

Quantifying Overeducation and Underskilling Across the Malaysian Workforce

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ABSTRACT

This research analysed the incidence of education and skills mismatch in the Malaysian labour market using SWS data from 2019. It also attempts to depict the spatial distribution of mismatch by demographic, occupational, industrial and geographic dimensions. The realised matches approach for educational mismatch and a job analysis approach for skill mismatch, as defined in MASCO 2013. There are notable shares of overeducation, at 29.31%, and undereducation, at 9.21%, alongside a significant skill gap, where 59.86% remain underskilled. From the analysis, there are gaps in the mismatch between different sociodemographic groups, whereby females are more overeducated and males are more likely to be underskilled. Ethnicity, marital status and age also impact the gap in mismatch. Managers and professionals with occupation-specific education tend to exhibit higher-than-average overeducation rates, while elementary and certain skilled trades disproportionately include the under-skilled. Geographically, urban areas show less undereducation paired with greater instances of overskilling than rural areas. These outcomes underscore the need to develop education and training programs as well as encompassing systems and policies on the labour market information systems, skill and job alignment and the overall productivity of the labour market concerning enabling Malaysia's transition to a high-value, knowledge-driven economy.

Keywords: overeducation, undereducation, overskilling, underskilling, wages

INTRODUCTION

The alignment between workers' educational qualifications, their acquired skills and the demands of the labour market is a foundation of economic efficiency and individual career success. Since Freeman's (1976) seminal work on overeducation, the phenomenon of mismatch has garnered significant academic and policy interest. Determining the incidence and understanding the implications of mismatches continues to be a major challenge (Valerio et al., 2020). Most researchers have used three methodological frameworks: self-assessment by the worker, empirical or realised match (RM) approaches and job analysis (JA) techniques (Leuven & Oosterbeek, 2011). As these researchers encountered, the appropriate application of such methods is essential, as Flisi et al. (2017) stressed, in addressing exploration and policy intervention to the intricate issue of mismatch in the labour market.

Historically, scholars have primarily investigated the relationship between overeducation and labour market discrepancies, focusing on where an individual's educational attainment surpasses what is typically necessary for their role. Despite this focus, the term mismatch documented by Allen and Van der Velden (2023) and CEDEFOP (2021) comprises multiple elements such as vertical mismatch (education level), horizontal mismatch (field of study), skill gaps (lack of necessary skills), skill shortages (shortage of available skilled personnel in the market) and skill obsolescence (outdated competencies). In light of this complexity, as highlighted by Mohd Kassim and Mansor (2022), there arises a need for effective policy advocacy to address different types of disparity, which demands clear conceptual definitions along with precise and measurable indicators.

The ambiguity in current policy guidelines concerning skills mismatch often stems from an inadequate discussion of the specific mismatch type being addressed and the prioritisation of policy interventions (McGuinness et al., 2018). Labour force surveys frequently rely on educational qualifications as a proxy for skills, a practice that can be misleading. As Flisi et al. (2014) demonstrated, an educational mismatch does not invariably translate into a skills mismatch, nor does the absence of the former preclude the latter. Consequently, distinguishing between indicators for educational and skills mismatch is vital for formulating clear and impactful policy responses.

As documented by McGuinness et al. (2018), the average incidence of overeducation was comparable across 39 countries using three different measures: subjective (21.5%), empirical (25.9%), and job evaluation (25.5%). However, there remains considerable variation across countries in the measurement technique used. For example, the European Commission (2015) showed that EU countries' overeducation levels and their rankings differed markedly in comparison with job evaluation and empirical measures, using Spain as an example of this discrepancy. Such method-related sensitivities reveal the need to exercise caution when interpreting and applying mismatch statistics (Kriechel & Vetter, 2023).

The phenomenon of overqualification is not limited to developed countries. Research conducted by Chua and Chun (2016) using STEP data from six Asian developing countries suggested that overqualification may be more prevalent there than in the US or other OECD countries, though often obscured by numerous specialisation needs and complex labour market frameworks. There have been some peripheral studies in the context of Malaysia. For instance, Zakariya et al. (2020) reported that 18% of workers in the manufacturing industry were overeducated, while 45% self-reported being overskilled. Abdullah (2019), using the older 2007 PICS, focused on educational mismatch dynamics among expatriate and local workers. However, undereducation, where workers possess fewer qualifications than typically required has received comparatively less attention, despite McGuinness et al. (2018) reporting non-trivial average incidences (e.g., 26.2% via empirical methods).

As noted by McGuinness et al. (2018), less research has contributed to measuring robust skills, unlike the studies targeting overeducation because of the scarce data available. Quantitative methods have been far more common relative to qualitative ones in the study of overskilling. The subset data from 30 countries reveals an average overskilling incidence of 27.5%, while underskilling appears to be less common at 13.2%. The issue of skills mismatch, particularly concerning overskilling and underskilling in Malaysia, has faced limitations due to the absence of comprehensive skill indicators in national surveys, a challenge this research intends to address using different strategies.

McGuinness et al. (2018) emphasised that skills mismatch research in developing countries is still in its early stages and is often hindered by a lack of high-quality data that connects relevant mismatch information to critical labour market outcomes. In particular, the issue of underskilling remains under-studied relative to other parts of the world, with the majority of research centred in developed countries. There are not a lot of studies conducted on low and middle-income countries (Handel et al., 2016; Mehta et al., 2011; Quinn & Rubb, 2006; Sparreboom & Staneva, 2014), so their findings are quite sparse and always contextual (Azevado & Loureiro, 2022).

