UNIVERSITI PUTRA MALAYSIA

SKILLS AND OCCUPATIONAL MISMATCH
IN MALAYSIAN LABOUR MARKET

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**SKILLS AND OCCUPATIONAL MISMATCH
IN MALAYSIAN LABOUR MARKET**

By

SALWATY BINTI JAMALUDIN

**Thesis Submitted to the School of Graduate Studies, Universiti Putra
Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of
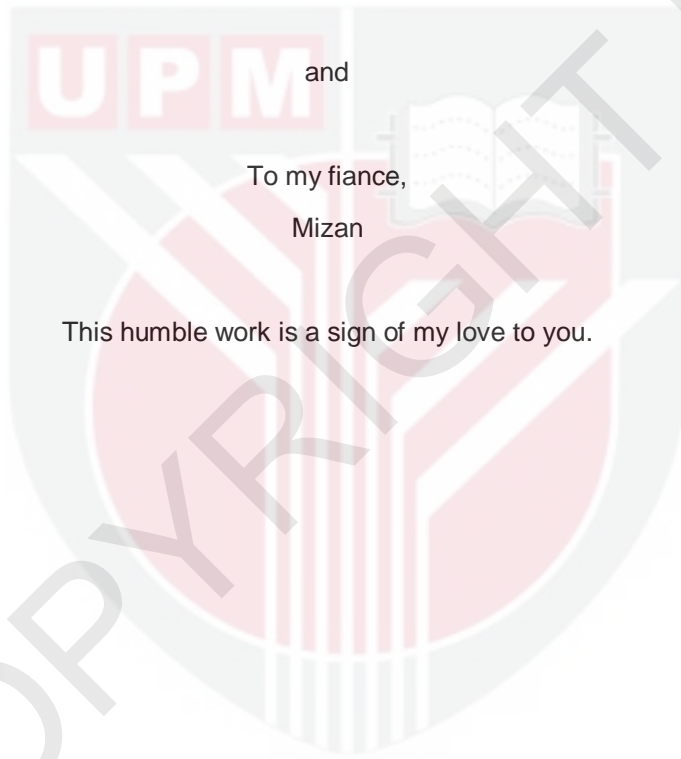Philosophy**

January 2021

DEDICATION

To my parents,

Mr. Jamaludin and Mrs. Zainab

To my siblings,

Nidzam, Hafiz, Hafizul, Najlaa

and

To my fiance,

Mizan

This humble work is a sign of my love to you.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in
fulfilment of the requirement for the degree of Doctor of Philosophy

SKILLS AND OCCUPATIONAL MISMATCH
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January 2021

Chairman   : Associate Professor Rusmawati Said, PhD
Faculty   : School of Business and Economics

Despite its low unemployment rate, Malaysian labour market is currently sending
signals of mismatch: a misallocation between demand and supply in the labour
market. The issue of mismatch should not be ignored as it indicates the
incapability of economies to employ their existing stock of human capital, and
impeding long-term productivity. Motivated by the above issue, this study
attempts to measure the level of mismatch and its factors. Specifically, the aims
of this study are threefold.

The first objective is to measure skills mismatch and its contribution towards
mismatch unemployment in Malaysia by using annual data 2006-2017 from the
Department of Statistics Malaysia (DOSM), Ministry of Human Resource
Malaysia (MOHR), and Bank Negara Malaysia (BNM). The result reveals that in
2007, the index was only 0.108, while in 2017, it surged up to 0.273, which
indicates there is 27% of hires were lost due to misallocations in the labour
market. Mismatch unemployment has contributed around 50% to the rise of the
unemployment rate. This suggests that the formal education system in Malaysia
is not responsive to the demands of the labour market and vice versa.

The second objective measures occupational mismatch by quantifying the level
of overeducated and undereducated workers in the labour market. It was
measured using both Job Analysis and Realized Matches methods, employing
2010-2015 Labour Force Survey (LFS) data. The analysis suggests
undereducated workers are more prevalent in the labour market. On average,
the level of undereducation was 0.338, which means that 34% of the labour force
were undereducated. However, the proportion of severely overeducated workers
have been rising year by year. Among occupations, technicians and associate
professionals, and clerical support workers are the ones in which there is the
highest proportion of overeducated. Among sectors, agriculture, forestry and

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fishery, construction, and administrative and support service activities are the ones in which there is the highest proportion of mismatch.

The third objective, survey fieldwork was carried out to identify supply-side factors of mismatch. A total of 402 questionnaires were gathered from a stratified random sample of unemployed graduates in career fairs. Using the Relative Importance Index (RII), the findings reveal that in general, job seekers believe that no jobs are available in the market. This circumstance at least indicates the disconnection between the demand and supply sides, as information on job vacancies of the former fails to reach the latter.

This study makes a significant contribution to the study of unemployment in two ways. First, it proposes new tools to measure the mismatch, specifically skills mismatch index, mismatch unemployment, and occupational mismatch level in Malaysia. Although mismatch remains a challenge and a top policy concern, there has been no systematic mismatch measurement analysis. Another contribution is that by understanding the reason for unemployment, policy makers could enhance an active labour market policy to avoid human capital destruction.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
Sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

KETIDAKPADANAN KEMAHIRAN DAN PEKERJAAN
DI DALAM PASARAN BURUH MALAYSIA

By

SALWATY BINTI JAMALUDIN

Januari 2021

Pengerusi : **Prof. Madya Rusmawati Said, PhD**
Fakulti : **Sekolah Perniagaan dan Ekonomi**

Walaupun dengan kadar pengangguran yang rendah, pasaran buruh Malaysia
memberi isyarat berlakunya ketidakpadanan: penyalahuntukan antara
permintaan dan penawaran di dalam pasaran buruh. Isu ketidakpadanan tidak
boleh diabaikan kerana ia memberi petunjuk ketidakmampuan ekonomi
menggunakan stok sumber modal insan yang sedia ada dan menghalang
pertumbuhan produktiviti jangka panjang. Bermotivasikan oleh isu-isu di atas,
kajian ini mengukur tahap ketidakpadanan dan faktor-faktornya. Secara khusus,
matlamat kajian ini terbahagi kepada tiga.

Objektif pertama adalah untuk mengukur ketidakpadanan kemahiran dan
sumbangannya terhadap ketidakpadanan pengangguran di Malaysia, dengan
menggunakan data tahunan 2006-2017 dari Jabatan Perangkaan Malaysia
(DOSM), Kementerian Sumber Manusia Malaysia (MOHR) dan Bank Negara
Malaysia (BNM). Analisis mendedahkan pada tahun 2007, indeks ini hanya
berada pada tahap 0.108, namun pada tahun 2017, ia mencapai sehingga 0.273,
yang menunjukkan terdapat 27% pekerja tidak dapat diserap kerana
penyalahuntukan di dalam pasaran buruh. Ketidakpadanan pengangguran
menyumbang sekitar 50% kepada peningkatan kadar pengangguran. Ini
menunjukkan bahawa sistem pendidikan formal di Malaysia tidak responsif
terhadap permintaan pasaran buruh, dan juga sebaliknya.

