PENANG INSTITUTE MONOGRAPHS

#17

23 JULY 2021

Penang's Skills Situation: Concerted Actions Needed

By Ng Kar Yong and Yap Jo-yee

PENANG INSTITUTE
making ideas work

10, Brown Road, 10350 George Town
Penang, Malaysia
T +604 228 3306 **F** +604 226 7042
E enquiry@penanginstitute.org

Penang's Skills Situation: Concerted Actions Needed

Ng Kar Yong (Statistician, Socioeconomics and Statistics Programme) and Yap Jo-yee (Analyst, Socioeconomics and Statistics Programme)

EXECUTIVE SUMMARY

- Penang's market for job vacancies is currently dominated by manufacturing, engineering, information and communications technology (ICT), as well as sales, marketing and business development specialisations. This reflects a high and growing need for technical and digital skills, complex thinking, and interpersonal competencies.

- Fresh graduates have been disproportionately affected during the current downturn, compared to experienced workers. This has negative implications for lifetime employment outcomes, stemming from the combination of slowed job creation activity and falling proportions of entry-level vacancies.

- The fields of study Penang's fresh graduates possess are inconsistent with what employers require. There is also a distinct lack of hard and soft skills among job applicants.

- While graduates from Kedah, Perak and Perlis help meet the labour demand from most of Penang's key sectors, there remains a scarcity of ICT graduates across the entire northern region.

- Addressing these challenges require effort from all stakeholders:
    a) Penang's employers should tighten partnerships with education institutions, starting with those in the northern region, in terms of curriculum-planning and recruitment activities.
    b) Initiatives to improve graduate quality need to be accompanied by incentives for them to remain in Penang upon graduating. Both public and industrial actors play important and complementing roles in developing liveability standards in Penang. Industrial actors should improve the attractiveness of work-related aspects, while public actors are recommended to improve labour market outcomes through regulation and the provision of information, and meet the demand for affordable public amenities.
    c) The State's skill and labour market initiatives should complement existing national programmes through close partnership with national human resources agencies.
    d) Accurate and timely labour market information such as salary trends and skills demanded by employers need to be provided to educators, parents and students, to improve the career and education choices that students make.

Table of Contents

1 Introduction 3

2 Skills demand trends during the pandemic 3

2.1 The drivers of job creation during the pandemic: Advanced Manufacturing and ICT sector 3

2.2 The role of experience: Fresh graduates are left behind 6

3 Mapping the labour supply and demand 8

3.1 The landscape of Penang's graduate skills: Education output is inconsistent with industry needs 8

3.2 A secondary supply: Northern states diminish Penang's skill mismatch 10

4 Policy Recommendations 16

4.1 Review of findings and challenges 16

4.2 The impact of Covid-19 on education 17

4.3 Policy recommendations 17

5 References 21

6 Appendix A: Mapping of job specialisations and fields of study 22

7 Appendix B: Courses available in the northern states 27

7.1 Other Training Providers 37

1 Introduction

Accelerated digital transformation at all stages of the supply chain, from the extraction of raw materials to end-user products, has contributed to rapid industrial growth in Penang. This is especially so in the advanced manufacturing, and information and communication technology (ICT) sectors. As Malaysia and the world march resolutely towards Industry 4.0, having the necessary skilled workers to keep in step with this growth is crucial to maintaining Penang's competitiveness as an exporter, and an investment destination. How well does the graduate labour supply of Penang meet industry needs? And what threats and opportunities do they alert us to?

2 Skills demand trends during the pandemic

To understand the labour-supply readiness, we begin by assessing the skills that are needed. We scrape data from JobStreet[1], and classify skills by their job specialisations. These specialisations were identified by employers and recruiting agencies. This allows us to create a list of 16 broad specialisations.

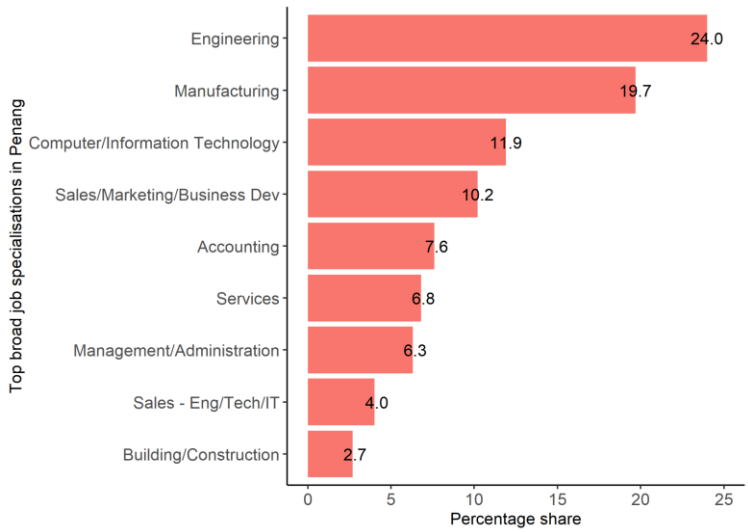
We found that the manufacturing and ICT sectors are thriving during this pandemic, but fresh graduates are less likely to benefit from this, with important ramifications for their employment outcomes in the decade to come.

2.1 The drivers of job creation during the pandemic: Advanced Manufacturing and ICT sector

New job postings show that at least during the pandemic, job creation will occur primarily in four specialisations: engineering (24%), manufacturing (20%), ICT (12%), and sales/ marketing/ business development (SMB) (10%) (Figure 2.1). E&E engineers in particular are in very high demand, contributing 57% to engineering vacancies.

[1] The job postings in Penang were scraped fortnightly on 9 March and 23 March 2021. For our analysis, we look at 3,284 unique graduate jobs that require at least a Professional Certificate, Diploma, Bachelor, Master or PhD degree.

Figure 2.1: Percentage share of top broad job specialisations in Penang



Note: "Sales – Eng/Tech/IT" refers to Sales in engineering, technological and information technology areas.
Source: Authors' calculations using data from JobStreet.

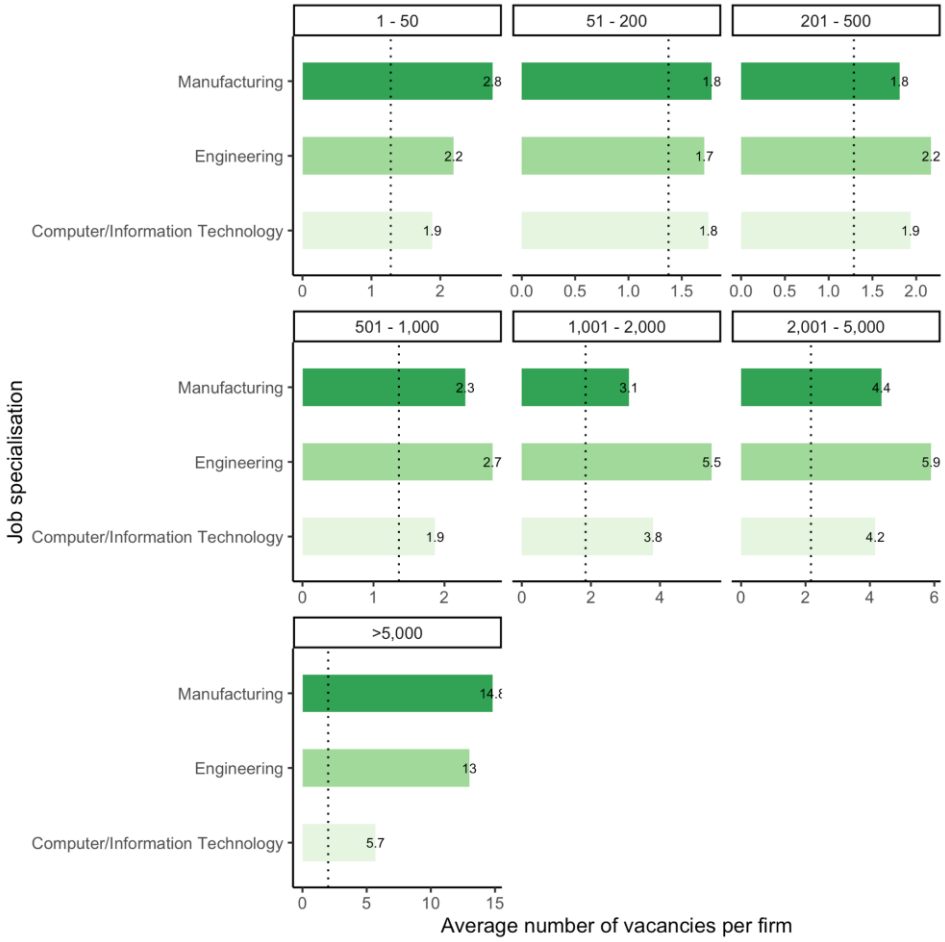
A detailed look reveals that the average number of vacancies posted by a firm for engineering, manufacturing and ICT roles are consistently far higher than the median of similar-sized firms (Figure 2.2). This suggests that growth in these specialisations is fuelled by persistent growth in the global automotive and consumer electronics industries, and rapid digitalisation. At the same time, given that the majority of skilled jobs lost came from the manufacturing, ICT and professional services sectors, firms are likely to be rehiring to fill old positions too. Thus, the high number of vacancies we see are due to a combination of firms filling existing positions, and expanding their operations.