In Malaysia, earlier studies on overeducation and overskilling have mostly focused on their causes and wage consequences using the PICS (2007) data or adapted field surveys (e.g., Hasnan et al., 2019; Osman & Shahiri, 2013; Zakariya, 2014; Zakariya et al., 2020; Zakariya & Mohd-Noor, 2014; Zakariya & Yin, 2016). Wye and Ismail (2019) built upon this by analysing skills profiles and competency impacts on wages. However, there has not been a recently conducted thorough analysis using nationally representative data which analyses the intricate patterns of the distribution of education and skills disparities across different segments of the Malaysian workforce. Moreover, the role of these mismatches as potential drivers of intra-group inequality, especially among the more highly educated, warrants deeper investigation.

Conceptualising and Measuring Education and Skills Mismatch

Two primary categories of mismatch are recognised, which are qualification mismatch (education level or field of study) and skills mismatch (overskilled or underskilled). Educational mismatch is typically assessed by

comparing an individual's attained level of education with the educational level required for their job (Hartog, 2000; Ortiz & Kucel, 2008). As previously noted, the main methods include:

- a. **Subjective Method (Worker Self-Assessment):** This relies on workers' perceptions of the educational qualifications needed for their job, compared against their actual attainment (McGuinness et al., 2017). While relatively simple to implement in surveys, its validity can be affected by workers' potentially biased perceptions or lack of awareness of formal job requirements, especially in less formalised organisational settings (Cohn & Khan, 1995; Maltarich et al., 2011). Similarly, self-reported skill utilisation or adequacy can be used to measure skills mismatch (Allen & van der Velden, 2001; Green & McIntosh, 2007). The International Labour Organisation (ILO, 2018) has developed standardised questions for this purpose, distinguishing between overall skill match and specific skill type assessments.
- b. **Empirical Method (Realised Matches (RM)):** The RM technique determines the required educational level for an occupation based on the actual distribution (e.g., mean or mode) of education among workers in that occupation. As noted by Verdugo and Verdugo in 1989, those exceeding the bounds are overeducated and those lacking are undereducated. Its primary strength is its applicability to existing micro datasets that include education and occupation information, which allow for cross-country comparison studies (McGuinness et al., 2017; Somers et al., 2019). However, such averages obsolescence gaps and equal-exclusivity discrimination within an occupation, especially when broad occupational groups are used as the basis for analysis (Boll et al., 2021). The RM strategy of comparable reasoning could be used for skill level mismatch if data about the skill level of each occupation is available.
- c. **Job Analysis (JA) Method:** This method uses professional job analysts to determine the education and skill prerequisites of particular jobs within an organisation, often recorded in occupational dictionaries such as O*NET or SOC (McGuinness et al., 2017). While providing expert JA-tailored requirements is precise, it is expensive and resource-heavy, which makes regular maintenance difficult, risking out-of-date requirements if not properly sustained (Verhaest & Omey, 2012). ISCO classifications can also be linked to ISCED levels to estimate the education needed for some broad occupational categories while assuming uniformity within and across countries (Quintini, 2011).

Given the absence of subjective mismatch questions in the SWS (2019) dataset utilised for this research and the resource intensity of primary JA, this study adopts the RM method to assess educational mismatch and a JA-informed approach using the Malaysia Standard Classification of Occupations (MASCO) 2013 to define skill levels for skills mismatch analysis. This dual-methodological strategy allows for a comprehensive examination of both education and skills dimensions of mismatch.

Therefore, the study aims to analyse the incidence and distribution of education and skills mismatch across diverse demographic, occupational, industrial and geographical segments of the Malaysian workforce using the Salaries and Wages Survey (2019) data. Focusing on addressing these gaps, the study aims to inform strategic socio-political interventions that could improve policies related to the functioning of the labour market, aiding Malaysia's advancement towards a high-income and knowledge-driven economy. The method, the empirical results and the discussion are provided in the following sections.

METHOD

This study's empirical analysis of overeducation and overskilling utilises established quantitative approaches, chosen for their appropriateness to the given data and research objectives. Three primary methodologies dominate the literature on mismatch: i) the realised matches (RM) or empirical approach, which statistically derives required education and skill levels from observed worker characteristics within occupations (Kiker et al., 1997; Verdugo & Verdugo, 1989), ii) the job analysis (JA) method, which depends on expert evaluations of occupational skill and educational prerequisites, frequently codified in occupational classifications (Kiker & Santos, 1991; Rumberger, 1987; van der Meer, 2006); and iii) the subjective method, which is predicated on workers' self-evaluations of their job requirements concerning their qualifications (Dolton & Vignoles, 2000; Sicherman, 1991; Sloane et al., 1999). Each method exhibits unique benefits and drawbacks (see Groot & Maassen van den Brink, 2000; Leuven & Oosterbeek, 2011). The availability of data considerably influences the selection of methodology, as the Salaries and Wages Survey (SWS) 2019, which serves as the main data

source for this study, omits subjective self-assessment enquiries. Thus, this study utilises the RM method to evaluate educational mismatch and a JA-informed approach, employing the Malaysia Standard Classification of Occupations (MASCO) 2013, to analyse skills mismatch. This dual methodology facilitates a thorough analysis of both aspects of labour market mismatch (Levels et al., 2014).

Measuring Educational Mismatch: The Realised Matches (RM) Modal Approach

To examine the incidence of educational mismatch, the RM method is used. This approach is necessitated by the absence of subjective educational requirement data in the SWS 2019. The RM method ascertains the normative educational requirement for an occupation by analysing the distribution of educational attainment among individuals employed within that specific occupational category (Hartog, 2000). Workers are then classified as overeducated, undereducated or well-matched by comparing their actual educational attainment to this derived occupational norm.

While some RM studies utilise the mean educational level (e.g., Bauer, 2002; Verdugo & Verdugo, 1989), this study adopts the modal educational level as the benchmark for required education within each occupation, a common practice supported by Kiker et al. (1997) and Mendes De Oliveira et al. (2000). The educational mismatch (EM) for an individual i in occupation j is determined as follows:

An individual is classified as:

- Well-matched if their actual educational attainment falls within one standard deviation of the modal educational attainment for their occupation j . That is, $\text{Mode}_j - \text{SD}_j \leq \text{Education}_i \leq \text{Mode}_j + \text{SD}_j$.
- Overeducated if $\text{Education}_i > \text{Mode}_j + \text{SD}_j$.
- Undereducated if $\text{Education}_i < \text{Mode}_j - \text{SD}_j$.

