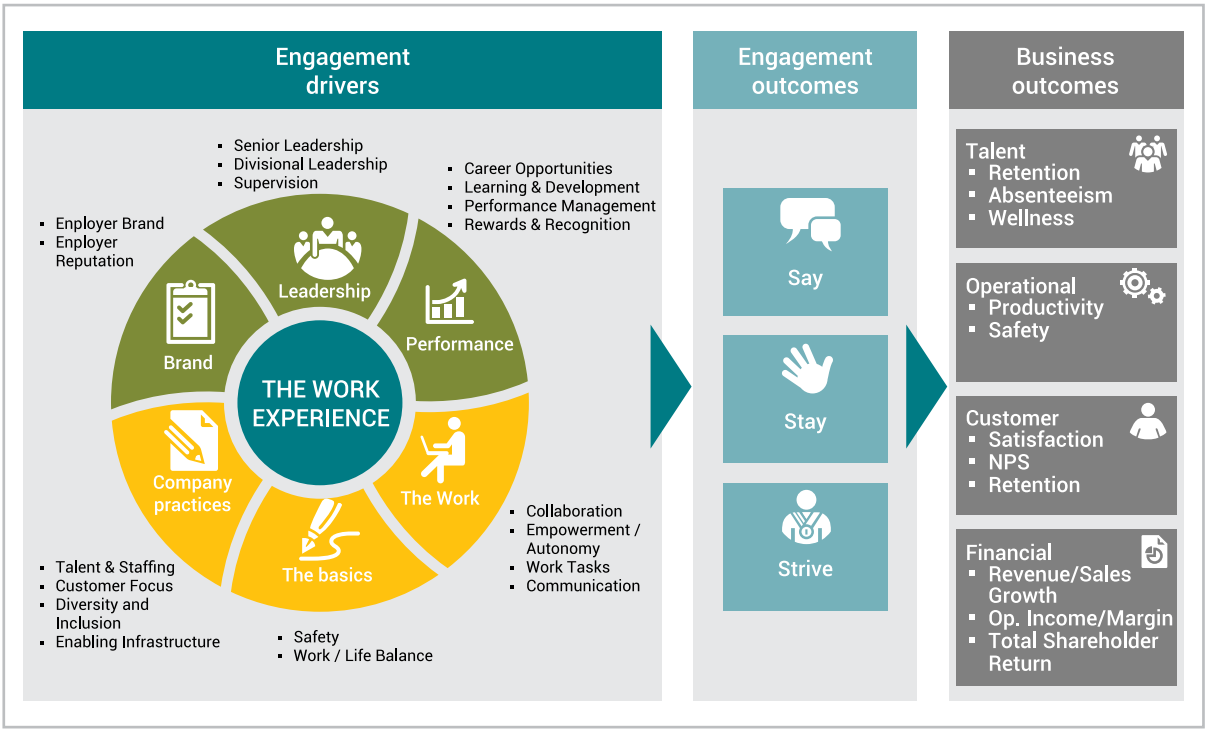
As revealed by the interview findings, Penang's GBS operations have adopted a new approach to overcome labour retention by specifically speaking to Millennials or Generation-Y employees. The lamenting approach to mobility and employee attitude is seen as overly negative, unproductive and dated. New generations of employees require a different – and more positive – approach, the core principle of which is to understand and accommodate their preferences, values and so on. In this sense, employers are urged to practise worker engagement.

Interestingly, a management lesson of a high employee quit rate are alluded. For example, organisations should be aware of the high importance of placing individuals on work-life balance practices. They would need to draw up policies and procedures to foster and enhance this balance among the employees, including changing inflexible corporate policies and practices to allow for a greater degree of adaptability and flexibility. Changes could include flexible work schedules, compressed five working days, job-sharing and other workplace arrangements.

The meaning and concretisation of worker engagement in a new management approach, as suggested by Aon Hewitt (2014-2016). Figures 9.16 and 9.17 show that positive business outcomes are linked with three engagement outcomes, which are to stay, to say and to strive. These outcomes are derived from a series of engagement drivers linked to different elements of work experience (Figure 9.16). These drivers constitute the concrete action points of management. The larger the company is, the more are the elements involved.

A Malaysian perspective on engagement drivers is offered in the scheme depicted in Figure 9.17. The scheme depicts Malaysia as a whole, as well as different categories of employees. Corporate leadership is ranked as the top employees' engagement for female and senior management employees. An enabling infrastructure is a function of positive action of corporate leadership. A PEMAS (Plan, Equip, Measure, Act, and Sustain) framework is recommended for the effective implementation of employees' engagement as deliberated by Aon Hewitt (2014-2016). The ultimate goal is to continuously provide training and ongoing communication.

Figure 9.16: Basic characteristics of employee engagement (%)



Source: Aon Hewitt (2014–2016)

Figure 9.17: A Malaysian perspective on engagement drivers

Malaysia	Generation Y	Female	Leadership	Senior Management	Middle Management
Brand	Brand	Senior Leadership	Senior Leadership	Senior Leadership	Enabling Infrastructure
Enabling Infrastructure	Senior Leadership	Brand	Work / Life Balance	Diversity and Inclusion	Brand
Senior Leadership	Enabling Infrastructure	Enabling Infrastructure	Brand	Brand	Senior Leadership
Rewards and Recognition	Rewards and Recognition	Rewards and Recognition	Career Opportunities	Career Opportunities	Work / Life Balance
Career Opportunities	Empowerment / Autonomy	Empowerment / Autonomy	Diversity and Inclusion	Talent and Staffing	Talent and Staffing

Source: Aon Hewitt (2014–2016)

Some argue that employee engagement is becoming a crucial approach and strategy in the digital age where information concerning opportunities in the market is increasingly abundant than ever (Box 9.2). However, employee engagement approach also meets with scepticism. Others also argue that engagement only goes so far when it comes to retention. A dilemma is presented to many companies as addressing the engagement drivers at the same time enhances employability, producing an incentive for mobility.