In the future, we can continue to expect greater growth in demand for technical roles. Digital transformation is underway in the services sector, and its future recovery will contribute significantly to demand for technical skills. Comparable industries in neighbouring countries, such as Food and Beverage in Indonesia and Logistics in Vietnam, are expecting Industry 4.0 to have net positive impact on job creation by 2030[2].

Employers are also hiring for roles that require distinctively "human" skills, indicated by the significant share of SMB roles (Figure 2.1). Core skills for jobs in sales, marketing and business development are those that cannot be automated, such as people management, emotional intelligence, creativity and negotiation.

[2] Asian Development Bank, *Reaping the Benefits of Industry 4.0 through Skills Development in High-Growth Industries in Southeast Asia*.

Figure 2.2: Average number of vacancies per firm in Penang, by firm size



Note: Medians for each group are represented by dotted lines.
Source: Authors' calculations using data from JobStreet

This highlights potential job displacements in the future.

In the short run, job loss data suggests that 40% of Penang's retrenched skilled workers will face considerable difficulties regaining employment, because they were working in industries that are still badly affected by Malaysia's intermittent lockdowns[3].

In the long run, certain industries currently experiencing a downturn will improve post-pandemic, alleviating unemployment to a certain extent. However, job displacement due to skills incompatibility will persist because of trends such as automation, the digitalisation of marketplaces, and changing consumer preferences. This means that even now, the focus should be on future skill sets needed, and measures to equip workers for them.

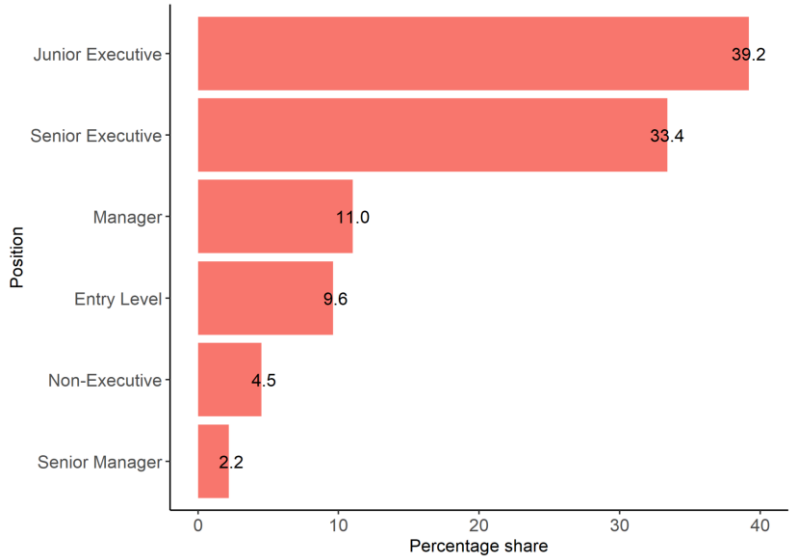
[3] Employment Insurance System, 'Loss of Employment'.
Data from 2020 – June 2021. These are workers not working in Manufacturing, Professional and Technical, and ICT industries.

2.2 The role of experience: Fresh graduates are left behind

Although jobs are being created in Penang, they do not benefit all workers equally. Figure 2.3 shows that junior and senior executives (requiring medians of 2 and 5 years of experience respectively) are most sought after in Penang's graduate labour market. They form 72.6% of all vacancies. Entry-level roles, on the other hand, are scarce (9.6%), and worse, have fallen from pre-pandemic times. In 2016, entry-level positions were 10.6% of skilled vacancies[4], 1 percentage point higher. This could be due to the rise of engineering and manufacturing jobs that typically have low shares of entry-level vacancies.

This means that even when certain sectors are creating jobs during the pandemic, it is only experienced workers who mostly benefit from it. Though comforting for retrenched workers with 2-5 years of experience under their belts, it is worrying when we consider how youth unemployment has soared during this recession.

Figure 2.3: Percentage share of position levels in Penang



Source: Author's calculations using data from JobStreet

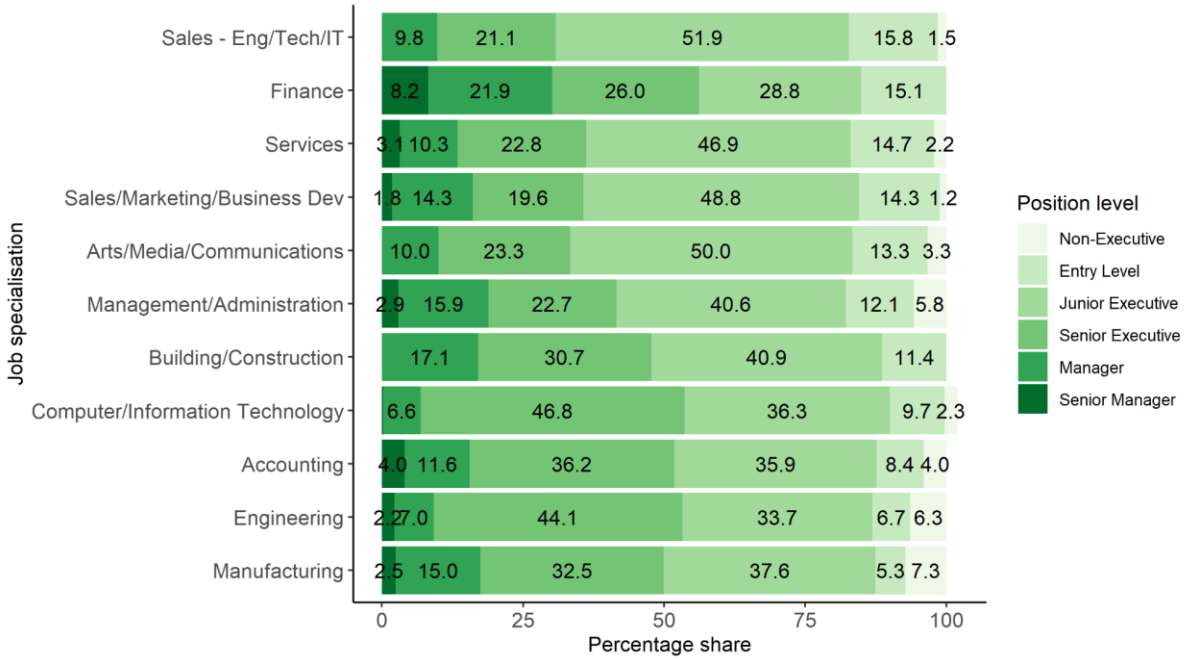
Fresh graduates suffer from a double whammy. Firstly, an overall downturn in the labour market has reduced overall work opportunities. The national youth unemployment rate, which has always been higher than the total unemployment rate, jumped from 10.3% in Q1 2019 to 12.1% in Q1 2021. This is during a time when the youth labour force participation rate[5] is falling, which means that actual labour conditions for them might be worse than the figures suggest – some may not be looking for work due to the belief that there are no opportunities, or because they have decided to continue with studies to insulate against poor job prospects.

[4] Penang Institute, 'Penang Skilled Workforce Study'.
[5] Department of Statistics, 'Labor Force Survey Report'.
In 2019, labour force participation rates for 15-19 year olds and 20-24 year olds in Penang were 17.7% and 63.4%. These fell to 12.9% and 62.6% in 2020.

Secondly, even in the few sectors that are hiring, entry-level roles are scarce. While there is a substantial demand for engineering and manufacturing roles, allocations for entry-level positions are the smallest in those specialisations (Figure 2.4).

One key issue that must be addressed here are the long-term consequences of the recession on employment and wage outcomes of fresh graduates, as studies in various countries have found. Graduates who start working in a recession are at risk of experiencing skill erosion as a result of long job-search periods or poorly-matched first jobs. This deterioration in skills lowers lifetime earnings and employment opportunities of graduates, when compared to their counterparts who join the labour market in good times. For example, males in South Korea who graduated during the Asian Financial Crisis experienced lower employment likelihood and poorer earnings for up to a decade. The same was found for graduates (overall) in Europe and the United States as well[6].

Figure 2.4: Percentage share of position levels by job specialisation



Source: Author's calculations using data from JobStreet

[6] Brunner and Kuhn, 'The Impact of Labor Market Entry Conditions on Initial Job Assignment and Wages'; Liu, Salvanes, and Sørensen, 'Good Skills in Bad Times'; Cockx and Ghirelli, 'Scars of Recessions in a Rigid Labor Market'.

3 Mapping the labour supply and demand

After assessing the industry needs, we look at the graduate supply from Penang as well as the neighbouring states of Kedah, Perak and Perlis, because they are top migrant sending states for Penang.