Objektif kedua mengukur ketidakpadanan pekerjaan, dengan mengukur tahap
terlebih pendidikan dan terkurang pendidikan di dalam pasaran buruh.
Pengukuran ini menggunakan kedua-dua metod Job Analysis (JA) dan Realized
Matches (RM) dengan memanfaatkan data Penyiasatan Tenaga Buruh (LFS)
dari tahun 2010 hingga 2015. Analisis mencadangkan kadar pekerja yang
terkurang pendidikan melebihi kadar pekerja yang terlebih pendidikan. Secara
purata, tahap terkurang pendidikan adalah 0.338, yang menggambarkan 34%

tenaga kerja di Malaysia mempunyai tahap pendidlkan yang lebih rendah berbanding tahap pendidikan yang diperlukan industri. Namun, kadar pekerja yang terlebih pendidikan menunjukkan peningkatan tahun demi tahun. Di antara pekerjaan, juruteknik dan profesional bersekutu, dan pekerja sokongan perkeranian adalah pekerjaan di mana terdapat peratusan terlebih pendidikan tertinggi. Di antara sektor pula, pertanian, perhutanan dan perikanan, pembinaan, dan aktiviti pentadbiran dan perkhidmatan sokongan adalah sektor di mana terdapatnya kadar ketidakpadanan tertinggi.

Bagi objektif ketiga, kajian lapangan dijalankan bagi mengenalpasti faktor ketidakpadanan dari pihak penawaran. Seramai 402 responden dikumpul, daripada graduan yang menganggur di pameran kerjaya. Menggunakan *Relative Importance Index* (RII), hasil kajian mendapati pada umumnya pencari kerja merasakan tiada pekerjaan yang sesuai bagi mereka di dalam pasaran buruh. Keadaan ini sekurang-kurangnya memberikan petunjuk ketidaksambungan maklumat antara pihak permintaan dan penawaran, memandangkan maklumat mengenai kekosongan jawatan gagal mencapai sasarannya.

Kajian ini memberi sumbangan kepada isu pengangguran dalam dua aspek. Pertama, ia mencadangkan cara mengukur ketidakpadanan; indeks ketidakpadanan kemahiran, ketidakpadanan pengangguran, dan tahap ketidakpadanan pekerjaan di Malaysia. Walaupun ketidakpadanan tetap menjadi cabaran dan perhatian utama bagi pembuat dasar, namun tiada analisis sistematik bagi mengukur ketidakpadanan sebelum ini. Sumbangan lain adalah dengan memahami sebab pengangguran, pembuat dasar dapat menambahbaik dasar pasaran buruh yang aktif untuk membendung kemusnahan modal insan.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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Declaration by graduate student

I hereby confirm that:
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Signature: _____ Date: _____

Name and Matric No.: Salwaty binti Jamaludin (GS46213)

Declaration by Members of Supervisory Committee

This is to confirm that:
- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

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LIST OF ABBREVIATIONS

BNM	Bank Negara Malaysia
DEA	Data Envelopment Analysis
DFA	Distribution Free Approach
DOSM	Department of Statistics Malaysia
E&E	Electrical and Electronics
FDH	Free Disposal Hull
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
ILO	International Labour Organization
JOLTS	Job Opening and Labour Turnover Survey
LCE	Lower Certificate of Education
LFS	Labour Force Survey
MASCO	Malaysia Standard Classification of Occupations
MEF	Malaysian Employers Federation
MITI	Ministry of International Trade and Industry
MOHR	Ministry of Human Resources
MSIC	Malaysia Standard Industrial Classification
OECD	Organisation for Economic Co-operation and Development
PMR	*Penilaian Menengah Rendah*
PT3	*Pentaksiran Tingkatan 3*
JA	Job Analysis
RM	Realized Matches
SFA	Stochastic Frontier Analysis
SRA	*Sijil Rendah Agama*
SRP	*Sijil Rendah Pelajaran*
SPM	*Sijil Pelajaran Malaysia*
STPM	*Sijil Tinggi Persekolahan Malaysia*
TFA	Thick Frontier Approach
WA	Worker Self-Assessment
UPSR	*Ujian Penilaian Sekolah Rendah*
UPSRA	*Ujian Penilaian Sekolah Rendah Agama*

CHAPTER 1

INTRODUCTION

1.1   Introduction

Labour mismatch refers to the inefficient allocation of human capital in the labour market (Şahin, Song, Topa, & Violante, 2014; Adams, Greig, & McQuaid, 2000). Mismatch may either be educational/skills, occupational, industrial, and geographical/regional. Of course, labour market always demonstrates a certain level of mismatch, or else job vacancies would fill up instantly. In reality, both job seekers and firms need time to digest the information in the labour market before hires can be formed (Borjas, 2000; Liu, 2013). This is the reason why some degree of unemployment is unavoidable in free market economies (Lilien, 1982). However, any rise in mismatch above its usual level makes it tougher for the unemployed to find jobs and more expensive for firms to fill vacancies (Daly, Hobijn, Şahin, & Valletta, 2012).

Mismatch results in either underemployment or unemployment, and could arise in at least three circumstances. Firstly, technology shock that could change skill set demanded by employers (Bauer & Bender, 2004; Goldin & Katz, 2009). This is happening when new technology comes in the market, and some skills become obsolete. However, investing too much in high technology may not always be a good strategy. When an industry invests too much in sophisticated technology, firms might face the difficulty of recruiting high-skilled labour due to their shortage in the market. In contrast, an industry that continues to use low technology tends to hire low- and middle-skilled workers. Thus, the excess supply of graduates cannot be absorbed into the labour market (Zulkiply, 2017).

Secondly, job seekers are not located in areas where jobs are available (Erken, van Loon, & Verbeek, 2015). This refers to the difficulty in moving regions to get a job. For instance, there may be jobs in the capital state, but constrained by the transportation problem or accommodation. Lastly, lucrative unemployment benefits (Rothstein, 2011; Nickell, Nunziata, Ochel, & Quintini, 2003). This is happening under circumstances when job seekers do not put an effort to find the jobs once they have received the monthly stipend. Indirectly, unemployment benefit programs modestly raise the national unemployment rate.

The issue of mismatch should not be ignored as it could impede long-term productivity and economic growth. This could be explained in terms of resource allocation, as resource allocation is a possible explanation why some countries are more productive than others (Bartelsman, Haltiwanger, & Scarpetta, 2013;

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Hsieh & Klenow, 2009). Resource misallocation or mismatch adversely affects physical and human capital accumulation once the labour market fails to create job opportunities and absorb the labour force (Zulkiply, 2017). As a consequence, human capital in the country is not abundantly utilized, and labour productivity could decline below its potential level (Mukoyama & Şahin, 2009).