A further counter-argument is that when tailoring HR strategies to retain Generation-Y employees according to the engagement framework, management should note that employees' decision to quit are not mainly due to unsuitable practices. Instead, findings of studies suggest that, irrespective of potential good HR practices, Generation-Y employees still resign because of culturally influenced decisions, such as following the footsteps of their friends or simply switching jobs for no apparent reason. In other words, anecdotal information that attributes increased job mobility among Generation-Y employees to cultural trends receives substantial empirical validation.

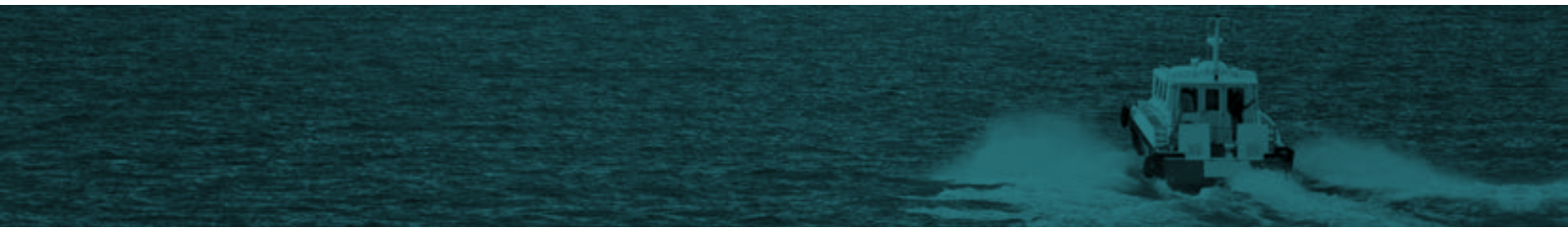
Box 9.2: Retaining talent in the digital age

Digital development is rapidly transforming the landscape of business operations, work culture and the workplace environment. According to a report released by Deloitte (2015), a younger and connected workforce are aspiring towards employment with purpose, mission and work-life integration. Millennials are particularly subject to such forces.

As employees are connected to a number of mobile devices concurrently, employers need to build a work culture to support digital implementation at the workplace. This will improve the competitive advantages of the company by attracting top talent to work for the company; reducing voluntary turnover rates; and thus sustain labour productivity. Employers need to be open to innovation and offer some flexibility by breaking down barriers and limitations on creative employee solutions. Employee engagement becomes an important tool to keep the talent innovating for the company. Boonsiri Somchit, the Partner and Co-Founder of Xtrategize Technologies encourages companies to build constant communication with younger employees through the adoption of work culture beyond the traditional practices. This is an important strategy to make workers stay longer in the company.

10

AUGMENTING SKILLS FOR THE NEXT ECONOMY: IDEAS FOR A SKILLS STRATEGY



This chapter presents suggestions for a short-term human capital and skills strategy based on the findings and observations emanating from the study. We include the vision and objectives of skills strategy supporting the – further – growing of human capital; the basic principles of establishing – and in the end implementing – a skills agenda; and the formulation of concrete components and linked initiatives.

10.1 A skills strategy

This study indicates that Penang's economy, industries and firms, are confronted with concrete skill issues in the realm of high-qualified labour. Demand patterns in the market are substantially shifting. While it signals Penang's success in moving the economy into a higher plain, skill sets as they often get in the way of firm's desired development path, impose – additional – costs on employers, and hinder the achievement of workers ambitions in regard to their career and life. Due to a range of factors that have been pointed out throughout the various chapters of this report, Penang's labour market at the mid- and high-end is marked by a number of deficiencies and distortions. In large parts of the economy, firms and workers are caught in a vicious circle, and thus firms cannot achieve desired goals.

Notwithstanding remedial measures that have been adopted over years and are in place, the onus is still in large part on companies themselves. While companies are a locus of skill-building, their potential to invest in human capital has constraints. There are limitations as to what they can offer workers, imposing dilemmas. There are generational differences in the workforce arising from different mind-sets and communication styles of workers in different eras. Indeed, skills is about economy, industries, firms and people. A range of discrepancies relative to (prospective) employees' perceived needs engender substantial turnover and mobility. It remains to be seen whether efforts at worker engagement can reverse these trends.

It should be noted that many of the issues are not new. We cannot expect that these issues will disappear overnight. This requires a joint effort by stakeholders, institutional and private. A first – core – recommendation is as follows.

Recommendation: Develop a coherent, encompassing, state skills strategy, departing from a clear vision – shared by stakeholders – and reflecting ambitions

Several aspects of such strategy are highlighted through specific objectives broadly shared by stakeholders that a skills strategy eventually must accomplish, which reflects the vision. It should depart from and adopt a number of core principles. Further, there is the question of the ownership of a strategy, in relation to formulation and implementation.