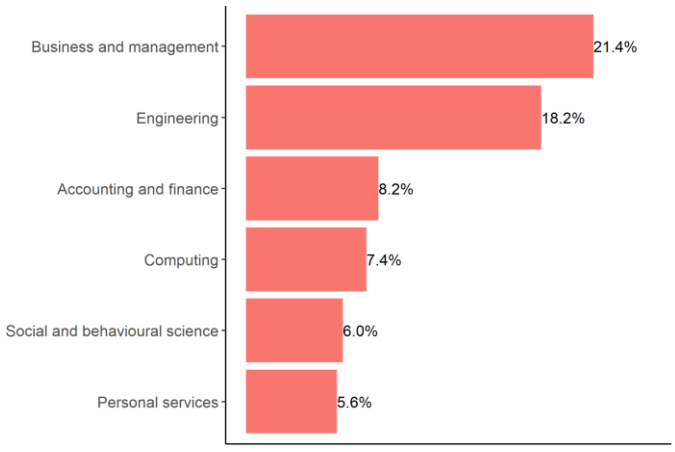
In Penang alone, graduate supply is disproportionately low for fast-growing manufacturing, engineering, ICT and SMB job specialisations. Incoming graduate migrants from Kedah, Perak and Perlis can partially alleviate this mismatch, but ICT graduates are scarce in the entire northern region.

3.1 The landscape of Penang's graduate skills: Education output is inconsistent with industry needs

The top three fields of study amongst Penang's graduates[7] are Business and Management (21.4%), Engineering (18.2%), and Accounting and Finance (8.2%). Given that manufacturing, engineering and ICT are the major specialisations required by Penang's employers, Figure 3.1 hints at a mismatch between education output and industry needs.

We analyse this mismatch in detail by breaking down the course categories further and mapping them to job specialisations.

Figure 3.1: Percentage share of graduates from Penang by top fields of study, 2017



Note:

1. *We use information from 2017 because data for years after 2017 are incomplete.*
2. *Only fields with percentage shares larger than 5% are shown.*

Source: Authors' calculations using data from Ministry of Education, Malaysia

[7] Those who graduated from higher education institutions (HEIs) in Penang.
HEIs refer to public and private universities, polytechnics, community colleges, and private colleges.

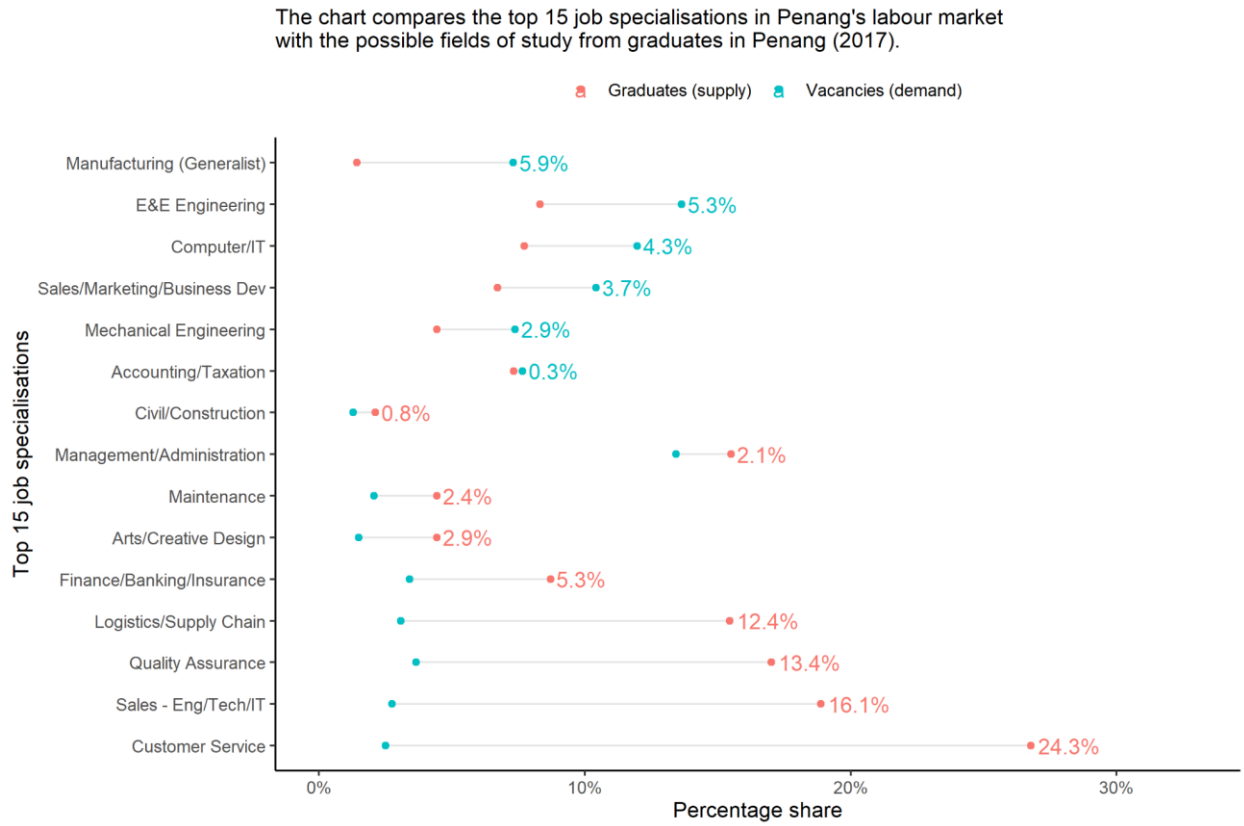
Figure 3.2 shows the skills profile gaps for the top 15 job specialisations in Penang, where *Vacancies* is the proportion share of each job specialisation required in the job market, and *Graduates* is the proportion share of graduates who are able to work in each job specialisation (based on their field of study[8]). The difference between both proportions tells us how well the overall skills profile of supply matches the skills profile of demand. Note that this does not necessarily indicate a shortage or surplus in terms of absolute numbers.

In terms of proportion, the gaps in Figure 3.2 show a clear mismatch. In the manufacturing, engineering, ICT, and SMB specialisations, the share of local graduates is disproportionately low compared to demand, the gap being 2.9 percentage points (ppt) in mechanical engineering roles and 5.9 ppt in manufacturing (generalist) roles.

At the same time, many job specialisations in Penang, highlighted in red, have a disproportionately high percentage of graduates compared to existing demand. These range from management/ administrative (2.1 ppt) to customer service (24.3 ppt).

[8] See Appendix A for the list of fields of study - job specialisation mappings.

Figure 3.2: Skills profile mappings between graduates' supply and demand in Penang[9]



Note: *Manufacturing (Generalist) refers to jobs that involve more than one manufacturing specialisation (i.e. combination of quality assurance, maintenance etc.)*
Source: Authors' calculations using data from Ministry of Education, Malaysia and JobStreet

The mismatch in Figure 3.2 immediately suggests at least three possible problems. Perhaps there is a disconnect between higher education institutions and industry, a dire lack of labour market information among students when choosing their tertiary courses, or perhaps push factors that deter students from taking up technical courses, or a combination of all three.

3.2 A secondary supply: Northern states diminish Penang's skill mismatch

Although some of the mismatches seen in Figure 3.2 are significant, it is important to bear in mind that they are considerably lessened by the inflow of graduates from other states. Almost half of the

[9] Latest complete graduate data for Penang are from 2017, and only for fresh graduates. We assume that the distribution of local fresh graduates' field of studies in 2017 represents the distribution for total graduate labour supply in the market today. Furthermore, only local graduates (those graduating from Penang) are considered. Thus, this serves only as a guideline. We consider how this figure may change when we include graduates from northern states.

firms in Penang advertise vacancies in other states[10], and Penang is a net interstate migration destination.

In this exercise, we map out potential talent in sending states. In particular, we focus on the northern states of Kedah, Perlis and Perak, the top origins for migrants in Penang.

Between 2014 and 2018, there was a net inflow of 2,600 – 6,700 migrants each year from Kedah, Perlis and Perak combined (Table 3.1). Given that 30 – 37% of internal migrants aged 15-64 were graduates[11], we estimate that there was an average net inflow of 1,330 graduates per year from the northern states (Table 3.2). This is a significant number, since in 2018 alone, this would be equal to 9% of graduates from Penang's higher education institutions (HEIs).

Table 3.1: Net inflow to Penang from the northern states ('000)

	2014	2015	2016	2018
Perak	1.7	5.0	3.1	2.4
Kedah	0.7	0.7	3.5	1.8
Perlis	0.2	0.3	0.1	1.3
Total	2.6	6.0	6.7	5.5

Note: Data for 2017 are unavailable.
Source: Authors' calculations based on Migration Survey Report 2014-18, Department of Statistics, Malaysia.

Table 3.2: Estimated net inflow of graduates to Penang from the northern states ('000)

	2014	2015	2016	2018	4-year average
Total	0.65	1.46	1.87	1.34	1.33

Note: The estimations assume that the internal migrants for all states have the same distribution for age and educational attainment as Malaysia's.
Source: Authors' calculations based on Migration Survey Report 2014-18, Department of Statistics, Malaysia.

In terms of total graduates, Perak has the largest number amongst the four states, followed by Penang, Kedah and Perlis. The distribution of public and private graduates varies in the northern states.