Labour mismatch also causes other issues, such as long unemployment spells (Groshen & Potter, 2003). While some scholars stress that mismatch is a temporary phenomenon (see Dolton & Silles, 2003; Freeman, 1976), yet others argue that when an individual experiences unemployment in the early stage of his career development, he would have a higher chance of facing a long unemployment spell later on in his life (Domadenik & Pastore, 2006). To make it worse, as unemployment duration could indicate the loss of human capital, the probability of finding a job decreases with the duration of unemployment (Blanchard & Summers, 1986).

Self-esteem, likewise, would be affected. As a job seeker remains longer in unemployment, his search intensity becomes lower because he presumes that the probability of being invited to an interview is low (Layard, Layard, Nickell, Nickell, & Jackman, 2005; Falk, Huffman, & Sunde, 2006). As a consequence, the job-finding probability of unemployed workers decreases as their unemployment duration increases. Other social issues, such as criminal activities, would also emerge due to the positive correlation between unemployment and crime (Fougère, Kramarz, & Pouget, 2009; Habibullah, Baharom, Din, Muhamad, & Ishak, 2014).

The Department of Statistics of Malaysia (DOSM) reports that the country has achieved full employment for decades, with an average unemployment rate of 3.3%. Despite so, Malaysian labour market is currently sending signals of mismatch, as measured with several indicators that will be discussed in the next section. To mitigate the issue of mismatch, it is vital to first measure it and to look beyond the aggregate unemployment rate and unpack the information that it may contain. Relying solely on the unemployment rate could reveal an inaccurate picture of the labour market due to its limitations. For instance, it cannot measure the level of underemployment. The statistic of underemployment is an important, as it could indicate the underutilisation of the productive capacity of the employed population.

Therefore, this study attempts to propose suitable measurement tools that can strengthen the linkages between policy design and mismatch monitoring in a purposeful way. Specifically, the aims of this study are threefold. First, it attempts to develop a skills mismatch index and measure the share of mismatch unemployment in Malaysian labour market. Second, it aims to tackle the issue of undereducation and overeducation (underemployment), by measuring level of occupational mismatch in Malaysian labour market. Individual mismatches will be aggregated to obtain the level of mismatch for each occupational group and sector.

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Third, it identifies the factors of graduate unemployment from the perspective of the supply side. As the high unemployment rate coincides with the increasing number of vacancies, systematic studies based on primary data are still needed to better understand the factors that delay the unemployed from entering the formal labour market. The purpose of measuring skills, occupational mismatch and factor of mismatch are to fill the significant theoretical and practical gap in mismatch measurement in developing countries, especially in Malaysia.

1.2   Research Background

The government of Malaysia is aware of the issue of unemployment and has launched many initiatives to tackle this matter. For instance, in 2011, it has introduced *Skim Latihan 1Malaysia* (SL1M), whose aim is to resolve the problem of inadequate skills of young graduates. However, due to financial, administrative, regulatory, and monitoring issues, even after eight years of the programme, youth unemployment rate is still below a satisfactory percentage (IRDP, 2019). These results question the ability of SL1M to address unemployment. The programme has now been rebranded as PROTÉGÉ, which places more emphasis on entrepreneurship training to create more entrepreneurs or job creators. This is in line with strategic objective 10 of the National Entrepreneurship Framework (NEF): entrepreneurship skills for unemployed youth.

Other ministries, such as the Ministry of Higher Education (MOHE), is also responsible for its alleviation. The ministry has introduced several initiatives to equip higher education students with future-proof skills, such as 2 Years in University, 2 Years in Industry (2u2i). Introduced in 2016, 2u2i is a programme that aims to boost students' employability through enhanced industry exposure. Students will participate in university courses for two years before gaining experience in the industry for another two years. Aside from 2u2i, there are three other types of structured programs. However, they are still in the pilot phase, covering only certain courses in select universities. For example, Universiti Putra Malaysia (UPM) offers only two courses for the 2u2i programme: Bachelor of Science in Plantation Management and Bachelor of Science in Food Manufacturing Operations with Honours (MOHE, 2018).

Furthermore, in 2017, MOHE has launched another programme, Gap Year. It allows students to take two semesters off their formal education to pursue personal growth. Though optional, students are encouraged to join the programme after completing their first academic year. The programme enables them to reflect profoundly on their life purposes, careers, and roles in society. In addition, to monitor labour shortages, the Critical Skills Monitoring Committee (CSC), managed by TalentCorp and the Institute of Labour Market Information and Analysis (ILMIA) under the Ministry of Human Resources (MOHR), has produced the Critical Occupations List (COL), a set of occupations that are in demand. It aims to promote better coordination of human capital policies aimed

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at attracting, nurturing, and retaining talent. The COL has been updated annually since its first publication in 2015.

Despite all these programmes devised by various government agencies and industries to reduce the unemployment rate, Malaysia still faces significant challenges in developing and fully utilize its human capital.

1.2.1 Indicators of Mismatch

The labour market may signal the presence of mismatch in five ways, either from the supply side such as high unemployment of graduates, and the demand side; concentration of job vacancies in low and middle-skilled jobs, long duration to fill up vacancies, slow salaries and wages growth, and salary and wage differentials across occupations and sectors.

1.2.1.1 High Unemployment of Graduates

From the supply side, the main indicator to identify the emergence of mismatch in the labour market is the rising number of unemployed. As the young population has more awareness to pursue tertiary education, the share of labour force with tertiary education has doubled to 28% in 2017, compared to 2011, dotted yellow line in Figure 1.1
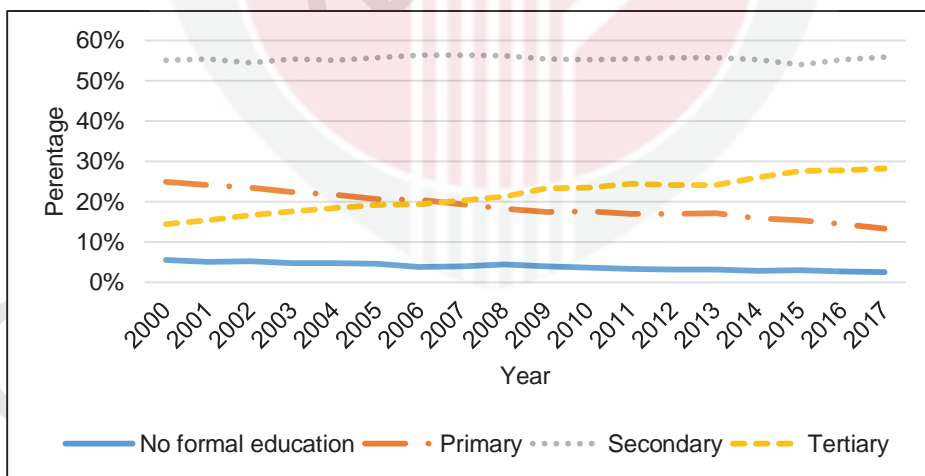
Figure 1. 1: Labour force by educational attainment in Malaysia
(Source: DOSM)