Occupations in the SWS 2019 are classified using MASCO-2013 (at the 2-digit level, yielding 48 categories). Educational attainment is recorded as the highest certificate obtained, which was converted into years of schooling (ranging from 0 for no certificate to 16-17 for degree and above) based on Malaysian Qualifications Agency (MQA) guidelines to calculate the mode and standard deviation for each occupational group. This operationalisation aligns with contemporary applications of the RM method that incorporate a measure of dispersion to avoid overly narrow definitions of a match (Mahy et al., 2015; Mavromaras & McGuinness, 2012).

Measuring Skills Mismatch: Job Analysis Approach using MASCO 2013

To assess the incidence of skills mismatch, this study employs a JA-informed approach, leveraging the structure of the Malaysia Standard Classification of Occupations (MASCO) 2013. MASCO 2013, which is aligned with the International Standard Classification of Occupations (ISCO), defines the required skill for an occupation along two dimensions: skill level and skill specialisation. This study focuses on skill level, which reflects the complexity and range of tasks and duties involved (Department of Statistics Malaysia, 2013).

MASCO 2013 delineates four formal skill levels, broadly corresponding to ISCED educational categories:

- Skill Level 4 (Highest): Corresponds to tertiary education (e.g., university degree, ISCED levels 5-8). Typically associated with Professionals.
- Skill Level 3: Corresponds to post-secondary non-tertiary education (e.g., diploma, ISCED level 4). Typically associated with Technicians and Associate Professionals.
- Skill Level 2: Corresponds to secondary or post-secondary education (e.g., vocational certificates, ISCED levels 2-3). Associated with 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
- Skill Level 1 (Lowest): Corresponds to primary education (ISCED level 1). Associated with Elementary Occupations.

(Note: MASCO 2013 specifies that skill level concepts are applied differently for Managers and Armed Forces Occupations, where other factors like experience and responsibility are more defining than formal ISCED levels for distinguishing these major groups.)

Crucially, MASCO (2013) emphasises that the use of educational categories to define the four skill levels does not imply that the skills required to perform the tasks and duties of a particular occupation can be acquired only through formal education. Skills can be acquired and often are through informal training and experience. The classification focuses on the skills necessary to perform the job tasks, not solely on how an incumbent acquired them.

To operationalise skills mismatch, this study compares an individual worker's actual skill level (proxied by their highest ISCED level of educational attainment as reported in SWS 2019, mapped to one of the four skill levels) with the required skill level for their occupation as defined by MASCO 2013. This approach is consistent with methods that use national occupational classifications to infer skill requirements (ILO, 2018; Quintini, 2011).

A worker is thus classified as:

- Skill-matched if their actual skill level (proxied by education) is equal to the required skill level of their occupation.
- Overskilled if their actual skill level is greater than the required skill level.
- Underskilled if their actual skill level is lower than the required skill level.

This methodology, while relying on educational attainment as a proxy for actual skills possessed by individuals, provides a standardised and objective framework for assessing skills mismatch across the Malaysian workforce, given the data constraints of the SWS 2019. It allows for a nuanced analysis beyond educational mismatch alone, recognising that skills can be acquired through diverse pathways (Pitan & Adedeji, 2021).

Therefore, over and underskilling status among workers can be identified by comparing the individuals' actual skill levels (S^a) and the required skills (S^r) to do the job. A worker is classified as overskilled if his or her actual skill is greater than the required skill ($S^a > S^r$) and as underskilled if his or her actual skill is below the required skill ($S^a < S^r$).

Table 1. Standard Occupational Classification (SOC) Measure

Skill Level	Educational Level	Major Groups
Fourth	Tertiary education leading to a University or postgraduate university degree; Malaysian Skills Advanced Diploma (DLKM) Level 5-8	2. Professionals
Third	Tertiary education leading to an award not equivalent to a first University Level; Malaysian Skills Certificate (SKM) Level 4, or Malaysian Skills Diploma (DKM) Level 4.	3. Technicians and Associate Professionals
Second	Secondary or post-secondary education; Malaysian Skills Certificate (SKM) Level 1-3	4. Clerical Support Workers 5. Service and Sales Workers 6. Skilled Agricultural, Forestry and Fishery Workers 7. Craft and Related Trades Workers 8. Plant and Machine Operators and Assemblers
First	Primary education	9. Elementary Occupations
Note: The concept of skill level does not apply to Major Group 1: Managers and Major Group 0: Armed Forces Occupations. For these two groups, the skill level concept does not reflect the main skill requirements for distinguishing them from other Major Groups.		

Source: (MASCO, 2013)

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Malaysian workforce, given the data constraints of the SWS 2019. It allows for a nuanced analysis beyond educational mismatch alone, recognising that skills can be acquired through diverse pathways (Pitan & Adedeji, 2021). However, the authors acknowledge a key limitation of this quantitative approach, which is the lack of triangulation with qualitative insights. Incorporating perspectives from employers, workers and training providers through interviews or case studies could provide a richer contextual interpretation of these findings, explaining the underlying causes and lived experiences of mismatch beyond what descriptive statistics can reveal.

FINDINGS

Incidence of Education Mismatch Using the Realised Matches (RM) Method

The investigation into educational mismatch within the Malaysian labour market utilised the SWS (2019) dataset. Given the absence of subjective self-assessment questions in this survey, the realised matches (RM) method was employed. This approach establishes the normative level of education for each occupation based on the modal educational attainment of workers therein and compares this benchmark with individuals' actual education levels to determine incidences of mismatch.