Public institutions

This covers public universities, and technical and vocational education training (TVET) institutes. In all four states, public institutions are the main provider of graduates. They are particularly

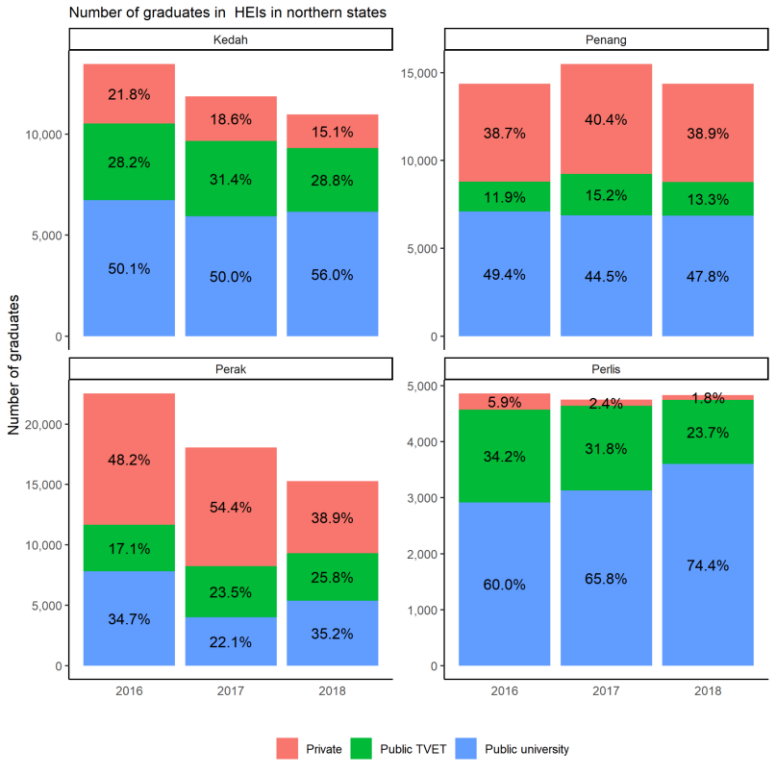
[10] Penang Institute, 'Penang Skilled Workforce Study'.
[11] At the national level.

popular in Kedah and Perlis. Specifically, TVET graduates tend to form 20-35% of the total in each state, with the exception of Penang where the TVET graduates are less than 16%.

Private institutions

Private HEIs have a very strong base in Penang and Perak. In 2018, they were responsible for nearly 40% of graduates in those states. Private HEIs in Perlis contribute only 1.8% of total graduates, and even this is on a declining trend. The general drop in the number of graduates from private HEIs could be linked to the reduction of government study loans by 15% which was enforced in late 2014[12]. As a result, private HEIs have become less profitable as students switch towards cheaper alternatives, causing several of these institutions to exit the market.

Figure 3.3: Number and percentage share of higher-education graduates in northern states, 2016-18



Note:

1. *Graduates from UiTM branches in each state are excluded due to data unavailability.*
2. *Technical and vocational education training (TVET) refers to community colleges and polytechnics.*

Source: Statistics of Higher Education 2016-18, and Profile of Higher Educational Institutions (PHEIs) 2016-18, Ministry of Education.

Based on available data, Kedah, Perak and Perlis produce a sizable percentage of graduates for manufacturing, engineering, and SMB roles (See Appendix B for a full list of courses offered). ICT graduates, however, are generally scarce. This immediately highlights the need to increase ICT courses in Penang to meet future demand within the state.

[12] The Edge Markets, 'PTPTN Financing for IPTA Students Cut by 5%, and 15% for IPTS'.

The analysis of selected job specialisations for each northern state is presented as follows.

Manufacturing and Engineering specialists

Kedah, Perak, and Perlis

About 55-57% of TVET graduates in Kedah and Perak specialise in Engineering, Manufacturing and Construction (Figure 3.4). In Perlis, although this figure is smaller (22%), the state's public university, UniMAP, compensates by specialising in engineering courses (Table 3.3).

Sales/ Marketing/ Business Development specialists

Kedah, Perak and Perlis

In Kedah, 23.6% of TVET graduates and 37.8% of private HEI graduates come from business and finance backgrounds. The state's public university, UUM, also specialises in business and economics as well as management. In Perak, 20.3% of graduates in its TVETs and 43.1% in private HEIs are skilled in business and finance. Finally, Perlis has 19.2% of TVET graduates in this field. While 84.1% of its private graduates have business and finance backgrounds, its private education sector is tiny.

ICT specialists

Perak and Perlis

Roughly 14% of TVET graduates in Perlis have ICT backgrounds. Whereas in Perak, the same can be said of 11% in its TVETs and 8% in the private HEIs. Notably, there are considerably fewer potential candidates for ICT roles, compared to manufacturing, engineering, and SMB roles.

Table 3.3: Main subjects in the public universities in the northern states

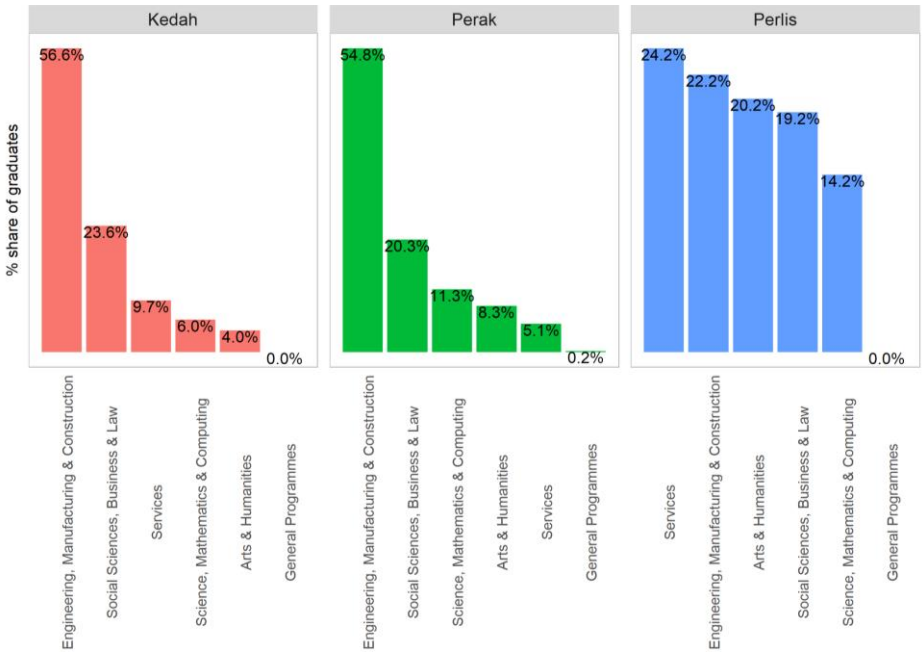
State	Public university	Main subjects
Kedah	Universiti Utara Malaysia (UUM)	Business and Economics, Management[13]
Perak	Universiti Pendidikan Sultan Idris (UPSI)	Education and Training[14]
Perlis	Universiti Malaysia Perlis (UniMAP)	Engineering[15]

[13] http://www.uum.edu.my/uum-news-feed/839-uum-is-malaysia-s-fourth-best-in-the-world-university-rankings-by-subject-2021.html

[14] https://www.topuniversities.com/universities/universiti-pendidikan-sultan-idris-upsi

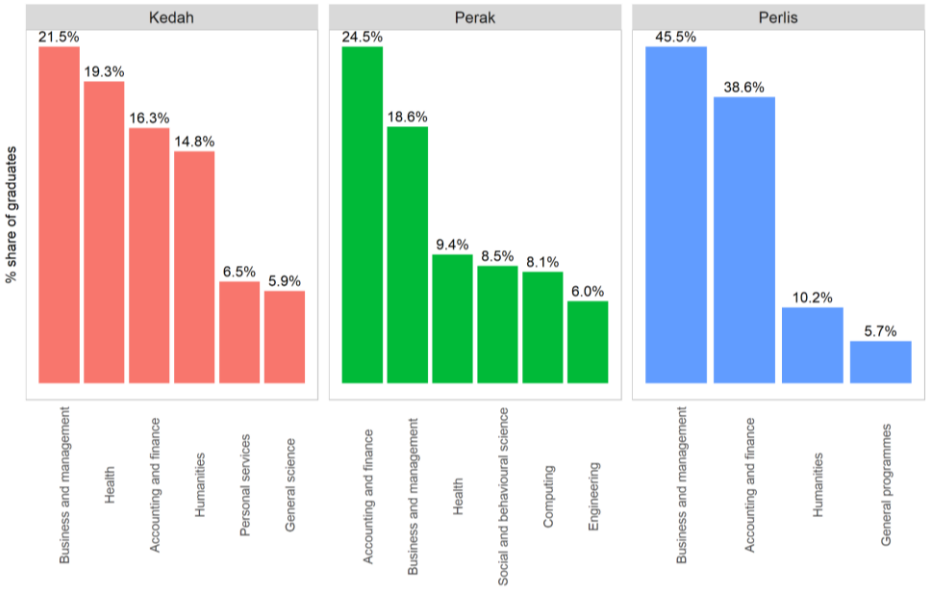
[15] https://www.timeshighereducation.com/world-university-rankings/universiti-malaysia-perlis

Figure 3.4: Percentage share of graduates from public TVET institutions, 2020



Note: Only graduates from community colleges and polytechnics are included.
Source: Statistics of Higher Education 2020, Ministry of Education.