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However, the number of unemployed graduates steadily rises along with the increase in tertiary-educated workers. Figure 1.2 shows the unemployment rate in Malaysia in 2000-2017. Even though national unemployment rate is stagnant around 3.3%, however, as illustrated by the dotted yellow line, the percentage of unemployed tertiary graduates is very alarming: almost up to 35% (of total unemployed) in 2017, a 20% increase compared to a decade ago. Youth unemployment, illustrated by the dotted grey line, has reached up to 10%, three times higher than the national unemployment rate. This circumstances happen due to certain reasons; the requirement of the vacancy does not match with the requirement of job seekers or employers are unable to find appropriate candidates to fit the vacancies.
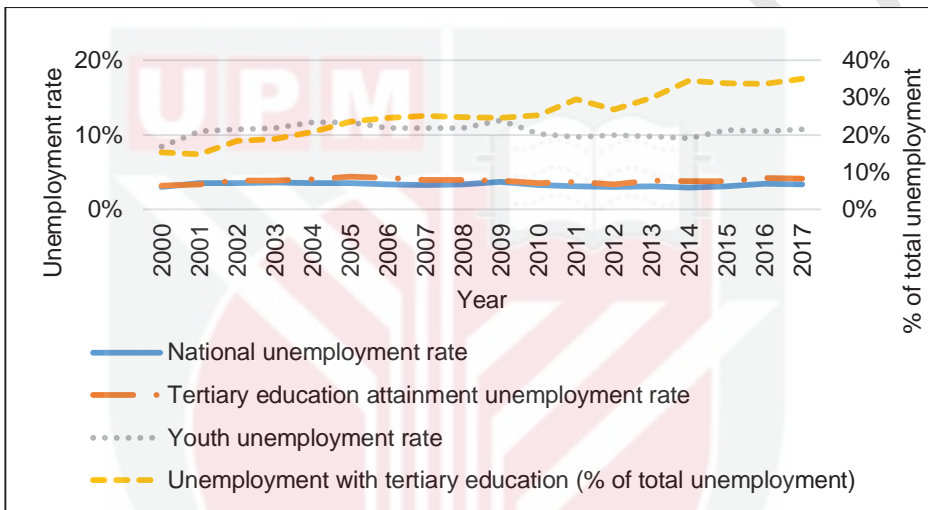
Figure 1. 2: Unemployment rate and unemployment with tertiary education in Malaysia
(Source: DOSM)

1.2.1.2 Concentration of Job Vacancies in Low- and Middle-skilled Jobs

From the demand side, the main indicator of mismatch could be explained in terms of job vacancies; a job that is currently vacant and available to be filled (Jackman, Layard, & Savouri, 1990). Figure 1.3 illustrates the distribution of job vacancies by skill in Malaysia. Low-skilled vacancies are most representative, making up an average of 65% of total vacancies from 2006 to 2017. During the same period, on average, middle-skilled vacancies were 26%, while high-skilled vacancies only 9%.

The most number of vacancies was recorded in 2011, with approximately 2.3 million vacancies. Services contributed the most vacancies (34%), followed by manufacturing (31%), agriculture, forestry and fishing (18%), and construction (17%). In the services sector, the sub-sectors of finance, insurance, real estate,

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and business activities contributed significantly to the total (16%). From 2014 to 2015, the number of vacancies shrunk by almost 50%. On average, manufacturing contributed 31% to the total, services 26%, agriculture, forestry and fishing 24%, and construction 19%. From the services sector, the wholesale and retail trade, and accommodation and food service activities sub-sectors contributed the most to the total vacancies (9%). In 2017, there were almost 1.5 million vacancies.
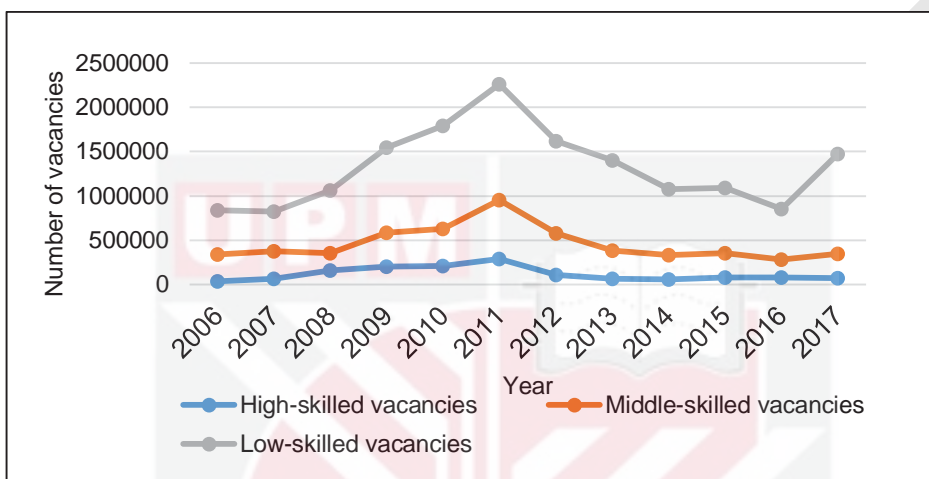
Figure 1. 3: Job vacancies by types of skills in Malaysia
(Sources: BNM and MOHR)

Figure 1.4 shows the relationship between vacancy and unemployment. Panel A shows the general relationship. Overall, the number of vacancies have fluctuated throughout the years, but the number of unemployed has consistently increased. Panel B shows the relationship between total vacancy and unemployment for high-skilled workers. Following the Malaysia Standard Classification of Occupations 2008 (MASCO 2008), high-skilled vacancies include jobs for managers, professionals, and technicians and associate professionals. The high-skilled unemployed refers to unemployed graduates, that is, those who have attained at least tertiary education. Though the supply of unemployed graduates has been increasing, vacancies are still shrinking in quantity. In 2006, the number of high-skilled vacancies was 38,201 (5% of total). In 2011, it inflated to 13%, or 292,438 vacancies. However, in 2012, it significantly dropped to 7%, with only 108,508 vacancies in the market. It continued to decrease until 2017, which recorded only 69,239 high-skilled vacancies.