We suggest the following vision and objectives of skills strategy.

Vision: To further grow human capital as an enabler of a high-income economy and society, and to upgrade Penang as a node in the national and global economy

Specific objectives may include:

i. Overcome discrepancies between demand and supply, quantitatively and qualitatively, mitigating the negative effects of such discrepancies, such that high-qualified human capital continues to be a competitive asset in the investment climate of the region;
ii. Achieve a skill-equipped workforce for economic productivity, thus moving forward to a flourishing next economy with resilience; the focus of education and training providers will be on providing skill development that is relevant to the needs of learners, society, and industries in light of local, national and global trends;
iii. Achieve broad access of all segments of the economy to a high-quality skill system according to their demand; and
iv. Effectively assist in a productivity drive that enables high-qualified labour to accomplish its ambitions without unduly burdening employers.

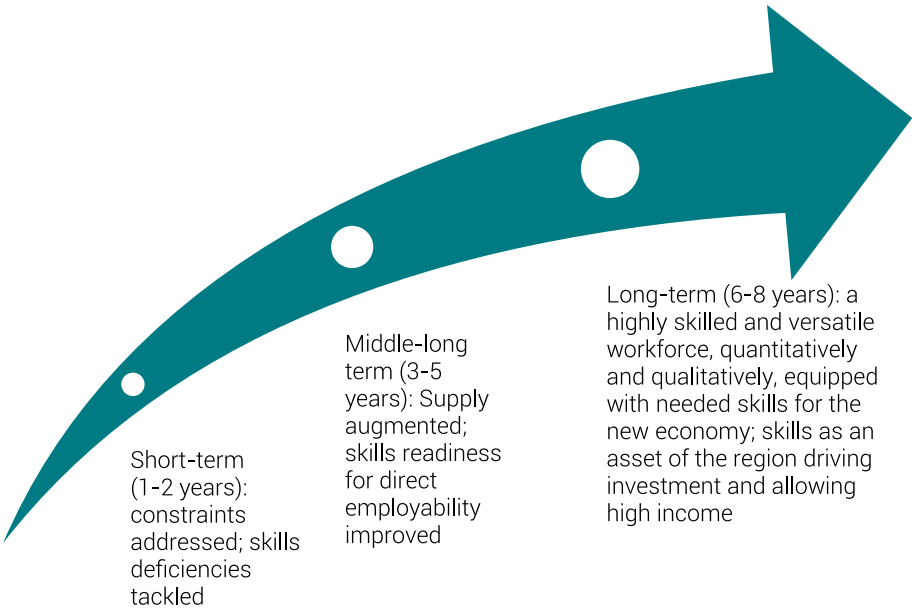
Figure 10.1: Basic principles of a skills strategy

The principles are described as follows:

1. **Integrated approach of demand and supply side**
   A strategy evidently must consider both sides of the labour market coin. One proviso is that the demand side is more difficult compared with the supply side.
2. **Incorporate macro-, industry/firm and worker levels**
   A strategy should take a multi-level approach as skill issues are evident at more than one level; at the same time the level of industries must be sensitive to differences between industries and firms.
3. **Must take a multi-actor and multi-pronged approach**
   Initiatives and programmes concern a range of actors. It is important to coordinately involve not only public and private agencies, but also institutions, companies and workers. Inclusiveness is an important principle where multi-actor approach requires consideration of the presence of diverse government- and governance levels, each claiming specific jurisdictions. As issues are diverse, a strategy must pursue a range of avenues.
4. **Building on what is already in place**
   The presence of a substantial skills training and development infrastructure, in part geared towards higher-qualified labour and specific hard and soft skills in different areas. This infrastructure involves institutions, companies, private training providers and others. While part of this infrastructure is a manifestation of skill issues, they are also part of the solution. Thus, a strategy must seek to:
   - Improve effectiveness and the return of what already exists by removing impediments and disincentives;
   - Build on existing programmes and initiatives by augmenting and supporting them, as well as identifying and filling gaps; and
   - Identify a balanced contribution of actors according to their core competencies and jurisdictions.
5. **Not only short-term but also middle- and longer-term**
   A strategy cannot do without a time frame. While a range of issues require short-term policies and initiatives, the vision and objectives also pertain to the longer-term. Figure 10.2 elucidates that different objectives have different time scale.
6. **Incorporate structure and organisation of implementation**
   A strategy has little meaning without a clear implementation plan and path.

The main focus is on the short-term while the structure and organisation of implementation will not be elaborated in this study as it touches directly on strategy ownership. The skills development landscape in Penang consists of a range of actors, operating at different levels. In the Penang's skill situation, the presence of diverse government and governance levels implies divided jurisdictions. While this has to be recognised, it appears to complicate an effective multi-actor approach to the formulation of a skills strategy. Coherence may be difficult to achieve in the current landscape. Some of these issues are further indicated and a possible way forward is suggested in Section 10.3, where we discuss the organisational framework of a skill strategy.