Figure 3.5: Percentage share of graduates from private HEIs by top fields of study, 2018



Note: Only fields with percentage shares larger than 5% are shown.
Source: Profile of Higher Educational Institutions (PHEIs) 2018, Ministry of Education.

While the mapping exercise suggests that talent from the northern states can correct the misalignment between education output and industry demands in Penang to a certain extent,

it does not address the core reason employers find it hard to fill skilled roles – the lack of competence[16].

Thirty-one percent of Penang's employers cite poor technical and soft skills as the reason for persistent vacancies[17]. Some examples are critical thinking skills and English proficiency. Though it is true that the scarcity of graduates from Penang poses a problem for firms, this is not as grave a problem as the scarcity of competence. Tight competition for talent, the second most-cited factor, is mentioned by only 17% of employers in Penang[18].

Interestingly, the lack of necessary skills contrasts with the opinions of HEIs who say that they are already tailoring their curriculum to meet employer needs, and that graduates are sufficiently trained to meet industry standards[19].

At the same time, HEIs express increasing difficulty in filling student places, due to declining interest in technical courses. According to educators, students perceive them to be more difficult than other fields of study, but not more lucrative[20].

This may be linked to the quality of education. Fifteen-year-old Malaysians score lower than the OECD average, in terms of reading, mathematics and science. Only 0.5% are advanced in reading, 2% in mathematics, and 0.6% in science, as of 2018. In Singapore, this is 25.8%, 37% and 20.8% respectively[21]. As a result of poor performance, Malaysian students tend to perceive technical subjects as difficult. Naturally, they prefer investing their efforts in other "easier" subjects if future salary is likely to be similar.

All is not bleak. It deserves to be mentioned that Malaysian students have improved in mathematics and science in the past decade, which is good news for firms' future productivity, and innovation capacity.

Still, the rise in graduate employability alone does not guarantee that employers in Penang will find it easier getting competent graduates. As graduates become more competitive not just domestically but worldwide, they will become more geographically mobile, aggravating Penang's existing brain drain problem. Retaining talented graduates will be a key agenda, as it should be already.

[16] CIPD, 'The Future of Talent in Malaysia 2035'.
[17] Penang Institute, 'Penang Skilled Workforce Study'.
[18] Ibid.
[19] Responses from our expert survey conducted amongst Penang's HEIs also show that some HEIs believe their graduates are well equipped to meet employer needs, and that more than 75% from technical degrees secure jobs before graduation. HEIs also engage industrialists to provide mandatory internships or final-year-projects for their students, jointly undertake research projects with firms, and craft curriculum according to employer needs.
[20] Qualitative responses based on the expert survey conducted amongst Penang's HEIs.
[21] OECD, '2018 Database - PISA'.

4 Policy Recommendations

4.1 Review of findings and challenges

a) Penang's labour market is currently dominated by demand for manufacturing, engineering, ICT and SMB[22] specialisations. These reflect a need for technical and digital skills, complex thinking, and/or interpersonal competencies. These trends will only grow as businesses move towards Industry 4.0. We can also expect greater demand for these roles as Penang's economy recovers once lockdown measures ease.

b) However, there are two key challenges in Penang's labour market.

   Firstly, the skill mix of its local graduates is inconsistent with industry needs. Penang is driven by advanced manufacturing and has a growing ICT industry. Yet, supply for skills needed in those industries is disproportionately smaller than demand.

   Moreover, even amongst job applicants with the right degrees, there is a distinct lack of hard and soft skills.

   One possible root problem for both these challenges is the education quality during students' formative years in primary and secondary schooling, affecting their confidence of succeeding in technical fields. Additionally, students do not think that technical occupations are worth the effort when considering returns to education.

c) While there are encouraging signs of improvement in students' technical abilities, high-performing graduates are also more mobile, and sought after by employers abroad. Therefore, improving graduate quality may not necessarily benefit domestic employers if it is not accompanied by increased incentives to stay.

d) Graduates from public institutions (TVET and universities) located in Kedah, Perak and Perlis help meet demand for manufacturing, engineering and SMB roles in Penang. However, there is a scarcity of ICT graduates across the entire northern region.

   The important role that migrating graduates play also means that employers may find it harder to fill vacancies during the pandemic, given movement difficulties.

e) Growing demand for technical and digital skills also implies that while we worry about cyclical unemployment now, an ongoing risk that should not be ignored is job displacement caused by automation. This is a challenge for workers of all skill levels, but particularly so for the semiskilled and unskilled because their tasks are more likely to be routine, and therefore, more automatable.

[22] ICT: Information and Communications Technology;
SMB: Sales, Marketing and Business Development.

f) Furthermore, the statistics show us that fresh graduates are disproportionately affected in downturns. Youth employment outcomes will remain poor during the current recession, because even resilient sectors like advanced manufacturing or ICT prefer experienced workers when it comes to hiring. The issue is not a short-term one, however. Graduating during a recession has lifetime consequences for employment and earnings.

g) Since fresh graduates are future leaders in their industries, a "lost generation" of fresh graduates today will make filling experienced positions tomorrow more difficult, when mature workers begin to retire and experienced workers are scarce. This is all the more likely when we consider the small percentage share of entry-level vacancies, especially those in growing sectors.

4.2 The impact of Covid-19 on education

One last note that should be mentioned are the indelible repercussions of Covid-19 on Malaysia's 4.7 million national school youths who were mostly cut off from education last year. Even where online classes are being implemented, actual learning remains ineffective. This translates into lower education quality, and the disadvantaged will bear most of its consequences, widening inequalities in education and life outcomes.

In terms of the future stock of human capital, this presents serious challenges. As more get left behind, the quantity and quality of graduates will fall, inflaming existing skill issues.

4.3 Policy recommendations

At a national level, the government has invested significant resources into the development and implementation of policies to prepare employers and workers for Industry 4.0. The forthcoming Future of Work Action Plan in particular, will serve as a roadmap for Malaysia's skill development, including strategies to improve employability, and graduate job-matching outcomes.

A large number of national programmes target youth unemployment, such as Graduates Empowerment Programme, National Apprenticeship Scheme, and Career Advancement Programme (PENJANA KPT-CAP). Others are broader in their reach, targeting all unemployed workers or job-holders. Examples are MyDigitalWorkforce Work in Tech, and the EIS Vocational Training.

In the following section, we discuss solutions that address the challenges above from a Penang-specific perspective.

1. **Tighten links between Penang firms and higher education institutions in the northern states**

Although many HEIs already engage firms on a frequent basis, an accelerating rate of change in the workplace means that what students learn in their courses may not be needed anymore after they graduate. To ensure that graduates possess the skills required, curriculum in HEIs need to be industry-led, sufficiently adaptive, and forward-looking. Equally as important is the development of core skills such as communication, and critical thinking.

Given that students who graduated from the northern states are a natural talent pool for firms in Penang, firms may find it efficient to invest resources and time co-creating curriculums with HEIs from Kedah, Perak and Perlis (in addition to Penang).

2. **Provide internships as one key way of recruiting fresh graduates**

   Internships give HEIs a way of understanding business needs better[23], equip students with practical skills and business awareness, and supply firms with competent, work-ready fresh graduates[24].

   Internships also give firms greater insight into students' soft skills which are difficult to discern from resumes and interviews. This leads to better quality graduate hires. Insofar as internships improve students' employability, this may also improve entry-level salaries for them, as some studies suggest[25].

   Moreover, having a ready cohort of fresh graduates from a class of interns encourages firms to increase the base of entry-level roles in a firm. This helps reduce overall salary costs (instead of having a top-heavy workforce), foster innovative ideas, and provides firms with a larger pool of internal talent to fill junior and senior executive roles with, so that vacancies become easier to fill.

3. **Complement existing national-level labour initiatives**

   Several national initiatives already address school-to-work transition issues by partnering with employers to provide work placements[26]. These remain crucial because they help graduates secure skill-appropriate jobs, prevent skill depreciation and improve future employment outcomes.

   However, broad country-wide measures cannot be tailored according to state-level needs, and gaps are inevitable. To meet Penang-specific needs, the Penang state government should consider forming a state-level skills monitoring committee, and an implementing unit for skills and labour market initiatives.

[23] Anjum, 'Impact of Internship Programs on Professional and Personal Development of Business Students'.
[24] Crumbley and Sumners, 'How Businesses Profit from Internships'.
[25] Gault, Redington, and Schlager, 'Undergraduate Business Internships and Career Success'.
[26] For example, the TNB Reskilling Programme, Digital Skills for Tomorrow's Jobs done in partnership with Microsoft, and PENJANA KPT-CAP.

The target should be to complement existing national programmes. This would require the state to work closely with national human resources agencies, and evaluate existing national initiatives to develop complementary, effective and tailored programmes of its own.

4. **Bolster the quality of national education by providing teachers with more support**

   Enthusiastic and dedicated teachers create students who are interested in their subjects, and improve education outcomes[27]. However, national schools find that it is difficult getting subject specialists, and teachers are forced to teach subjects they do not have expertise in. They are also prevented from developing themselves professionally because of a lack of relevant training, and overwhelming workloads.