As detailed in the methodology, years of schooling were systematically derived from the highest qualification certificate reported, adhering to MQS guidelines, yielding a continuous variable from 0 (no certificate/not applicable) to 16-17 years (degree and above). This enabled the calculation of the modal years of schooling for each of the 48 2-digit occupational categories (classified under MASCO 2013). Consistent with the RM framework, individuals whose actual years of schooling exceeded the occupational mode were classified as overeducated. Conversely, those whose schooling fell below the mode were deemed undereducated, while individuals whose educational attainment aligned with the occupational mode were categorised as well-matched.

Incidence of Education Mismatch Based on Individual Characteristics

The distribution of educational mismatch across various demographic segments of the Malaysian workforce is presented in Figure 1. The analysis, encompassing 27,224 individuals, reveals that based on the RM method, 9.21% of the surveyed population were undereducated, 29.31% were overeducated and a majority, 61.48%, possessed educational levels matched to their occupational roles. These aggregate figures, however, mask considerable heterogeneity across different socio-demographic categories.

Regarding gender, the data indicate differential patterns of educational mismatch. Males exhibited a higher incidence of being well-matched (66.39%) and undereducated (11.13%) compared to their female counterparts. Conversely, females demonstrated a significantly higher rate of overeducation (39.59%) and a correspondingly lower proportion of being well-matched (54.09%). This pronounced overeducation among females may be indicative of structural labour market factors, such as restricted access to high-level positions commensurate with their qualifications, persistent occupational segregation by gender, or gender-based discrimination. Furthermore, societal expectations or limited opportunities in traditionally male-dominated fields might contribute to women accepting positions for which they are formally overqualified.

Analysis by ethnicity reveals distinct profiles of educational mismatch. Bumiputera workers recorded a slightly higher incidence of overeducation (30.36%). In contrast, Chinese workers showed a higher proportion of undereducation (12.61%) alongside a marginally lower rate of overeducation (27.27%). A similar trend of higher undereducation was observed among Indian workers (14.29% undereducated, 24.36% overeducated) and other ethnic groups (22.37% undereducated, 21.05% overeducated). These disparities may be influenced by a confluence of factors, including differential access to educational resources, varying socio-economic backgrounds and differences in the sectoral and occupational distribution patterns among ethnic groups. The higher incidence of undereducation among Chinese and Indian workers, for instance, might reflect their concentration in industries or roles with historically lower formal educational prerequisites, whereas the higher overeducation rates among Bumiputera could be partly associated with concerted efforts and policies aimed at increasing higher educational attainment within this group.

Marital status also correlates with the incidence of educational mismatch. Never-married individuals exhibited a higher rate of being well-matched (65.82%) and a lower rate of overeducation (26.75%). Married individuals, conversely, presented with a higher incidence of overeducation (31.61%) and a reduced proportion of being well-matched (58.94%). Widowed and divorced/permanently separated individuals showed notably higher rates of undereducation, possibly due to economic or social pressures that may have constrained their educational attainment or utilisation in the labour market.