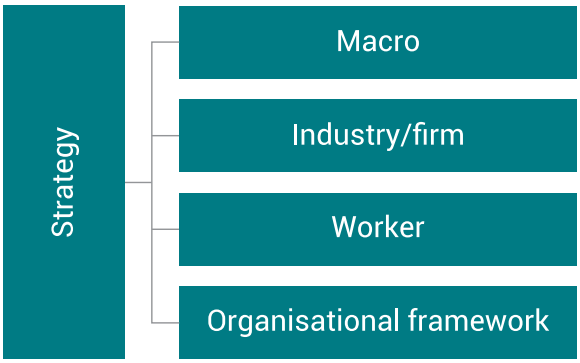
Figure 10.2: Skills strategy objectives in time perspective



10.2 Skills strategy: Components

Following the basic principles of the strategy as outlined above, several components may be identified to structure the strategy. These are depicted in the Figure 10.3.

Figure 10.3: The basic components of a skills strategy



The macro component in the strategy refers to overall demand for high-qualified labour skills and skill supply, while the industry/firm component is at a next level. This component revolves around matching of supply to demand, taking into account of industry differentiation and specificity. A third component concerns worker behaviour contributing to labour market processes. Finally, the organisational framework of skill augmentation, including its institutional setting, is a necessary part of a strategy, following on from issues in the skills development landscape and the question of ownership of a strategy.

10.3 Ideas for short-term initiatives

Objective: Overcome quantitative and qualitative discrepancies between demand and supply in mitigating skill shortages and gaps, such that high-qualified human capital continues to be a competitive asset in the investment climate of the region.

A. Market

Recommendation **Implement avenues to ease high-qualified labour demand**

Initiative 1 *Further implementation of labour-saving technologies in work processes*

- Explore and transfer relevant technologies;
- Devise and provide incentives to adopt human capital saving technologies in work/labour processes throughout the economy; and
- Invigorate local automation industry for sourcing of solutions locally.

Initiative 2 *Accelerate phasing out of operations in industries that are cost-based or incompatible with upgrading ambition*

- Devise and implement more disincentives to continue such operations in Penang; and
- Retrain skilled local workers who become available, for employment in targeted operations.

Notes:

- Human capital saving technologies are easier to implement in manufacturing than in services. In addition, a category of operations will necessarily continue to be based on input of human capital as they are difficult to automate (e.g. customer services). Yet, in a range of services industries/ operations automation developments are underway. For instance, Shared Services Centres (SSC) in GBS have started to adopt Robotics Process Automation (RPA) in their operations and business processes.
- Penang's automation industry has the competencies to offer solutions to automation of work processes in several industries.
- Industry 4.0 initiatives are underway.

Key Observations	Issues	Proposed solutions
Demand		
The demand for high-qualified workers is expected to remain high.	Sensitivity to global and domestic events causes volatility; makes quantitative prediction difficult.	Monitoring of demand trends; Skills Information System (see Organisational Framework).
	Newly established firms absorb a significant number of workers; skill demand structure different from skills of labour made redundant due to closures; competition in the market intensifies.	Dampen demand by judicious industrial, investment and technology policy, to start with promotion labour saving technologies.
Demand is expected to further shift towards higher skills, with more emphasis on specific hard and soft skills; also more demand for experienced workers.	Supply constraints lead to intense competition among firms for such skills and experience.	Bring supply in line with demand (see Supply).
Vacancies, while indicating labour need, may not be a perfect indicator for actual or net demand because of chain effects of job shifts and labour mobility (behaviour of secondary supply). Apart from new jobs, vacancies result from high labour circulation.	Recruitment of high-qualified labour is attributable to replacements, next to expansion. Firm's structure (see Chapter 2); constrained industry markets; worker behaviour.	Increased supply; mitigate labour competition; worker attitudes (see Supply, Industry/firm and Worker levels).

Key Observations	Issues	Proposed solutions
Supply		
Vacancies are present in a constrained market as far as high-qualified labour is concerned.	Brain drain; more outflow to KL core region than inflow; international outflow (Singapore).	Improve competitiveness in terms of perks and living environment.
As against prevalence of generic transferable skills, within the constrained market there is genuine shortage in the fields of fairly high skill-specificity/skill shortage in the area of professional (job-) specific skills.	While overall supply is moving in the right direction, there is quantitative shortage in a number of critical occupations and functions. Study preferences of students lead to mismatch demand and supply.	Increased output of graduates in areas of shortage. Support new sources of supply. Redirect preferences of students. Improve skill specialisation and depth demanded by core industries (see Industry/firm).
	Lack of hands-on/practical experience of entrants lowers employability given recruitment preference.	More opportunities to gain real world experience during studies. Learning@work opportunities
While skill demand is changing towards a greater importance of selected hard skills such as language proficiency (English and foreign), and soft skills, competency does not quite follow.	Skill-readiness of entrants; insufficient skill-building among existing employees. Constraints faced by educational institutions as far as primary supply is concerned. Costs of training for selected firms; general disincentives for upskilling.	Improve readiness of entrants in most demanded hard and soft skills. Educational institutions: from constraints to flexibility. Do away with disincentives for upskilling and effective training of existing employees.
Recruitment practices and mobility indicate the role of the secondary supply, adding to primary supply.	Overall supply. Entrants have too little practical experience.	Increased output of graduates in areas of shortage. More opportunities to gain real world experience during studies, including Learning@work opportunities.
	Significant labour loss associated with turnover is a burden to companies. Labour loss through turnover contributes to skill gaps and produces disincentives for upskilling.	Economic structure that levels the playing field of competition for employees, moderating mobility (see Industry/firms).
Frequent job shift as indicated by the application patterns of vacancies pointing towards the supply marked by a prevalence of generic transferable skills.	Skill orientation of educational programmes.	Improve skill specialisation and depth demanded by core industries (see Industry/firm).