   Furthermore, teachers say that it is difficult to spend time teaching soft skills such as critical thinking, or develop lesson plans that encourage creative problem-solving because of time constraints, and pressure from the education system and parents to cover dense syllabi. As a result, students are spoon-fed information and taught to answer questions without real understanding. Its consequences are unfortunately felt keenly by employers and graduates themselves, years down the line[28].

   Given these challenges, improving education entails providing teachers and schools with more support. Examples are tailoring professional development to teachers' needs, decreasing teachers' workloads, and allocating resources towards the development of subject specialists.

5. **Improve Penang's liveability**

   Improving education quality may only lead to greater outflow of talent if there are no incentives for graduates to stay in Penang. The public and private sector have different roles to play in developing the liveability or quality of life in Penang.

   Economic prosperity that comes from competitive salary packages and affordable living costs must be accompanied by attractive cultural and recreational possibilities, adequate security, healthcare, infrastructure, and education opportunities. The World Bank found that 66% of Malaysia's diaspora left the country for better career development abroad, 54% for higher job compensation, and 28% for safer surroundings[29].

   In particular, there is a vacuum between the state government, business leaders and graduates, where dialogue should take place. Creating a space for this is crucial to identifying stakeholder needs and viable solutions.

[27] Zakharov, Tsheko, and Carnoy, 'Do "Better" Teachers and Classroom Resources Improve Student Achievement?'
[28] Ibid.
[29] World Bank, 'Malaysia Economic Monitor'.

Some suggestions for industry support are competitive wage levels, clear career progression pathways, flexible work hours for young families, and plentiful professional development opportunities. Small businesses who face significant hurdles providing training may consider seeking out financial support from the Human Resource Development Corporation (HRDCorp).

The state government for its part should seek to:

a) fulfil demand for quality and affordable public transport, childcare, recreation and learning facilities, and housing.
b) fill in informational gaps linked to wages and productivity, so that workers and firms are both equally aware of market rates.
c) calculate an annual living wage recommendation for Penang, to accurately reflect real living costs of the state. See the Living Wage Foundation for a case study of its implementation and calculation methods[30].
d) evaluate the viability of wage top-up programmes.

6. Provide timely and accurate labour market information to the right audience

Information gaps in the labour market contribute to the skills mismatch, and job-search difficulties. Fortunately, the state is particularly well-positioned to provide this information, given its access to state-level and national-level labour data. Two notable examples of how this can be done are the "Labour Insights" page provided by the Malaysian government displaying detailed information of labour trends, and JobStreet's "Career Insights" page featuring salary data[31].

This can be taken one step further by extending the information to students on accessible platforms such as websites, workshops, or student camps. Labour market trends are highly relevant to students before they make tertiary education choices, and providing information keeps students aware of costs and rewards before spending 3-4 years on a field of study.

Teachers and parents are also key influencers of students' education/ career choices, and should be explicitly targeted to receive this information as well[32]. Moreover, data provided must be accurate, timely and comprehensive to encourage frequent use by the public.

[30] Living Wage Foundation. https://www.livingwage.org.uk/calculation
[31] See "Career Insights" (https://www.jobstreet.com.my/en/career-insights) and "Labour Market Insights" (https://www.myfuturejobs.gov.my/labour-market-trends/).
[32] Penang Institute, 'Students' Choice of STEM Study in Secondary and Tertiary Education in Penang'.

5 References

Anjum, Sadia. 'Impact of Internship Programs on Professional and Personal Development of Business Students: A Case Study from Pakistan'. *Future Business Journal* 6, no. 1 (10 January 2020): 2. https://doi.org/10.1186/s43093-019-0007-3.

Asian Development Bank. *Reaping the Benefits of Industry 4.0 through Skills Development in High-Growth Industries in Southeast Asia: Insights from Cambodia, Indonesia, the Philippines, and Viet Nam*. Asian Development Bank, 2021. https://www.adb.org/publications/benefits-industry-skills-development-southeast-asia.

Brunner, Beatrice, and Andreas Kuhn. 'The Impact of Labor Market Entry Conditions on Initial Job Assignment and Wages'. *Journal of Population Economics* 27, no. 3 (2014): 705–38. https://econpapers.repec.org/article/sprjopoec/v_3a27_3ay_3a2014_3ai_3a3_3ap_3a705-738.htm.

CIPD. 'The Future of Talent in Malaysia 2035', 2019. https://www.cipd.asia/knowledge/reports/future-talent-malaysia-2035.

Cockx, Bart, and Corinna Ghirelli. 'Scars of Recessions in a Rigid Labor Market'. *Labour Economics* 41, no. C (2016): 162–76. https://econpapers.repec.org/article/eeelabeco/v_3a41_3ay_3a2016_3ai_3ac_3ap_3a162-176.htm.

Crumbley, D. L., and Glenn E. Sumners. 'How Businesses Profit from Internships'. *Undefined*, 1998. https://www.semanticscholar.org/paper/How-businesses-profit-from-internships-Crumbley-Sumners/cc819972051dae5c1ac5426ffb7ec8eb84c69986.

Employment Insurance System. 'Loss of Employment'. Accessed 8 July 2021. https://eiscentre.perkeso.gov.my/loss-of-employment/.

Gault, Jack, John Redington, and Tammy Schlager. 'Undergraduate Business Internships and Career Success: Are They Related?' *Journal of Marketing Education* 22, no. 1 (1 April 2000): 45–53. https://doi.org/10.1177/0273475300221006.

Liu, Kai, Kjell G. Salvanes, and Erik Sørensen. 'Good Skills in Bad Times: Cyclical Skill Mismatch and the Long-Term Effects of Graduating in a Recession'. *European Economic Review* 84, no. C (2016): 3–17. https://econpapers.repec.org/article/eeeeecrev/v_3a84_3ay_3a2016_3ai_3ac_3ap_3a3-17.htm.

OECD. '2018 Database - PISA'. Accessed 8 July 2021. https://www.oecd.org/pisa/data/2018database/#d.en.516012.

Penang Institute. 'Penang Skilled Workforce Study: Labour Skills for Growth and Change', 2017.

Penang Institute. 'Students' Choice of STEM Study in Secondary and Tertiary Education in Penang'. Penang Institute, 2020. https://penanginstitute.org/publications/books-and-reports/students-choice-of-stem-study-in-secondary-and-tertiary-education-in-penang/.

The Edge Markets. 'PTPTN Financing for IPTA Students Cut by 5%, and 15% for IPTS'. The Edge Markets, 4 November 2014. http://www.theedgemarkets.com/article/ptptn-financing-ipta-students-cut-5-and-15-ipts.

World Bank. 'Malaysia Economic Monitor: Brain Drain'. World Bank, 2011.

Zakharov, Andrey, Gaelebale Tsheko, and Martin Carnoy. 'Do "Better" Teachers and Classroom Resources Improve Student Achievement? A Causal Comparative Approach in Kenya, South Africa, and Swaziland'. *International Journal of Educational Development* 50 (1 September 2016): 108–24. https://doi.org/10.1016/j.ijedudev.2016.07.001.

6 Appendix A: Mapping of job specialisations and fields of study

The table below matches a specific job specialisation to its related fields of study[33].

Job specialisation[34]	**Field of study[35]**
Accounting/Taxation	Accounting and taxation
Actuarial/Statistics	Mathematics; Statistics
Advertising	Audio-visual techniques and media production; Marketing and advertising
Agriculture	Crop and livestock production
Architect/Interior Design	Architecture and building; Architecture and town planning; Design
Arts/Creative Design	Arts (broad programmes); Audio-visual techniques and media production; Craft skills; Design; Fine arts; Music and performing arts
Biomedical	Biology and biochemistry; Medical diagnostic and treatment technology; Pharmacy
Chemical Engineering	Chemical and process; Chemistry; Material engineering
Chemistry	Chemical and process; Chemistry
Civil/Construction	Civil engineering
Computer/IT	Computer science; Computer use
Customer Service	Social and behavioural science; Sociology and cultural studies; Business and administration; Management and administration; Marketing and advertising;

[33] There is a limitation in this mapping. For general job specialisations such as Customer Service, General Engineering and Sales - Eng/Tech/IT, an accurate mapping is not possible and thus the largest possible set (but not all) of fields of study are assigned to them.

[34] Refers to the detailed job specialisation in the job postings on JobStreet, which is defined by the employers or the recruiting agencies (some modifications are made).

[35] The field of study follows the classification of National Education Code (NEC) used by the Malaysian Qualification Agency (MQA).