Panel C shows the relationship between total vacancy and unemployment for middle-skilled workers. Middle-skilled vacancies are for clerical support workers, service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, and plant and machine-operators and assemblers. The middle-skilled unemployed are workers who have at least attained secondary education. While the supply of unemployed secondary graduates has

increased, the number of vacancies for this skill group has fluctuated. In 2006, the number of middle-skilled vacancies were 298,699 vacancies, making up 36% of total vacancies. Peak vacancies were recorded in 2011 with 657,949. In 2017, the number dropped significantly to only 276,653 vacancies, equivalent to 19% of the total.

Panel D shows the relationship between total vacancy and unemployment for low-skilled workers. Low-skilled vacancies are for elementary occupations, while the low-skilled unemployed are workers with at least primary education. Interestingly, even though the supply of the skill group has decreased throughout the years, the number of vacancies illustrate an opposite trend. In 2006, there were 497,775 vacancies, which made up 60% of the total. In 2017, they went up to 77% for a total of 1.3 million vacancies.

These trends indicate that the labour market prefers primary-educated workers, which does not match the increasing number of graduates. This trend also suggests the limited opportunity of graduates to apply their skill and knowledge, as the skills demanded by employers do not match theirs. Indirectly, the trend also implies that the demand side of the labour market does not correspond with the signals coming from the supply side.

A) Total number of vacancies and unemployed

B) Number of high-skilled vacancies and unemployed

C)

Number of middle-skilled vacancies and unemployed

D)

Number of low-skilled vacancies and unemployed
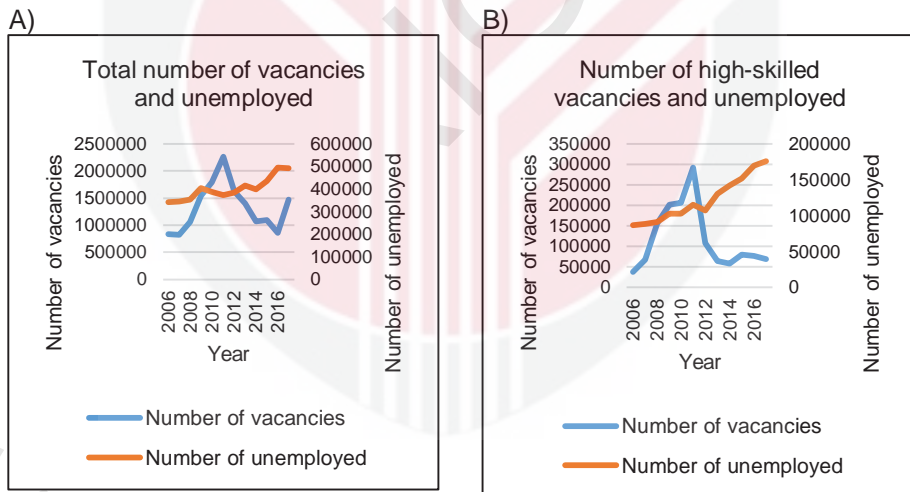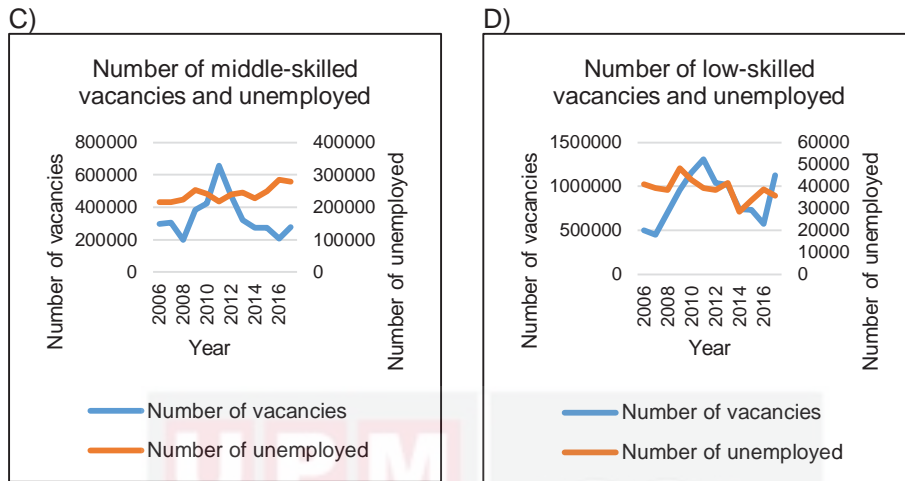
Figure 1. 4: Vacancy-unemployment relationship in Malaysia
(Sources: BNM and MOHR)

1.2.1.3 Long Duration to Fill Vacancies or Difficulty in Filling Jobs

This measure has been included by the World Bank and MOHR (2016) to indicate the shortage of skills in the market. The Productivity and Investment Climate Survey (PICS) (2009) reports that employers found it difficult to locate and recruit the skills that they need. Around 40% of firms assert that the average time to fill a vacancy in Malaysia is about four weeks. This is longer than other countries: for example, in Indonesia and India, vacancies for professional posts in the manufacturing sector can be filled in less than two weeks. The cost of searching for an employee would encumber potential productivity. In the end, the employer would hire an employee whose qualification or skill does not correspond to the requirements of the job.

1.2.1.4 Slow Salaries and Wages Growth

Furthermore, another indicator of mismatch from the demand side is in terms of the salaries and wages. MOHR and The World Bank (2016) reveal that the wage growth for educated workers is slowing down due to mismatch, as occupational mismatch is highly related to wage penalty. Osman & Shahiri (2013) also suggest that occupational mismatch is emerging in Malaysian labour market. The authors also reveal that the rate of return to education has declined, even negative, which could be interpreted as a sign for education inflation.

Data from DOSM also reveal that half of all graduates (53.7%) make less than RM2,000 per month. Starting salaries for graduates have largely stagnated since 2007, even in sectors that offer high salaries at the entry level, such as oil and

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gas. Based on an employer survey, it suggests that the nominal starting salaries for graduates remain at modest levels (BNM, 2018). Even after adjusting for inflation, real starting monthly salaries for most fresh graduates have declined since 2010. A fresh graduate with a diploma earned a real salary of only RM1,376 in 2018 (RM1,458 in 2010), while a master's degree holder earned a real salary of RM2,707, a 7% decline from RM2,923 in 2010.

The same report mentions that Malaysians are still being paid less than employees in benchmark economies (United States, United Kingdom, Germany, Australia, and Singapore), even after accounting for the different productivity levels across countries. To make it clear, for an output worth $1,000, a Malaysian worker will be paid $340. The wage received by a worker in the benchmark economies for producing the same output is much higher, $510. This suggests that the current wages in Malaysia do not match its productivity levels.

The World Bank (2009) reports that the stagnancy of real wages and decline in wage premiums indicate the unwillingness of employers to pay since the workers' skills do not meet the expectations of the employers. Furthermore, the National Economic Advisory Council (2009) reveal that in some circumstances, employers not only refrain from paying high wages to skilled workers, but they keep relying on low-skilled foreign workers to generate higher profits from the production of low value-added products. This tendency has contributed significantly to the dampening of wages.