Recommendations

Targets: Overall supply; study preferences of graduates; skill composition; practical experience of entrants; labour circulation excess (see Industry/firms).

Recommendation **Devise opportunities for more effective labour capture through the regional labour field**

Recommendation **Increase intake of students in areas of shortage**

Recommendation **Increase supply by tapping into tertiary supply (unconventional sources)**

Recommendation **Redirect preferences of students in the field of study such that choices and inflow are more in line with labour market needs (especially in areas of shortage of critical occupations)**

Recommendation **Re-orient education and training (teaching and learning) towards less emphasis on qualification(s) and more on skills and exposure that come with the qualifications**

Initiative 1 *Improve regional labour capture through labour field adjustment*

- Location of companies/establishments vis-à-vis residential nodes;
- Improve ease of commuting through improved connectivity;
- Address bottlenecks in traffic/transport and telecommunication; and
- Explore avenues of out-of-office and tele-working.

It should be noted that a number of measures under such an initiative are already underway.

Initiative 2 *Liaise with proper authorities to further augment capacity of (local) tertiary educational institutions to deliver graduates*

- Inventory of bottlenecks and opportunities; and
- Augment and deliver financial resources for investment.

Initiative 3 *Expand opportunities for needy students to obtain scholarships, allowing them to pursue tertiary education or an advanced degree*

- Expand Penang Future Foundation Scholarship awards; and
- Explore avenues for the establishment of philanthropic foundations for the disbursement of scholarships in specific areas.

Initiative 4 *Support and enhance existing "back into the workforce" programmes implemented by TalentCorp*

- Support provision of different training programmes to ensure that knowledge of re-entrants is relevant to market needs. Housewives and other returnees are likely to face challenges in closing the skill gaps to match current skill demand;
- Create a broad assistance platform to continually encourage potential returnees to pursue their careers after having been out of the workforce, which may include the necessary incentives;
- Devise and implement life-long training programmes in conjunction with relevant providers; and
- TalentCorp introduced the 3R approach – Return, Retain and Rise. The initiative aims to bring women on a career break to return to the workforce through Career Comeback Programme; retain women in the workforce through implementation of work-life programme; and increase women representation in senior management positions. The career comeback grant enables employers to offer work-life integration via Flexible Work Arrangement and Family Facilities such as mentoring programme, flexi-hours, etc., co-funded by TalentCorp.

Initiative 5 *Provide more choices for students in the field of study to align with labour market needs*

- Develop more undertakings such as the Penang Science Cluster in appropriate fields;
- Improve visibility of – and knowledge about – such undertakings using wider publicity and targeted dissemination;
- Make visits to such clusters/centres an integral part of school programmes; and
- Develop channels to showcase industries and new technologies.

Note: The promotion and adoption of new technologies in manufacturing and services change the skills needed. For instance, Industry 4.0 no longer rely predominantly on "traditional" engineers, but requires a broader spectrum of skills. Such technology may open up opportunities for those whose skills are less demanded with current technologies; thus, the effectiveness of the use of current human capital can be improved.

Initiative 6 *Change and improve skill-orientation of educational programmes*

Despite the lack of skills, theory still provides an important foundation for students to acquire knowledge, development and competencies. Yet, a rebalancing towards skill acquisition (teaching and learning) is desired.

- More diverse skill-learning through specific teaching and learning methods;
- Demanded hard skills: multilingualism; soft skills: communication, critical thinking, problem-solving and creativity; and
- Skills associated with qualifications must be up to standard.

Initiative 7 *Improve skill-readiness of entrants through more practical exposure*

- Practical knowledge/skills should be emphasised and incorporated into the curricula as students' progresses towards higher levels in undergraduate studies;
- Widen opportunities for students to gain real world experience through internship and practical sessions. These should become an integral part of the curricula;
- The constraint of mandates given by authorities is a barrier to develop programmes with more emphasis on practical training and to increase duration of industrial training programmes;
- Companies should provide more opportunities for internships and exposure to business processes and practices; and
- For this purpose, it is useful to revive platforms for industry-university dialogue, collaboration and partnerships. This invigoration can be assisted by a set of incentives.

Little can be done in the short-term with respect to attrition of labour in other attractive locations (such as Kuala Lumpur and Singapore). In the long run, initiatives such as the ones suggested here will enable the economy to progress further. This will automatically provide better opportunities for high-qualified labour with greater rewards. It is expected that these will lessen incentives to shift, especially if combined with projects that enhance the quality of life in Penang.