	Wholesale and retail sales
Diagnosis/Others	Medicine
E&E Engineering	Electricity and energy Electronics and automation
Education	Education science; Teacher training and education science (broad programmes); Teaching and training; Training for preschool teachers; Training for teachers at basic levels; Training for teachers of vocational subjects; Training for teachers with subject specialization
Environmental Engineering	Chemical and process; Chemistry; Community sanitation services; Environmental protection (broad programmes); Environmental protection technology; Environmental science; Occupational health and safety
Finance/Banking/Insurance	Economics; Finance, banking, insurance; Business and administration; Marketing and advertising; Mathematics; Statistics
Food Tech/Nutritionist	Chemical and process; Food processing; Pharmacy
Food/Beverage/Restaurant	Hotel, restaurant and catering
General Engineering	Engineering and engineering trades (broad programmes); Chemical and process; Civil engineering; Electricity and energy; Electronics and automation; Material engineering; Mechanics and metal work; Motor vehicles, ships and aircraft; Applied science
Hotel/Tourism	Hotel, restaurant and catering; Travel, tourism and leisure

Industrial Engineering	Manufacturing and processing (broad programmes); Mechanics and metal work
Journalist/Editors	Journalism and reporting; Languages (National languages, Other languages); Library, information, archive
Lawyer/Legal Asst	Law
Logistics/Supply Chain	Management and administration; Transport services
Maintenance	Mechanics and metal work
Management/Administration	Management and administration; Secretarial and office work
Manufacturing	Applied science; Manufacturing and processing (broad programmes); Food processing; Material (wood, paper, plastic and glass); Mining and extraction; Textiles, clothes, footwear and leather
Mechanical Engineering	Mechanics and metal work
Medical Practitioner/Asst	Applied science; Health (broad programmes); Medical diagnostic and treatment technology; Medical services
Nursing/Caring	Nursing and caring; Social work and counseling
Pharmacy	Pharmacy
Process Control	Manufacturing and processing (broad programmes); Mechanics and metal work
Public Relations	Business and administration; Marketing and advertising
Quality Assurance	Applied science; Engineering and engineering trades (broad programmes); Chemical and process; Electricity and energy; Electronics and automation; Material engineering; Mechanics and metal work; Manufacturing and processing (broad programmes)

Quantity Surveying	Building
Sales - Eng/Tech/IT	Engineering and engineering trades (broad programmes); Chemical and process; Civil engineering; Electricity and energy; Electronics and automation; Material engineering; Mechanics and metal work; Motor vehicles, ships and aircraft
Sales/Marketing/Business Dev	Business and administration; Marketing and advertising; Wholesale and retail sales
Science & Technology	Science, Mathematics and Computing; Biology and biochemistry; Environmental science; Physical science (broad programmes); Physics; Chemistry; Earth science; Mathematics; Statistics; Computer science; Computer use; Engineering and engineering trades (broad programmes); Chemical and process; Civil engineering; Electricity and energy; Electronics and automation; Material engineering; Mechanics and metal work; Motor vehicles, ships and aircraft; Manufacturing and processing (broad programmes); Food processing; Material (wood, paper, plastic and glass); Mining and extraction; Textiles, clothes, footwear and leather; Applied science; Environmental protection (broad programmes); Environmental protection technology;

	Natural environments and wildlife; Community sanitation services
Tech & Helpdesk Support	Science, Mathematics and Computing; Biology and biochemistry; Environmental science; Physical science (broad programmes); Physics; Chemistry; Earth science; Mathematics; Statistics; Computer science; Computer use; Applied science
Veterinary	Veterinary

7 Appendix B: Courses available in the northern states

The following four tables list higher education institutions in Penang, Kedah, Perak and Perlis respectively, with the number of courses offered by field of study.

Note that data are retrieved from documents in different years, whichever are the latest. The data sources are as follows:

1) IPTA (university): Requested from Ministry of Education, Malaysia;
2) IPTA (polytechnic and community college): Statistics of Higher Education, Ministry of Education, Malaysia;
3) IPTS: Profile of Private Higher Education Institutions, Ministry of Education, Malaysia;
4) Other training provider: trainingmalaysia.com (Accessed on 1 Jul 2021).

Penang

Broad Institution Type	Institution Type	Institution name	General programmes	Education	Arts & Humanities	Social Sciences, Business & Law	Science, Mathematics & Computing	Engineering, Manufacturing & Construction	Health & Welfare	Services	Language & Communication Skills	Quality & Productivity Improvement	Total	Year of data
IPTA	**University**	UiTM Kampus Bertam				4	1		3				**8**	2017
		UiTM Kampus Bukit Mertajam	4			1		18		7			**30**	
		USM		39	39	38	53	61	49	2			**281**	
	Polytechnic	Politeknik Balik Pulau					2						**2**	2020
		Politeknik METrO Tasek Gelugor			2		2						**4**	
		Politeknik Seberang Perai			2	2	2	2					**8**	

	Community college	Kolej Komuniti Bayan Baru	2							2			**4**	
		Kolej Komuniti Bukit Mertajam			2								**2**	
		Kolej Komuniti Kepala Batas			2			2					**4**	
		Kolej Komuniti Nibong Tebal								2			**2**	
		Kolej Komuniti Seberang Jaya					2	2					**4**	
		Kolej Komuniti Tasek Gelugor						2		2			**4**	
IPTS	**University**	Wawasan Open University		4	4	26	12	6					**52**	2018
	University college	Kolej Universiti KDU Penang	2		4	10	7	6	1	4			**34**	
		Kolej Universiti Komunikasi Han Chiang			5	13	1						**19**	
		Kolej Universiti Tunku Abdul Rahman Pulau Pinang				15	5	4					**24**	
		Vinakaya Mission International University College (VMIUC)		2		5							**7**	
	College	Adventist College of Nursing and Health Sciences							1				**1**	
		Equator College			6	1		2					**9**	
		Kemayan Advance Tertiary College Pulau Pinang	1			3							**4**	
		Kolej Antarabangsa								2			**2**	

		Excelpolitan												
		Kolej Antarabangsa Kejururawatan dan Sains Kesihatan KPJ Cawangan Pulau Pinang							2				**2**	
		Kolej Antarabangsa Stradford	1			1	1	4		1			**8**	
		Kolej Cosmopoint Pulau Pinang			2	2	1			1			**6**	
		Kolej Disted	2		2	10	1	1		3			**19**	
		Kolej Integrasi Perkembangan Kemahiran (IPK)				2							**2**	
		Kolej INTI Antarabangsa Pulau Pinang	3		1	21	4	5		2			**36**	
		Kolej Islam Teknologi Antarabangsa Pulau Pinang			2	1							**3**	
		Kolej Kejururawatan Lam Wah Ee							1				**1**	
		Kolej Olympia Pulau Pinang				5	1			1			**7**	
		Kolej Pergigian Antarabangsa Pulau Pinang							1				**1**	
		Kolej Perubatan Pulau Pinang PMC	1				1		2				**4**	
		Kolej PSDC						5					**5**	
		Kolej SEGI Pulau Pinang	1	2		9	4	3	1	4			**24**	
		Kolej Sentral Pulau				6	3			2			**11**	

		Pinang												
		Kolej Teknologi Pulau Pinang				5	3		1				**9**	
		The One Academy in Communication Design	4		12			1					**17**	
Other training provider	**Corporate training provider (professional development)**	British Council (Penang) Professional Development Unit, Penang			5						17	5	**27**	2021
		Customer Voice Sdn Bhd, Penang				3					1		**4**	
	Skill training provider (for SPM school leavers)	Institut Latihan Perindustrian Arumugam Pillai					2	4					**6**	
		Institut Latihan Perindustrian Kepala Batas					1	2					**3**	
		Japan - Malaysia Technical Institute (JMTi)					2	7					**9**	
Total			**21**	**47**	**90**	**183**	**111**	**137**	**62**	**35**	**18**	**5**	**709**	

Kedah

Broad Institution Type	Institution Type	Institution name	General programmes	Education	Arts & Humanities	Social Sciences, Business & Law	Science, Mathematics & Computing	Engineering, Manufacturing & Construction	Health & Welfare	Services	Total	Year of data
IPTA	**University**	UUM	Not available									
	Polytechnic	Politeknik Sultan Abdul Halim Mu`adzam Shah			2	2	2	2			**8**	2020
		Politeknik Tuanku Sultanah Bahiyah				2	2	2			**6**	
	Community college	Kolej Komuniti Baling			2					2	**4**	
		Kolej Komuniti Bandar Baharu						2			**2**	
		Kolej Komuniti Bandar Darulaman					2	2			**4**	
		Kolej Komuniti Cawangan Jerlun						2			**2**	
		Kolej Komuniti Jerai								2	**2**	
		Kolej Komuniti Kulim			2	2					**4**	
		Kolej Komuniti Langkawi @ Langkawi Tourism Academy			2					2	**4**	
		Kolej Komuniti Padang					2	2			**4**	

		Terap										
		Kolej Komuniti Sik						2			**2**	
		Kolej Komuniti Sungai Petani	2					2		2	**6**	
IPTS	**University**	Aimst University	1			6	2	5	12		**26**	
	University college	Kolej Universiti Insaniah	3		16	13	3		2	4	**41**	
	College	Institut Profesional Alor Setar			1	4					**5**	
		Kolej Cosmopoint Sungai Petani			2	4	1				**7**	2018
		Kolej Meritus						1		2	**3**	
		Kolej Poly-Tech MARA Alor Setar				3	2			1	**6**	
		MSU College Sungai Petani		1	1	2					**4**	
Other training provider	**Skill training provider (for SPM school leavers)**	Institut Latihan Perindustrian Jitra						11			**11**	2021
		Pusat Latihan Teknologi Tinggi (ADTEC), Kulim						6			**6**	
Total			**6**	**1**	**28**	**38**	**16**	**39**	**14**	**15**	**157**	