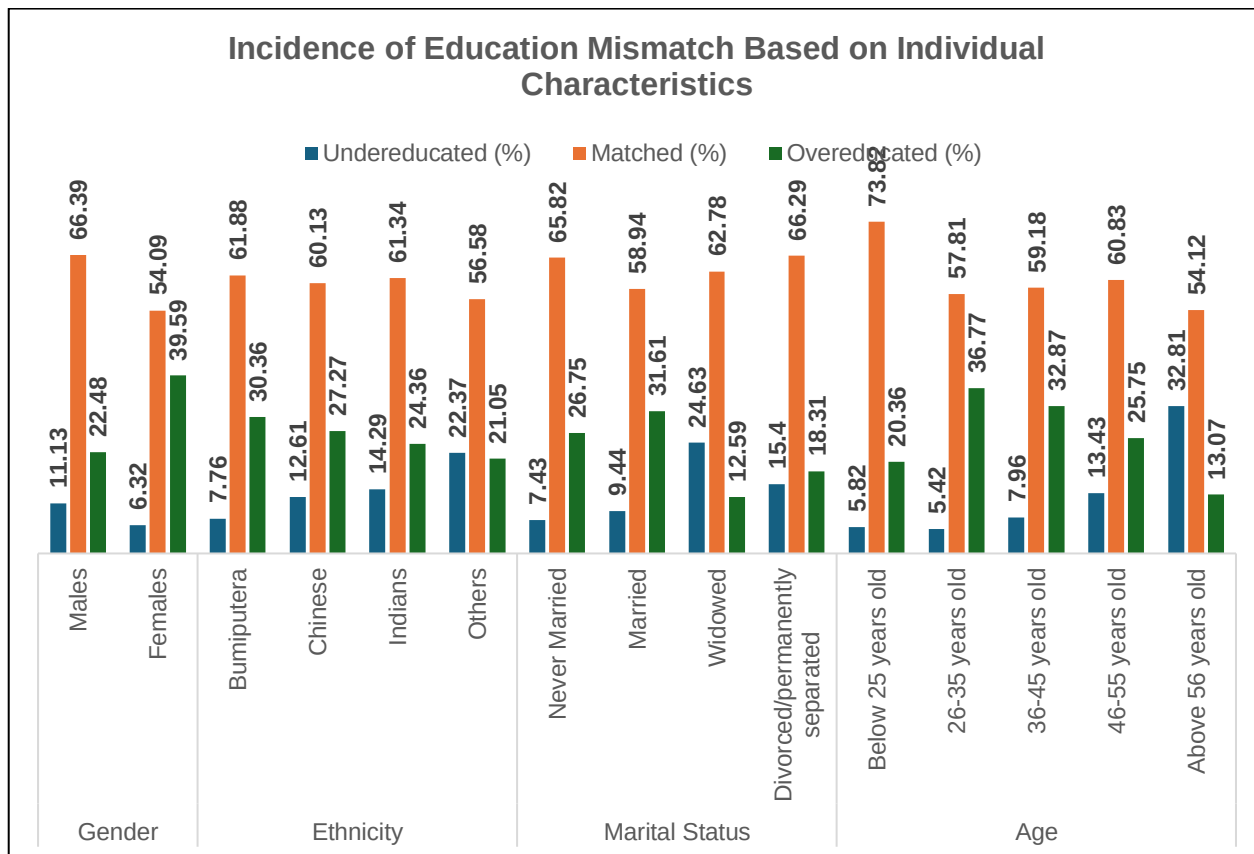


Figure 1. Incidence of Education Mismatch Based on Individual Characteristics

Age-related analysis indicates a dynamic pattern of educational mismatch across an individual's working life. Workers below 25 years of age demonstrated the lowest incidence of undereducation (5.82%) and the highest rate of being well-matched (73.82%), likely reflecting a closer alignment of their recent educational qualifications with current job market demands. A significant shift towards overeducation becomes apparent among those aged 26-35 (36.77% overeducated) and persists for the 36-45 age cohort (32.87% overeducated). This trend suggests that individuals in these prime working-age groups, often possessing higher educational qualifications, may enter the labour market in roles that do not fully utilise their credentials, possibly due to job market saturation, the necessity of gaining initial experience or longer job search durations for optimally matched positions. Progressing further, an increasing incidence of undereducation is observed among workers aged 46-55 (13.43%) and is most pronounced among those aged 56 and above (32.81% undereducated). This suggests that older cohorts may experience a growing disjuncture with evolving educational requirements for their roles or face diminished opportunities for career advancement and relevant retraining, leading to a higher prevalence of undereducation.

Incidence of Education Mismatch Based on Occupation

The distribution of educational mismatch across major occupational groups within the Malaysian labour market is detailed in Figure 2. The analysis reveals distinct patterns of overeducation, undereducation and educational alignment contingent upon occupational categories, reflecting varied educational prerequisites and labour market dynamics.

A prominent finding is the high incidence of overeducation among Managers, where 69.51% of individuals possess educational qualifications exceeding the modal level for their roles. This substantial figure suggests that entry into and progression within managerial positions may be influenced by a competitive job market, where higher academic credentials serve as a significant signalling device. Furthermore, it may reflect an emphasis on advanced educational attainment for perceived competence and career advancement in these leadership roles, even if not strictly essential for day-to-day job performance.

An even more pronounced level of overeducation is observed among Professionals, with 88.76% of individuals in this category being overeducated. This exceptionally high rate indicates that the vast majority of professionals in the sample have attained more formal education than the modal requirement for their specific professional occupations. While professional roles inherently demand high levels of education (e.g., in medicine, law, engineering), this finding could point towards credential inflation or a significant proportion of individuals possessing postgraduate qualifications in roles where a first degree is the established norm.

For Technicians and Associate Professionals, the distribution of educational mismatch appears more balanced, with 59.60% being well-matched. However, a notable proportion (38.14%) are overeducated. This suggests that while educational pathways for many technical and associate professional roles are relatively well-aligned with incumbent qualifications, a significant segment of individuals with higher qualifications may be occupying these positions. Such overeducation could be a consequence of limited opportunities in higher-skilled roles or individuals strategically using these positions as entry points or stepping stones towards more advanced careers.

Clerical Support Workers exhibit a high rate of educational match (70.46%), indicating a general alignment between their educational levels and those typical for clerical roles. Nevertheless, a moderate level of overeducation (27.69%) persists. This may arise from individuals with higher qualifications entering clerical positions due to a constrained supply of jobs matching with their education level or viewing such roles as transitional phases in their early careers.

A very high degree of educational alignment is found among Service and Sales Workers, with 80.21% being well-matched and a correspondingly low incidence of overeducation (9.60%). This suggests that the educational qualifications of individuals in these roles are, by and large, congruent with the occupational norms.

Conversely, occupations requiring traditionally non-academic skill sets demonstrate higher rates of undereducation. Among Skilled Agricultural, Forestry, Livestock and Fishery Workers, 22.81% are undereducated, while overeducation is minimal (7.19%). This pattern likely reflects the conventional nature of these occupations, where practical experience and tacit knowledge are often prioritised over formal educational credentials. The physically demanding nature of the work and potentially lower wage levels may also deter individuals with higher educational qualifications from entering these fields.

Similarly, Craft and Related Trades Workers exhibit a substantial rate of undereducation (19.45%) and a very low incidence of overeducation (5.00%). This underscores the primacy of vocational skills, apprenticeships and hands-on experience in these trades, where formal academic qualifications beyond a certain level may not be perceived as essential. These positions appear to be predominantly filled by individuals with the requisite vocational training rather than higher academic degrees.

Plant and Machine Operators and Assemblers also show a high proportion of well-matched individuals (82.62%), with very low overeducation (3.16%) but a notable level of undereducation (14.22%). This indicates that while many workers meet the typical educational levels for these roles, a segment operates with qualifications below the occupational mode.

Finally, Elementary Occupations record the highest incidence of undereducation at 26.16%, coupled with a substantial matched proportion (71.77%) and negligible overeducation (2.06%). This highlights that a significant portion of workers in elementary roles possess educational levels below the established norm for these occupations, which themselves are at the lower end of the educational requirement spectrum.