B. Industry/firm

Key Observations	Issues	Proposed solutions
What applies to the market as a whole, may not necessarily be the case for individual industries (meso) and/or firms (micro): skill issues tend to occur more in some industries and firms than in others. Economic structure has significant implications on the Penang labour market and functioning; the economic structure implies that industries and companies do not compete on a level-playing field with significant differences in the capacity to compete for labour skills in a competitive market. This is reinforced by skill-relatedness of newer industries and their employee functions as well as the tendency towards experience as one of the recruitment criteria; is manifested in a tendency to tap into – and rely on – the secondary supply.	Competition on unequal footing. Due to better remuneration packages and other conditions, reputable and new industries and firms are able to appropriate skills in demand available in the market – from primary and secondary supply – as these are 'preferred' employers; less established local firms in general experience to a larger extent not necessarily difficulties recruiting skilled labour but rather competency shortages and gaps. The latter are faced with substantial labour loss and diminished growth potential.	Selective approach in policies and plans. Level the playing field by addressing compartmentalisation and improving the attractiveness of currently less favoured industries and firms (see also Workers). Enhance supply of skills in high demand. Generate new sources of supply.
Persistent vacancies vary across industries and firms.	In each industry persistent vacancies are present, but to a varying level.	Focus augmentation of capacity of (local) tertiary educational institutions on occupational categories where they are most lacking and critical.
Even reputable preferred companies are faced with skill deficiencies of local labour supply (supply of labour in a number of critical occupations/fields of expertise).	Entrants and – to a lesser extent – those with work experience have insufficient specific hard skills (according to requirements of functions). Skill-orientation of educational programmes. Entrants have lack of practical experience Skill deficiences in MNC companies may affect the ability to win techological development projects, hindering the development of Penang establishment.	Improve skill specialisation and depth demanded by core industries (see Industry/firm). Achieve more balance in skill sets. Industry-education collaboration; partnerships for internships, practical training. Additional source: import skills from abroad.

Some firms – not linked to any specific industry or other characteristic – are themselves responsible for recruitment difficulties/skill shortages and retention issues.	Firms either tend to be selective in the recruitment process or employers adopt recruitment and work practices that are less appealing to the younger generations. Employers are insufficiently concerned with the work environment offered to employees, to offset e.g. lesser need for training.	Modernisation of recruitment and human resources practices. Improve work environment and give employees a stake in the company.
Different segments of the economy require different skill-sets; stated otherwise: not all segments require the same skills in terms of proficiency/competency level and experience. In principle, available skills (level) may fit some segments of the economy.	But recruitment and retention are constrained by preferences and attitude of workers, among others, training and skill acquisition opportunities.	Focus on solutions for skill recruitment difficulties in most affected industries. Other industries: focus on retention.
Frequent job shifts as indicated by the application patterns point towards the supply marked by a prevalence of generic transferable skills. As against the prevalence of generic transferable skills, within the constrained market there is genuine shortage in fields of high skill-specificity/skill shortage in the area of professional (job-) specific skills.	Insufficient industry- and job-specific hard skills; lacking industry knowledge. Circulation as a vehicle of function-specific skills acquisition and employability. Improvement towards preferred industries/firms, rather than reflecting acquired skills and experience. Mobile workers still have skill deficiencies.	Achieve more balance in skill-sets; larger degree of skill specialisation. More extensive skill-sets of entrants; more intra-firm career opportunities Upskilling across industries.
Skill demand is changing towards a greater importance of function-specific hard skills (including proficiency in English and foreign languages) and soft skills.	Competency in these skills does not quite follow: entrants have insufficient skills; corporate practices lead to insufficient upskilling for existing employees.	More extensive skill-sets of entrants. Remove disincentives for training and upskilling.
None of the skills measured are rated as proficient or highly proficient. There are skill gaps.	Skill-sets of entrants. Turnover and retention issues.	More extensive skill-sets of entrants.
Firms' view in relation to skills that need the most improvement lean towards specific hard and soft skills rather than generic hard ones; however, this differs by types of firm.	Labour turnover and retention; disincentives for upskilling.	Remove disincentives for labour training and upskilling. New sources of supply: quaternary.

Firms in Penang are showing a range of responses to skill shortages and gaps. One is underhiring, which may contribute to a low rate of persistent vacancies. Another is labour training in various ways.	However, reputable firms that have to maintain quality standards cannot afford to underhire without substantial upskilling efforts. There are risks to labour training constituting a disincentive. Many firms are 'dual' in their attitude: on one hand they frown upon job-hopping (negative recruitment factor), but at the same time engage in labour poaching.	Remove disincentives for labour training and upskilling. New sources of supply: quaternary Level the playing field on which companies operate.
Firms attempt to overcome skill gaps through multi-pronged responses that include changing work hours, re-allocation of tasks, supervision by experienced employees, and labour training. Upskilling is practised by most firms, and is done internally and by external providers.	Some firms lack resources to upskill/train. Workers do not prefer to work longer hours; goes against providing a better work environment. There are risks to labour training constituting disincentive in training investment.	Assist needy firms though financial and non-financial incentives.
Mobility reflects the degree of skill-relatedness of operations in industries and firms; high skill-relatedness of segments of the economy is expected to contribute to high levels of mobility. Skill-relatedness is an important determinant of mobility patterns in terms of links between sources and destinations; through skill-relatedness, chain effects occur.	Chain effects lead to skill shortages and gaps at some 'distance' from the initial source of skill demand. Skill gaps are associated in part with labour turnover revealing a connection with labour mobility at individual level and thus firm commitment of workers. Mobility dynamics in the secondary labour market present significant burdens to employers and generates negative perceptions of mobile workers.	Obtain more insight into chain effects by studying labour mobility in greater detail. Include skill requirements, degree and potential patterns of relatedness as considerations in industrial and investment policy to achieve more skill diversity. Forecast labour/ skill demand/needs, which takes chain drainage effects into account.
While there are retention difficulties across the board, these are also experienced by established industries and firms due to among others, labour pinching by competing firms in the same industry. Firms attempt to overcome skill shortages through multi-pronged responses that include not only underhiring, labour pinching, but also increasingly retaining schemes.	Firms in Penang are already focusing on retention, concretised through programmes that are concerned with worker engagement. But this appears to be embryonic. Retention/engagement is contested and challenged by believers in the virtues of mobility.	Assess engagement practices from the perspectives of firm practices and employee expectations.