Perak

Broad Institution Type	Institution Type	Institution name	General programmes	Education	Arts & Humanities	Social Sciences, Business & Law	Science, Mathematics & Computing	Engineering, Manufacturing & Construction	Agriculture & Veterinary	Health & Welfare	Services	Total	Year of data
IPTA	**University**	UPSI	Not available										
	Polytechnic	Politeknik Bagan Datuk						2				**2**	2020
		Politeknik Sultan Azlan Shah			2	2	2	2				**8**	
		Politeknik Ungku Omar			2	2	2	2				**8**	
	Community college	Kolej Komuniti Bagan Datuk					2	2				**4**	
		Kolej Komuniti Bagan Serai				2		2				**4**	
		Kolej Komuniti Batu Gajah			2						2	**4**	
		Kolej Komuniti Cawangan Lenggong									2	**2**	
		Kolej Komuniti Chenderoh	2		2			2			2	**8**	
		Kolej Komuniti Gerik	2		2		2	2				**8**	
		Kolej Komuniti Kuala Kangsar									2	**2**	
		Kolej Komuniti Manjung			2							**2**	

		Kolej Komuniti Pasir Salak	2				2	2			2	**8**	
		Kolej Komuniti RTC Gopeng					2					**2**	
		Kolej Komuniti Sungai Siput					2	2			2	**6**	
		Kolej Komuniti Taiping						2			2	**4**	
		Kolej Komuniti Tapah						2				**2**	
		Kolej Komuniti Teluk Intan			2			2				**4**	
IPTS	**University**	Universiti Tunku Abdul Rahman Kampus Perak (UTAR)		2	3	28	19	18	2	3	2	**77**	2018
	University branch	Universiti Kuala Lumpur Royal College of Medicine Perak (UNIKL RCMP)	1							11		**12**	
		Universiti Tunku Abdul Rahman Kampus Sungai Long		3	10	31	18	25	1	7	1	**96**	
	College	Kolej Antarabangsa TAJ		3		6	1	2			2	**14**	
		Kolej Bayu				1						**1**	
		Kolej Felcra	1	3		6			1			**11**	
		Kolej Lake View				1				1	3	**5**	
		Kolej PIA			4							**4**	
		Kolej Poly-Tech MARA Ipoh			2	2	1					**5**	
		Kolej Teknologi Perak				6	3				2	**11**	
Other training provider	**Skill training provider (for SPM**	Institut Latihan Perindustrian Ipoh					1	12				**13**	2021

	school leavers)												
Total			**8**	**11**	**33**	**87**	**57**	**81**	**4**	**22**	**24**	**327**	

Perlis

Broad Institution Type	**Institution Type**	**Institution name**	**General programmes**	**Arts & Humanities**	**Social Sciences, Business & Law**	**Science, Mathematics & Computing**	**Engineering, Manufacturing & Construction**	**Health & Welfare**	**Services**	**Total**	**Year of data**
IPTA	**University**	UniMAP	Not available								
	Polytechnic	Politeknik Tuanku Syed Sirajuddin		2	2	2	2		2	**10**	2020
	Community college	Kolej Komuniti Arau	2	2		2	2			**8**	
		Kolej Komuniti Cawangan Kangar					2			**2**	
IPTS	**University college**	Kolej Universiti Islam Perlis	1	5	12					**18**	2018
	College	Institut Pengajian Tinggi Islam Perlis (IPTIP)		3	1					**4**	
		Kolej Antarabangsa Teknologi Dan Profesional			1		2	1	1	**5**	

Other training provider	**Skill training provider (for SPM school leavers)**	Institut Latihan Perindustrian Kangar				1	4			**5**	2021
Total			**3**	**12**	**16**	**5**	**12**	**1**	**3**	**52**	

7.1 Other Training Providers

The table below obtained from trainingmalaysia.com, lists training providers that are not listed above.

No.	Penang	Kedah	Perak
1	Alliance Francaise De Penang	Cosmopoint Sdn. Bhd, Sungai Petani	Avanzamento Training Centre Sdn Bhd, Lumut
2	Alpine Reliance(M) Sdn Bhd, Sg Nibong	Hasani Mgt Sdn Bhd (Institut Hasani), Sungai Petani	Comtrain Computer Academy Sdn Bhd, IPOH
3	AR Consultancy	High Focus Training Consultancy (M) Sdn Bhd, Sungai Petani	Cosmopoint Sdn. Bhd, IPOH
4	Argi Management Consultants Sdn Bhd	Institut Teknologi TMC, Sungai Petani	ELS Language Centres, IPOH
5	Bayan Tree It Services Sdn Bhd, Bayan Lepas	Institut Wawasan, Kulim	Institut Kompas, Ipoh
6	BMT Certification (Penang) Sdn Bhd, Gelugor	KISMEC, SUNGAI PETANI	Institut Teknologi Perak, Ipoh
7	CNK Management Sdn Bhd, Bayan Lepas	Kulim Technology Management Sdn Bhd, Kulim	Ipoh Learning & Training Institute Sdn Bhd., Ipoh
8	Cosmopoint Sdn. Bhd	Naza Kia Academy Sdn Bhd, Gurun	Keris College Sdn Bhd, Ipoh
9	Cresco Training & Consultancy, Prai	PBH Management Consultancy, Kulim	Kolej Maxwell, Ipoh
10	Disted - Stamford Sdn Bhd	Pusat Teknikal Spextram, Sungai Petani	Kolej Menara Perak Jaya Sdn Bhd
11	Dream Catcher Consulting Sdn Bhd, Sungai Nibong	Quantum Achievers Academy Sdn Bhd, Alor Star	Kolej Syuen Sdn Bhd, Ipoh
12	Dunville Training Centre Sdn Bhd	TBT-EOSC Sdn Bhd, Kulim	Kolej Teknologi Praktikal Sdn Bhd, IPOH
13	Dynamic Network System (M) Sdn Bhd, Bayan Lepas	Uniutama Management Holdings Sdn Bhd, Sintok	Mina Resources Sdn Bhd, Ipoh
14	ELS Language Centres, GEORGETOWN	Wawasan Skill Development Centre Sdn Bhd, Kulim	Nirwana United (M) Sdn Bhd, IPOH
15	Emmedic Emergency Training Centre, Bukit Mertajam	Wilderness Centre Sdn Bhd, Langkawi	Noble School of Engineering
16	Equals Resources Consulting Sdn Bhd, Tanjung Tokong		Practical Advanced Technology Sdn Bhd, Ipoh
17	Excel College of Training & Dev Sdn Bhd		Professional It & Skill Training Centre, Ipoh
18	Excelpolitan Institute Sdn. Bhd.		Pusat Pembangunan Usahawan & Kemahiran Perak (PESDC)

19	G.C.Training Centre Sdn Bhd, Perai		Raffles Education Group Sdn Bhd, IPOH
20	Global Advantage Consulting Sdn Bhd, Bayan Lepas		Visionary System (PK) Sdn Bhd, IPOH
21	Han Chiang College		
22	Haotai Consultancy Sdn Bhd		
23	HD Training House Sdn Bhd, Air Itam		
24	Hrd Solutions Sdn Bhd, Bayan Lepas		
25	Infogenius Sdn Bhd		
26	Institut Perkim-Goon Sdn Bhd		
27	Institut Yayasan Bumiputra Pulau Pinang, Bandar Perai		
28	Institute of Training And Development		
29	INTI Industrial Training Centre (PG) Sdn Bhd, Bayan Lepas		
30	ITMP Training Centre Sdn Bhd		
31	Key Values Development Centre, Gelugor		
32	Kolej I-Systems Bukit Mertajam, Bukit Mertajam		
33	Kolej Utara		
34	Mapics Consultancy Sdn Bhd		
35	Marvellous Gateway Sdn Bhd		
36	Mega Yield Management Consultancy, Bayan Lepas		
37	MGSQ Consultants Sdn Bhd		
38	Mikekriss Sdn Bhd, BAYAN BARU		
39	Mikekriss Sdn Bhd, Butterworth		
40	Nexus Professional Sdn Bhd, Sungai Nibong		
41	OED Technology Sdn Bhd		
42	Oligo Training Centre Sdn Bhd		
43	Oxford Language Centre Sdn Bhd, Kepala Batas		
44	Pentamaster Information Technology Bhd		

45	Platronix Sdn Bhd		
46	Prima Link Training & Consultancy, Butterworth		
47	Pusat Bahasa Dinamik, Sg Nibong		
48	Pusat Bahasa Titian Jaya (PG) Sdn Bhd, Perai		
49	Pusat Latihan Excelpolitan (Excelpolitan Training Center)		
50	Pusat Pembangunan Kemahiran Pulau Pinang (PSDC)		
51	QMS Management Consultants Sdn Bhd		
52	SEGi College (PG) Sdn Bhd		
53	Sentral Education Sdn Bhd		
54	Silicon Institute of Technology, Prai		
55	Silicon Skill Tech Sdn Bhd		
56	Success Pillar Sdn Bhd		
57	Synerflex Consulting		
58	Techment Consultancy Sdn Bhd, Bayan Lepas		
59	Umega Consultancy Services Sdn Bhd, Simpang Ampat		
60	Universiti Sains Malaysia (Pusat Inovasi & Perundingan)		
61	Usains Holding Sdn Bhd, Minden		