1.2.1.5 Salary and Wage Differentials across Occupations and Sectors

Job characteristics, including occupation, sector, location, firm size, contract type, and hours worked, as well as individual characteristics, such as education level, skills, and experience, are among the factors that determine salary and wage differentials. Generally, those with high-skilled jobs, enjoy a wage premium over other workers. In 2010, the average salaries and wages for managers was only RM4,552, but it grew by up to 45% in 2015 to RM6,613. Service and sales workers, on the other hand, had the lowest wage growth with only 22% (from RM1,307 to RM1,598). Table 1.1 shows the average monthly salaries and wages by occupational groups in 2010-2015.

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Table 1. 1: Average monthly salaries and wages by occupational groups in Malaysia, 2010-2015 (RM)

Group of occupation/ Year	2010	2011	2012	2013	2014	2015
Managers	4,552	4,959	5,237	5,524	6,484	6,613
Professionals	3,800	3,485	3,818	4,116	4,401	4,733
Technicians and associate professionals	2,439	2,397	2,499	2,676	2,950	3,029
Clerical workers	1,582	1,664	1,739	1,847	1,935	2,010
Service and sales workers	1,307	1,279	1,322	1,477	1,539	1,598
Skilled agricultural and fishery workers	709	981	1,073	1,100	1,319	1,486
Craft and related trades workers	1,247	1,294	1,305	1,424	1,542	1,610
Plant and machine-operators and assemblers	1,185	1,195	1,275	1,369	1,522	1,551
Elementary occupations	945	919	973	1,045	1,105	1,191

(Source: DOSM)

By sector, the highest wage growth (47%) was recorded in the professional, scientific, and technical activities sub-sector. Conversely, the electricity, gas, steam, and air conditioning supply sub-sector records the lowest wage growth, 3%. Table 1.2 shows the average monthly salaries and wages by sector in 2010-2015.

Table 1. 2: Average monthly salaries and wages by sectors in Malaysia, 2010-2015 (RM)

Sectors/ Year	2010	2011	2012	2013	2014	2015
Agriculture, forestry, and fishing	876	918	1,005	1,041	1,109	1,232
Mining and quarrying	3,433	3,409	3,420	3,604	4,873	4,297
Manufacturing	1,549	1,550	1,706	1,759	2,013	2,038
Electricity, gas, steam, and air conditioning supply	2,772	2,685	2,684	3,242	2,867	2877
Water supply; sewerage, waste management and remediation activities	1,464	1,738	1,608	1,635	1,902	1,995
Construction	1,520	1,573	1,616	1,701	1,831	1,897
Wholesale and retail trade; repair of motor vehicle and motorcycles	1,384	1,416	1,443	1,553	1,658	1,758
Transportation and storage	1,944	1,877	1,968	1,987	2,166	2,500
Accommodation and food service activities	1,056	1,072	1,157	1,263	1,316	1,405
Information and communication	3,232	3,101	3,281	3,552	3,587	3,975

Sectors/ Year	2010	2011	2012	2013	2014	2015
Financial and insurance/takaful activities	2,976	2,949	3,151	3,156	3,612	3,808
Real estate activities	2,772	3,056	2,804	3,216	3,864	3,946
Professional, scientific, and technical activities	2,469	2,632	2,826	2,991	3,305	3,632
Administrative and support services activities	1,262	1,225	1,166	1,328	1,449	1,465
Public administration and defence; compulsory social security	2,360	2,474	2,576	2,873	3,155	3,196
Education	2,861	2,897	3,137	3,415	3,767	3,992
Human health and social work activities	2,367	2,351	2,455	2,687	2,974	2,999
Arts, entertainment, and recreation	1,523	1,466	1,424	1,626	1756	1,954
Other service activities	1,354	1,316	1,382	1,555	1,706	1,711

(Source: DOSM)

However, it should be noted that the wage for each group of occupation differs across sectors, as shown in Table 1.3. For example, technicians and associate professionals in mining and quarrying sector receive RM4,027 per month, while their confreres in accommodation and food service activities sub-sector receive only RM2,110. Another example is clerical and support workers: those working in the financial and insurance/takaful activities sub-sector earn much more than their colleagues in other industries.

Table 1. 3: Average monthly salaries and wages for selected occupational groups and sectors in Malaysia, 2010-2015 (RM)

Sectors/ Group of occupations	1	2	3	4	5
Agriculture, forestry, and fishing	3706	1703	1375	1001	1245
Mining and quarrying	7599	4027	1767	2143	1641
Manufacturing	3828	2189	1487	1356	1074
Construction	4311	2460	1485	1253	1551
Wholesale and retail trade; repair of motor vehicle and motorcycles	3505	2384	1339	1066	1250
Accommodation and food service activities	2620	2110	1297	991	1177
Information and communication	3990	2744	1897	1465	1569

Sectors/ Group of occupations	1	2	3	4	5
Financial and insurance/takaful activities	4191	3177	2149	1539	1575

Notes:
1 = Professionals, 2 = Technicians and associate professionals, 3 = Clerical support workers, 4 = Service and sales workers, 5 = Plant and machine-operators and assemblers.
(Source: DOSM)

This pattern may emerge for several reasons. First, the nature of jobs in the industry itself, whether the industry is capital- or labour-intensive. Second, over-reliance on low-skilled workers and cheap foreign workers. Third, occupational mismatch. Indeed, in the real labour market, not all workers are matched with their occupations; some may be overeducated and struggle with underemployment. This issue should not be disregarded as it could question the return to education. Ismail, Saukani, Khain, & Palel (2015) find that overeducated workers receive lower—but still positive—returns to education compared to well-matched workers. Undereducated workers, however, are much worse-off, since they receive negative returns from education. These conclusions are also supported by Zakariya (2014), who reports that overeducated workers earn significantly less than their lower-educated colleagues who are well-matched with their jobs.

1.2.2 Overeducation (underemployment) and Undereducation

The issue of overeducation or underemployment, normally affected those who are with tertiary education level. Some of educated may involuntary work in lower-status jobs, which mismatch with their level of education. There are several reasons for overeducation happened in the labour market. First, employers' tendency to hire better-educated workers to save training costs. Second, during times of high unemployment, even if job offers do not fit their educational background, most graduates have to accept them. Alternatively, graduates who enter the labour market during times of low unemployment are less likely to be mismatched. Therefore, the incidence of occupational mismatch may signal inefficiencies in the labour market, or it may be part of an efficient labour market where workers search for jobs throughout their careers.