Recommendations

Targets:	Industry/function-specific supply and skill-sets; experience, competitiveness in the playing field; disincentives for training and upskilling, career development.
Recommendation	**Increase intake of students specifically in areas that show high persistent vacancy rates.**
Recommendation	**Enhance opportunities for students/entrants to acquire industry- and function-specific skills and practical experience before entering the labour market.**
Recommendation	**Change and improve entrants' and existing employee's skill-sets towards more specificity.**
Recommendation	**Tap into avenues for new sources of supply that bring experience.**
Recommendation	**Level the playing field on which companies operate in relation to access to skills, labour recruitment and retention.**
Recommendation	**Devise ways to lower the quit rate of employees, perceived necessity and desire to circulate.**
Initiative 1	*Refer to initiative 2, macro part*
Initiative 2	*Refer to initiatives 6 and 7, macro part*

- Adjust curricula and programmes offered;
- Allow educational institutions more flexibility to devise new programmes;
- Augment opportunities for practical training;
- Intensify industry-educational institutions partnerships;
- Augment industry consultation in curriculum development as to specialised skills;
- Remove disincentives for upskilling/training; and
- Convince industry of relevance.

Initiative 3 — *Assess the current private upskilling infrastructure and devise solutions for gaps and usage constraints*

- Make private training providers an integral part of the skill system;
- Introduce quality standards; and
- Remove disincentives for use of upskilling infrastructure (especially disadvantaged firms; assess cost structure versus means; adjust cost structure where needed; provide grants and subsidies.

Initiative 4 — *Enhance the quaternary supply as a new source of specialised high-qualified labour in areas of specific skill shortages*

- Support and enhance TalentCorp programmes to tap into high-qualified Malaysian returnees who possess the right skills and experience (quaternary supply);
- Widen the scope of opportunities for foreign talents who have the right skills and experience in critical areas and who are willing to work and live in Penang for a prolonged period (quaternary supply);
- Invigorate campaigns abroad – promoting Penang as an attractive place to work and live; and
- Continue to invest to upgrade Penang's quality of life.

Initiative 5 — *Improve the attractiveness of currently less favoured industries and firms*

- Modernise firm recruitment/retention channels, strategies and practices;
- Promote the use of new technology-based channels that jobseekers lean towards social media and digital channels;
- Grow and showcase local firms/SMEs; assist such firms in the adoption of new business models and technologies (including some of the Industry 4.0) that appeal to the young generation.
- Provide more/better information to the corporate world beyond MNCs;
- Publicise the achievements of local firms, SMEs and start-ups;
- Acquaint students with tech start-ups and their relevance to future economic development;
- Rather than employee 'blaming', bring opportunities in line with ambitions; and
- Assist firms with less resources to enhance their capacity for a more effective human resources management:
  - Consider a skill-development fund; and
  - Improve access to/opportunity to make use of private upskilling infrastructure by adjustment of cost structures.

Initiative 6 *Improve intra-firm career advancement opportunities*

- Enhance longer-term career prospects in human resource management;
- Companies should step up efforts in career paths and guidance; and
- Companies should set clear criteria and time path for career advancement.

Initiative 7 *Carry out more detailed research into labour mobility pattern and drivers*

- Improve insight into chain effects of employee moves; and
- Improve insight into employee motivations.

See Initiative 2 under Organisational Framework

Initiative 8 *Assess engagement and retention practices*

- More detailed study to improve insight into current practices; and
- Perform benchmark study: make international comparison of good practice and assess local applicability.

C. Workers

Key Observations	Issues	Proposed solutions
Ubiquity of workers with generic skills means there is some competition for desired jobs.	Lack of application skills.	Improve application and presentation skills.
Poor-defined specific skills.	Random job application.	Teach applicants to be selective by offering dedicated information programmes to jobseekers. Improve information channels.
In the constrained market, high-qualified labour shows substantial mobility.	Lack of information/ right opportunities. Perceived lack of opportunities/career development with existing employer. Perceived necessity to acquire new skills elsewhere for advancement.	Improve career development opportunities, intra-firm (see Industry/firm).
While skill demand is changing towards a greater importance of language proficiency (English and foreign) and soft skills, competency does not quite follow. Preferences and attitude of workers constrain recruitment and retention.	Culturally and socially dictated behaviour. Misaligned preferences through information gaps.	Refer to section Macro and Industry/firm. Instill entrants with a broader set of values. Improve information on industries and firms (see Industry/firm).

On one side, mobility appears in part driven by skill advancement to improve employability, on the other side, it is perceived to reflect 'poor' attitude and unrealistic expectations of workers (promoted by economic structure).	Has a negative impact on employ-ability, and augments recruitment difficulties. As demand shows a significant degree of skill-relatedness, workers tend to 'over-exploit' transferability. Mobility not always desirable as vehicle for skills and career advancement. There is a concern among agencies, firms, experts, and stakeholders on the declining loyalty and commit-ment among younger workforce. Younger workers also perceive unrealistic and outdated expecta-tions of firms impinging on their willingness to contribute.	Other opportunities for intra-firm career advancement (see Industry/firm). Employers: change perception and attitude towards employees' ambitions; adopt a more positive approach by providing a more conducive working environment. Enlarge skill diversity in the economy (see Industry/firm). Instill a broader set of values in the labour force. Showcase industries/ firms (see Industry/firm).