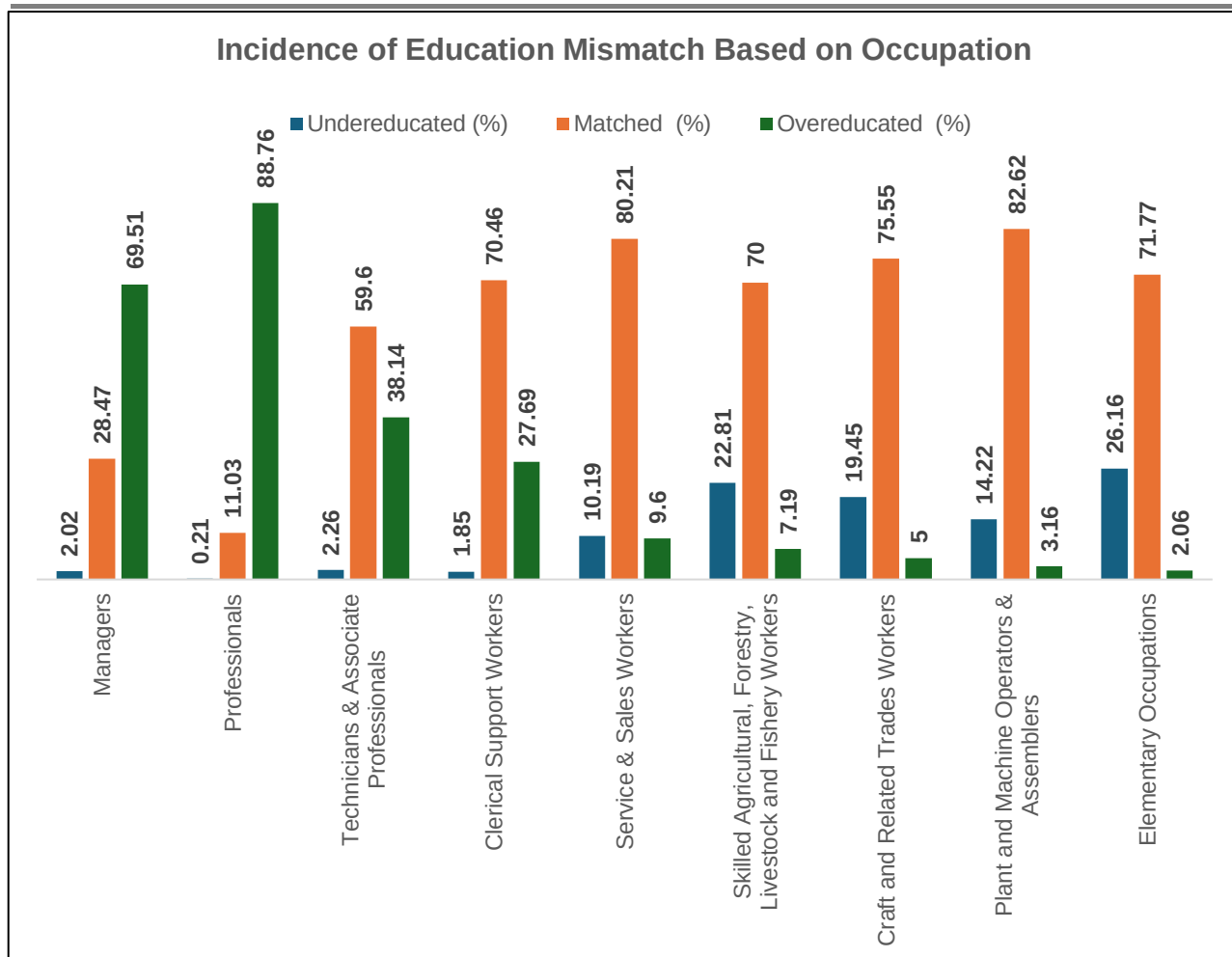


Figure 2. Incidence of Education Mismatch Based on Occupation

Incidence of Education Mismatch Based on Industry

The analysis of educational mismatch extends to various industries within the Malaysian economy, with findings presented in Figure 3. These data reveal significant inter-industry variations in the prevalence of undereducation, overeducation and appropriate educational matching, reflecting diverse human capital requirements and employment characteristics across sectors.

A notably high rate of undereducation (28.51%) is observed in the Agriculture, Forestry and Fishing sector. This finding is consistent with the traditional and often manual nature of employment in this primary industry, where practical skills and experiential knowledge are frequently valued more highly than formal educational qualifications. The comparatively low incidence of overeducation (9.58%) in this sector further suggests that it does not typically attract individuals with advanced educational credentials, possibly due to factors such as lower average wages and the physically demanding nature of the work. Similarly, the Construction industry also exhibits a significant undereducation rate (21.25%), alongside relatively low overeducation (15.09%), underscoring the importance of vocational skills and on-the-job training in this field. Administrative and Support Service Activities also report a considerable level of undereducation (20.12%), potentially reflecting a high concentration of roles with lower entry-level educational requirements.

Conversely, several industries demonstrate a pronounced incidence of overeducation. The Education sector records the highest rate of overeducation at 75.50%, coupled with minimal undereducation (0.72%). This indicates that a vast majority of workers in this sector possess qualifications exceeding the modal level, likely reflecting high baseline educational requirements for teaching and academic positions and potentially significant credentialism for career progression. The Information and Communication sector also shows a very high overeducation rate (65.92%), suggesting it attracts a highly educated workforce, driven by the technical and specialised nature of roles in this rapidly evolving industry.