From the viewpoint of a single firm, employing an overeducated or overqualified worker may be beneficial for productivity; however, from the perspective of the economy as a whole, it could be harmful. More productive firms could be more efficient if they utilise these high-skilled workers, but they may find it challenging to do so due to the lack of potential workers. In an economy where firms are quite heterogeneous, the reallocation of mismatched workers would be a problem and possibly affect aggregate productivity (McGowan & Andrews, 2015). The human capital resource is unexploited because the marginal benefit received by the

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overeducated worker from his education costs more than the productivity that he can confer, given the jobs available (Mehta, Felipe, Quising, & Camingue, 2011).

More educated individuals learn quicker, and their productivity is higher than less educated workers. However, because of allocation inefficiency, the benefits of education cannot be fully realised. Overqualified workers tend to have a short tenure with their current employer and likely to exit into unemployment (Sloane, Battu, & Seaman, 1999). When employees work in a job that does not match their educational background, skills, and interests, it is very tough for them to remain engaged with their job. Furthermore, if they do not receive proper training to meet the requirements of their positions, it could lead to involuntary job separations (Vroom, 1964; Sheppard & Herrick, 1972; Moreland, 2013). Overeducated workers and employee turnover affect firm productivity and incur extra cost to the employer, who now has to invest in training new workers (Eeckhout, 2018).

In term of wages, given that firms pay no wage premium for human capital that does not enhance labour productivity, overeducated workers would receive lower wages than workers with identical qualifications but in well-matched jobs (Allen & van der Velden, 2001; Black, 2013). In the same manner, undereducated workers also generally earn lower wages than their well-matched colleagues (Verhaest & Omey, 2012). However, this result is rather trivial and unsurprising because compared to adequately educated workers, undereducated workers invest less in their education and thus receive less in earnings.

For the issue of undereducated, it is commonly associated with the issue of skill shortage. To overcome this shortages, firms have to lower their recruitment standards and hire less productive workers (Bennett & McGuinness, 2009). As reviewed by many studies, skill shortage definitely significantly and negatively related to productivity (Haskel & Martin, 1993; Nickell & Nicolatsis, 1997). Besides that, both unfilled and hard-to-fill vacancies, which can be proxies of skill shortage, have decreased output per worker by 65-75% in high tech firms (Bennett & McGuinness, 2009). In term of wages, undereducated workers are suffering from the most, as there is a negative return to years of undereducation (Hartog, 2000).

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1.3   Problem Statement

Mismatch contributes to both unemployment and underemployment. Unemployment is the state of being unemployed, while underemployment refers to workers who are highly skilled but working in low-paying jobs. Some educated workers may involuntary work in lower-prestige jobs, while the uneducated may be forced into unemployment when the proportion of educated workers increases. Mismatch, in all its dimensions, creates a labour market situation where finding the right people for the right jobs is often difficult.

In 2011, the government has launched a programme to alleviate the plight of unemployed youth, the 1Malaysia Training Scheme (SL1M). This programme provides job training and soft skills development to enhance the opportunities of graduates to obtain jobs in the public and private sectors. Since its inception, the government has allocated almost RM40-RM50 million annually to ensure the effective implementation of the programme. In 2017, the government has allocated RM50 million to extend the SL1M programme in government-linked companies (GLCs) to 20,000 graduates, compared to 15,000 in 2016 (Ministry of Finance, 2017). However, the ability of SL1M to address unemployment remains questionable, as youth unemployment and unemployed graduates keep on rising over the years.

Thus, the consistent 3.3% unemployment over several decades, while considered as full employment, does not fully reflect the actual labour market. Relying solely on the unemployment rate could lead to an inaccurate depiction of the labour market, as it is severely limited. It is necessary to look beyond the aggregate unemployment rate and to unpack the information it might contain. A comprehensive and more detailed set of labour market statistics is essential to monitor actual unemployment and to support effective policy implementation.

The measurement of mismatch and its contribution towards the rise of mismatch unemployment is getting much attention recently. Most of the study focused on developed countries e.g. the United States, Japan, and the Netherlands (see Şahin et al., 2014; Shibata, 2013; Erken et al., 2015). All these countries have experienced a tremendous decline in unemployment rate such as the unemployment rate in the United States declined from 7.9% in 2013 to 3.9% in 2017, while in Japan from 4.0% to 2.4% (The World Bank, 2017). Following the same approach taken by those studies, this study aims to measure the skills mismatch index and the contribution of mismatch to unemployment.

The second issue that this study addresses is the measurement of occupational mismatch. A study by the MOHR and the World Bank reveals that the wage growth for educated workers is slowing down due to mismatch, as occupational mismatch is highly correlated to wage penalty. In 2018, BNM discloses that the wages of Malaysian employees are not commensurate with the values of output that they produce. Even after accounting for the different productivity levels

across countries, local employees are still being paid less than their counterparts in benchmark economies (United States, United Kingdom, Australia, Germany, and Singapore).

The issue of occupational mismatch should not be disregarded as it could question the value of return to education. From the micro perspective, overeducated workers receive lower returns to education compared to well-matched workers, but undereducated workers receive negative returns from education. However, from the macro perspective, overeducation in the labour market may question the benefits of government funding of higher education, even if overeducation may generate positive wage premiums. In addition, if a mismatch occurs in a production team, the current workers have to carry out tasks that they are not specialised in, impeding the firm's productivity. While educational mismatch can be solved with in-house training, a bad match between employer and employee may lead to ex-post sorting out of a firm and high rehiring costs.

Most mismatch studies in Malaysia focus on the effects of occupational mismatch towards the salaries and wages (Zakariya, 2012; Osman & Shahiri, 2013; Zakariya, 2014; Ismail et al., 2015). Tracing this relationship is undeniably important, but the foremost step is to accurately measure occupational mismatch. That is, how to aggregate individual mismatches to obtain the mismatch by occupational groups. To overcome this challenge, the first and principal concern is to find an appropriate measure of occupational mismatch.

To disentangle the issue of unemployment as a whole, tracing the reasons behind it is important. From the demand side, it is reported that recent graduates lack certain so-called "soft skills" required by employers. For example, they have poor communication skills. The other reasons are that the applicants do not meet the required skills and experience. In some cases, applicants are qualified for the job, but employers are unable to meet the requested salary. Other studies highlight that graduate unemployment in Malaysia is caused by not-work-ready graduates, not because of limited employment opportunities.

However, most primary studies focus on demand-side factors (Rahmah, Ishak, & Lai, 2011; Hanapi & Nordin, 2014). It is therefore necessary to carry out a systematic primary research to allow better understanding of supply-side factors that delay the unemployed from entering the formal labour market. As the preferences of job seekers and employers in the matching process have not been much explored, despite increasing interest from the field, this issue will be addressed in the third objective.