Recommendations

Recommendation **Improve the infrastructure for information, career advice, job application and skills learning.**

Recommendation **Devise and implement programmes to instill different values in job seekers/employees.**

Recommendation **Employers to get better acquainted with, recognise and act upon new generation values.**

Initiative 1 *Expand the role of the Career Assistance and Training (CAT) Centre*

- Enhance its function as a channel to obtain and disseminate relevant information;
- Enhance courses offered for job applications, presentations and job interview skills;
- Provide assessment of suitability of individuals for job profiles;
- Enhance the visibility and accessibility of the centre through more publicity; and
- Promote the centre as an integral part of a newly created Skills Unit (see Organisational Framework).

Initiative 2 *Invigorate ethics as part of teaching and learning in college and university programmes*

D. Organisational framework

Key Observations	Issues	Proposed solutions
In relation to shortages, issues and challenges have been taken up through interventions by an expanding web of actors/stakeholders, each running and exercising control over their own programmes and schemes, addressing all levels from macro to micro.	The 'web' is fragmented, hindering complete and accurate information on skill situation and interventions. Each actor and stakeholder develops its own policies from its jurisdictions with different coverage. There appears little visibility, coordination, collaboration and monitoring.	Improve the information landscape and channels through better coordination. Establish a coordinating and collaborative framework that can play a central role in strategy formulation, implementation and monitoring.
The impression is that many programmes, schemes, and interventions developed and implemented in/through the web are still premature and it may take a while to see their effectiveness; however, in view of the fragmented nature of information, little can be said about the effectiveness of interventions (programmes and schemes, activities of the range of actors) that are in place.	An expanding and more crowded web with a multitude of actors adds complexity to information gathering, processing, and use by relevant agencies on skill issues and responses.	Improve the information landscape and channels through better coordination.

Recommendations

Recommendation **Establish a unit at state level, dedicated to overseeing a skills strategy, policies, programmes, and plans of actors and stakeholders in a coordinated and coherent fashion.**

Recommendation **Implement a (institutional) structure through which timely and reliable information on the demand and supply trends of human capital skills is produced**

Initiative 1 *A new Penang Employment and Skills Unit*

- A unit within the state government system;
- Vested with needed authority and expertise; and
- Active involvement of relevant actors and stakeholders. These include institutional agencies and councils at different levels operating in the state (such as Labour Department, Industry Councils, InvestPenang, NCIA, TalentCorp, MIDA); skills development architecture (PSDC, selected private training providers); selected recruitment agencies and consultants; industry associations (FMM, Chambers of Commerce, Penfeia, Samenta, Frepenca); key local and foreign companies; and worker representative organisations.

Mandate may include:

- Coordinate the development and implementation of State Skills Strategy; and
- Assure programmes and plans of actors and stakeholders are in line with strategy.

Tasks may include:

- Bring together actors; solicit and coordinate role of actors in strategy formulation and implementation;
- Operate platforms or committees through which stakeholders (industry associations) participate; consultation on policies and plans;

Figure 10.4: Some indicators for the success of short-term strategic initiatives

Performance	Industry & firm role	Institutional role
Hard-to-fill vacancies reduced; Skill-readiness improved; Brain gain flow increased; Mindset of employees improved; Labour mobility moderated; and Playing field more level.	Policies and practices in areas indicated in the initiative improved; Hiring methods (especially SMEs) are more effective; and Industry-educational institutions partnerships increased.	State Employment and Skill Unit set up; CAT Centre incorporated role enhanced; Information infrastructure improved; Skill-monitoring committees set up; and Coordination between state-federal skill policies improved.

- Oversee further development of regional skills development architecture;
- Oversee plans and programmes;
- Development of new initiatives, in consultation with relevant actors; and
- Market intelligence; monitor skills development strategies elsewhere and 'world of work' trends relevant to industries in Penang.

Initiative 2 *Develop and implement an encompassing Skills Information System*

- Institutional form: this could be a department to be established in the Penang Employment and Skills Unit;
- Liaison with existing institutional sources of information;
- Liaison with industries (industry associations) and (key) firms;
- Market intelligence; and
- Annual reporting on labour market trends and skill situations.

10.4 Conclusions

One additional element to what has been outlined in the first part of this chapter is that a skills strategy has to monitor progress of implementation and periodically measure whether objectives – and at a more detailed level initiatives and their targets – are being reached or accomplished. This requires explicit benchmarks. Figure 10.4 provides a number of examples of such measures, without being exhaustive. Covering only the short-term, the challenge is substantial. An even greater challenge is going from the short-term to the longer-term. The conclusiveness of the longer-term strategy lies simply in the fact that new technological disruptions are just around the corner. These produce new work trends. It has to be acknowledged that these are still surrounded by uncertainties in regard to their pervasiveness. As such, future skill needs associated with new work trends remain difficult to predict. But change is certain. This calls for a flexible system for timely response. Skill-readiness for the next technological lap is an imperative element for each node in the global economy that wants to maintain and enhance its position.

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