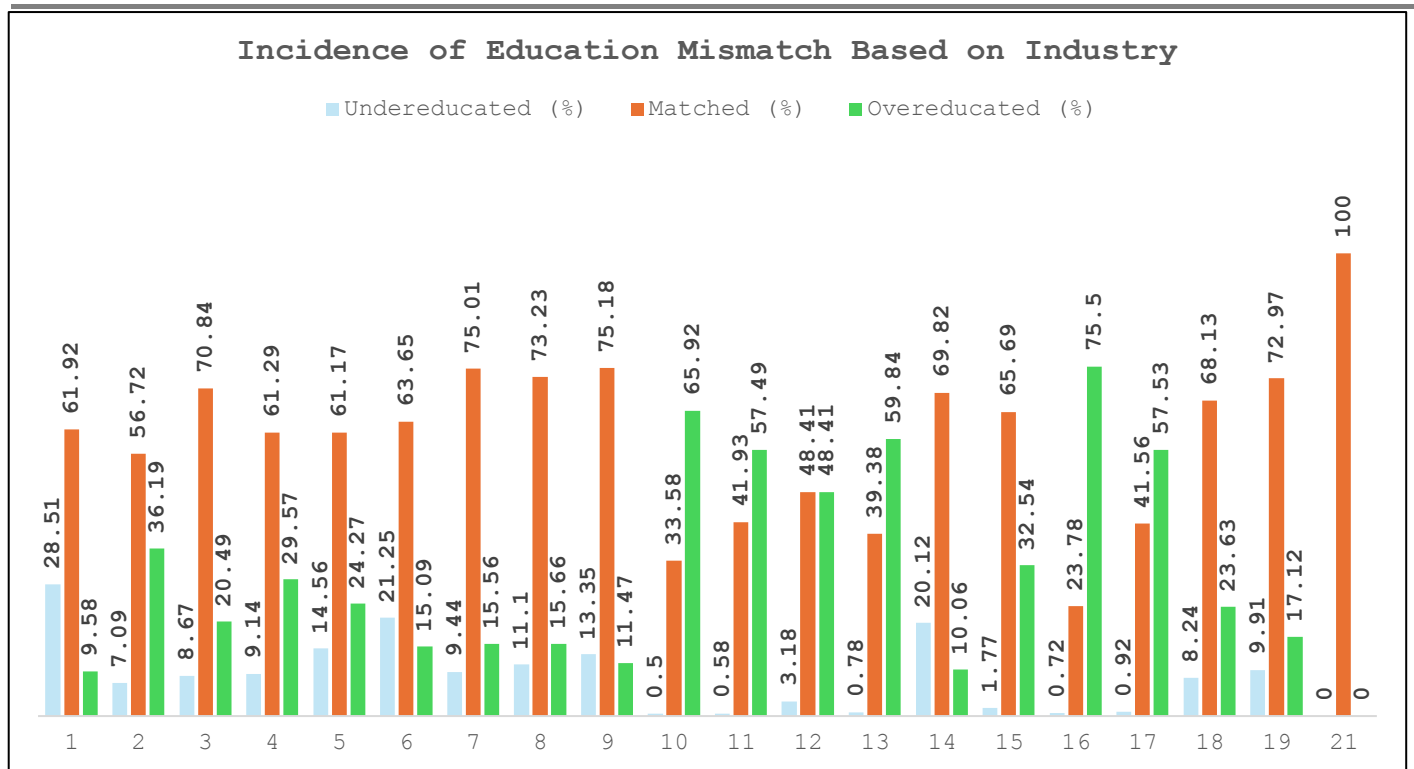


Figure 3. Incidence of Education Mismatch Based on Industry

A similar pattern is evident in Professional, Scientific and Technical Activities (59.84% overeducated), Human Health and Social Work Activities (57.53% overeducated) and the Financial and Insurance/Takaful Activities sector (57.49% overeducated). These high rates of overeducation are indicative of sectors that inherently demand advanced educational attainment and specialised expertise. The Mining and Quarrying industry also exhibits substantial overeducation (36.19%), which may be attributed to the need for highly qualified professionals in technical fields such as engineering and geology. Furthermore, Real Estate Activities (48.41% overeducated) and Public Administration and Defence; Compulsory Social Security (32.54% overeducated) also feature prominently in terms of overeducation, possibly reflecting increasing professionalisation and the signalling value of higher qualifications in these sectors.

Several industries display a high proportion of workers whose educational levels are well-matched to their occupational roles. The Manufacturing sector, a key component of the Malaysian economy, shows 70.84% of its workforce as educationally matched, with a moderate overeducation rate (20.49%). This suggests a relatively effective alignment between the educational outputs and the human capital needs of many manufacturing roles, possibly supported by established vocational and technical training pathways. High match rates are also observed in Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (75.01% matched), Transportation and Storage (73.23% matched) and Accommodation and Food Service Activities (75.18% matched). These sectors encompass a diverse range of occupations, many of which appear to have educational requirements that align well with the qualifications of the incumbent workforce. The Electricity, Gas, Steam and Air Conditioning Supply sector (61.29% matched) and Other Service Activities (72.97% matched) also fall into this category.

Some industries present a more mixed profile. For instance, Water Supply, Sewerage, Waste Management and Remediation Activities have a majority of well-matched workers (61.17%), but also notable proportions of both undereducated (14.56%) and overeducated (24.27%) employees. Similarly, Arts, Entertainment and Recreation demonstrates a relatively high match rate (68.13%) alongside moderate overeducation (23.63%) and lower undereducation (8.24%).

These industry-specific findings highlight the complex interplay between sectoral characteristics, skill demands, educational supply and labour market dynamics in shaping the landscape of educational mismatch in Malaysia.

Incidence of Education Mismatch Based on Geographical Characteristics

The geographical distribution of educational mismatch in Malaysia, as delineated by urban-rural classifications and major administrative regions, is presented in Figure 4. These findings highlight significant spatial variations in the alignment between workers' educational attainment and the characteristics of local labour markets.

A distinct divergence in educational mismatch patterns is evident between urban and rural locales. Urban areas exhibit a notably higher rate of overeducation, at 31.92%, compared to a lower incidence of undereducation (7.82%). This pattern is likely attributable to the concentration of higher educational institutions and a more diversified spectrum of job opportunities in urban centres, which attract a larger pool of individuals with higher qualifications. The competitive nature of urban labour markets may also contribute to individuals accepting positions for which they are overqualified. Conversely, rural areas demonstrate a higher incidence of undereducation (13.36%) and a lower rate of overeducation (21.53%), alongside a greater proportion of well-matched individuals (65.11%). This suggests that limited access to higher education and fewer employment opportunities requiring advanced degrees characterise rural labour markets. These areas tend to have a higher prevalence of employment in sectors such as agriculture and manual labour, which traditionally have lower formal educational prerequisites and may, therefore, be less likely to attract or retain overeducated individuals.