1.4   Research Questions

Based on the research objectives of this study, the research questions are as follows:
1. What is the level of skills mismatch in Malaysian labour market?
2. What is the unemployment rate without the presence of mismatch in Malaysian labour market?
3. How much is the contribution of mismatch unemployment rate in the rise of unemployment rate in Malaysian labour market?
4. What is the level of undereducated or overeducated worker (occupational mismatch) in Malaysian labour market?
5. Which group of occupations that suffering the most from undereducation or overeducation in Malaysian labour market?
6. Which sector or sub-sector that suffering the most from undereducation or overeducation in Malaysian labour market?
7. What are the factors that are hindering the unemployed to enter the formal labour market in Malaysia?

1.5   Research Objectives

This research aims to measure the level of mismatch in Malaysian labour market and mismatch factor that contribute to the unemployment in the labour market.

1.5.1   Specific Objectives:

The specific objectives of this study are as follows:
1. To develop a skills mismatch index to calculate mismatch unemployment.
2. To measure the level of occupational mismatch.
3. To identify supply-side factors that contribute to mismatch.

1.6   Significance of the Study

This study will fill the theoretical and practical gaps concerning mismatch in developing economies, contributing new knowledge to the body of literature. To the author's knowledge, there is limited research on mismatch in Malaysia and other developing countries. At the moment, most studies in Malaysia focus only on the effect of educational or occupational mismatch towards salaries and wages (Zakariya, 2012; Osman & Shahiri, 2013; Zakariya, 2014; Ismail et al., 2015).

Although there has been much debate on mismatch in the policy circles, there has been no systematic analysis of mismatch. The gap in mismatch analysis in Malaysia can be filled with a comprehensive analysis of underemployment and unemployment. In addition, the developed tool can be to introduce appropriate mechanisms to control mismatch and unemployment as a whole.

By developing a skills mismatch index, we could identify (1) the share of mismatch unemployment in the aggregate unemployment rate and (2) the aggregate unemployment rate without mismatch, which cannot be quantified by the current measure. In addition, the index can be used to benchmark Malaysia's mismatch unemployment against developed countries, such as the US, the UK, and Japan by adopting their good practices in managing the issue of mismatch or unemployment. As the index plays an important role in promoting a more flexible and dynamic labour market, policy makers could propose better-designed economic and social policies by learning from the relevant labour market policies of those countries. It also permits in-depth understanding about mismatch within the context of developing economies.

Next, by measuring occupational mismatch, the proportion of undereducated and overeducated or underemployed workers can be computed. The occupational mismatch trend can also be captured. Furthermore, the occupational groups with high incidence of overeducation or undereducation may also be identified. Specific and suitable programmes, such as upskilling and reskilling, could target specific occupational groups, such as those with the most undereducated workers, in order to boost their productivity and wages.

The study provides new, in-depth insight into the mismatch phenomenon faced by unemployed graduates. While most previous studies have focused on the perspective of the demand side, this study explores the viewpoint of the supply side. Graduates may have a different view of the factors hindering them from entering the formal labour market. Those factors may have been neglected by researchers and policy makers in Malaysia. To accomplish this, surveys were distributed in four regions in Peninsular Malaysia: southern region (Johor), northern region (Penang), western region (Selangor), and eastern region (Terengganu).

1.7   Scope of the Study

This study covers Malaysia as the country of analysis. The coverage of the mismatch dimensions will only focus on skills mismatch and occupational mismatch, subject to the availability of secondary sources of data. For objective one, to measure the skills mismatch index and mismatch unemployment, the data used from the year 2007-2017 are regarded as valid as these are the latest data from the responsible agencies. For objective two, to measure occupational mismatch, the data used are from Labour Force Survey (LFS) from the year 2010-2015. This survey is a reliable and valid that represents the labour market

in Malaysia and has been published by the government to monitor Malaysian labour market landscape. Lastly, for the third objective, data are collected from primary data as it intends to seek feedback from those who are unable to enter the formal labour market.

1.8   Organization of Study

This study is organized as follows. The next chapter presents the theoretical review of this study. It starts with a discussion on the theories related to mismatch from the supply and demand sides of the labour market. Following that, the chapter discusses the empirical literature review on mismatch unemployment. Next, this chapter discusses some mismatch indexes proposed by pioneering scholars and a more comprehensive index that has been recently developed. Using the index, mismatch unemployment can be measured. The concepts of job finding rate, job separation rate, and matching efficiency will also be explained in this chapter. This chapter then describes the measurement of occupational mismatch, classifying workers into overeducated, matched, or undereducated based on three different methods. The last part of this chapter reviews the factors of unemployment from the supply side.

Chapter 3 presents a detailed explanation of the methods chosen to accomplish the objectives of this study. The chapter starts with a description of the sampling and methods for objectives one, two, and three. For the first objective, following the presentation of the data and their sources, the definition and equations for the job finding rate, job separation rate, matching efficiency, mismatch index, mismatch unemployment, and robustness check will be presented. For the second objective, the process of selecting the right approach to measure occupational mismatch will be discussed. Lastly, for objective three, the questionnaire, population and sample, pilot test, and analysis techniques will be discussed.

The results and their discussion are presented in Chapter 4. Some of the main findings from the analyses are mentioned here. For objective 1, the skills mismatch index has shown an increasing trend over a 10-year period. In 2007, the index was only 0.108, while in 2017 it reached 0.273. Mismatch unemployment alone has contributed around half to the rise of unemployment rate in 2007-2009 and 2013-2017.

For objective 2, by comparing four different indicators of occupational mismatch, it can be concluded that more than half of the labour force are employed in jobs for which they are either overqualified or underqualified. On average, around 34% of the workforce are undereducated and 17% are overeducated. However, the proportion of undereducation has been decreasing, while overeducation has been rising throughout the years. The analysis also reveals that managers and professionals are the groups with the most matched workers, while technicians and associate professionals and clerical support workers are the groups that

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contribute most to the share of overeducated workers. The remaining groups suffer from undereducation.

Lastly, for objective 3, the relative importance index (RII) reveals that in general, job seekers believe that there are currently no suitable jobs in the market. This may happen due to information asymmetry between the supply and demand sides of the market.

Chapter 5 presents some conclusions and policy recommendations, as well as proposals for future research. To reduce the gap between demand and supply in the labour market, and as the labour force with tertiary education are growing, there is an urgent need to create high-skilled jobs to match the excessive supply. However, to improve the matching efficiency of the labour market, effective hiring practices should be implemented to ensure that information about vacancies can reach job seekers.

In conjunction with Industry 4.0, the government should promote upskilling and reskilling programmes to current employees to boost the quality of human capital, while simultaneously ensuring trainer competency, up-to-date course contents, and infrastructure availability e.g. funding mechanism. In addition, strong supporting policies for the gig and informal economy and the self-employed, especially in terms of social protection and employment injury protection, should also be considered, as these are expected to grow further, enabled by the use of technology.

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