Analysis by major administrative regions further illuminates the heterogeneity of educational mismatch across the nation. The Central Region, encompassing Selangor, W.P. Kuala Lumpur and W.P. Putrajaya, records the highest rate of overeducation in the country at 42.42%, coupled with the lowest rate of undereducation (3.73%). As Malaysia's primary economic, governmental and educational hub, this region attracts a significant concentration of highly educated individuals. The intense competition for a finite number of high-skilled positions may compel many to accept roles for which they are overqualified, contributing to this pronounced overeducation.

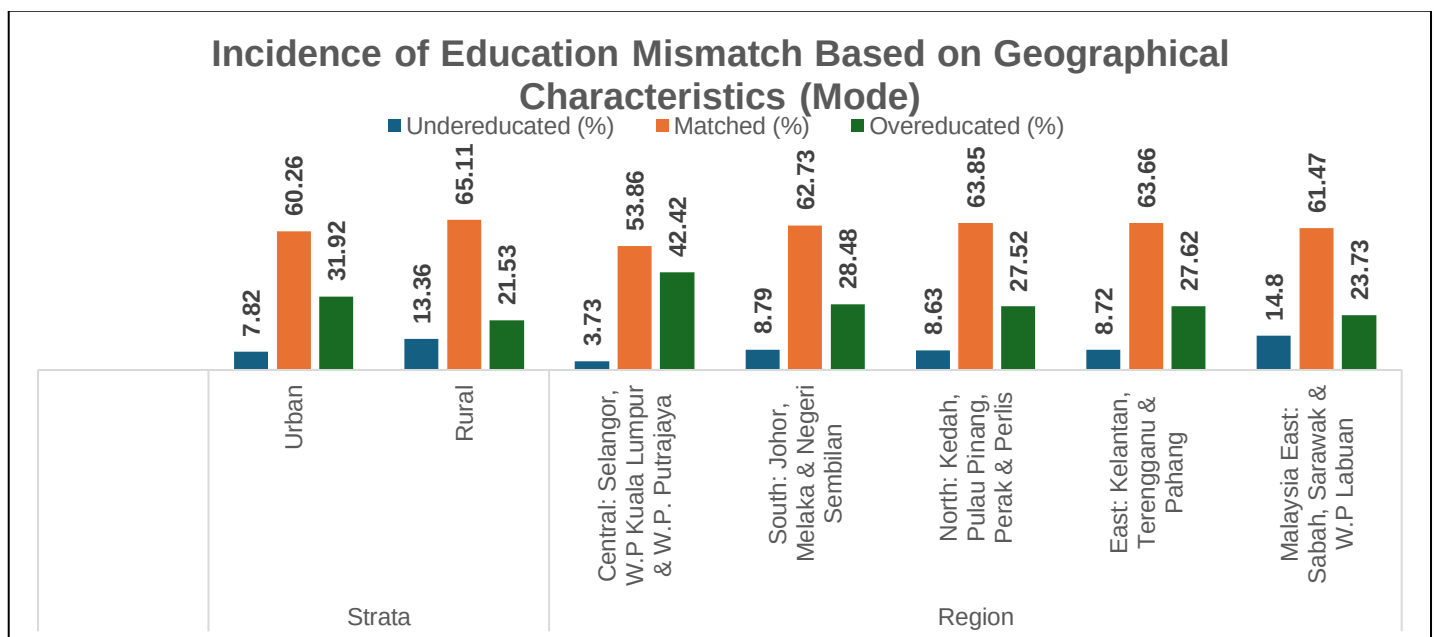


Figure 4. Incidence of Education Mismatch Based on Geographical Characteristics

The South Region (Johor, Melaka, Negeri Sembilan), North Region (Kedah, Pulau Pinang, Perak, Perlis) and East Region (Kelantan, Terengganu, Pahang) of Peninsular Malaysia present more balanced distributions of educational mismatch. Rates of undereducation in these regions hover around 8.63% to 8.79%, while overeducation ranges from 27.52% to 28.48%. The proportion of well-matched individuals is also notably higher, generally exceeding 62%. These more moderate mismatch levels, compared to the Central Region, may reflect the distinct economic structures of these regions, which feature a greater emphasis on manufacturing, agriculture and service industries that may not uniformly demand higher tertiary qualifications for a large segment of their workforce.

A significant finding pertains to Malaysia East (Sabah, Sarawak and W.P. Labuan), which reports the highest incidence of undereducation at 14.80%. While overeducation is moderate (23.73%), the pronounced undereducation suggests that a considerable portion of the workforce in this region possesses educational qualifications below the modal requirements for their jobs. This could be attributed to historically constrained access to higher education institutions, fewer opportunities for high-skilled employment and the predominantly rural and less economically diversified nature of these states compared to many parts of Peninsular Malaysia.

These geographical findings underscore the importance of considering spatial context in understanding and addressing educational mismatch, pointing to the influence of local economic structures, educational infrastructure and demographic compositions.

Incidence of Skills Mismatch Using Job Analysis Method

Consistent with the methodological framework outlined previously, the analysis of skills mismatch leverages the SWS (2019) dataset. As this survey does not contain direct self-reported measures of workers' skills, information about occupational skill requirements was derived using the Malaysia Standard Classification of Occupations (MASCO) 2013. This job analysis-informed approach defines required skills as the competencies essential for the proficient execution of tasks and duties associated with a specific occupation.

According to MASCO (2013), these required skills are conceptualised along two primary dimensions:

1. **Skill Level:** This dimension reflects the complexity and range of tasks and duties inherent in an occupation. It is the principal focus for determining the skills mismatch in the present study.
2. **Skill Specialisation:** This pertains to the specific field of knowledge, tools and machinery utilised, materials worked with and the nature of goods and services produced within an occupation.

MASCO (2013) delineates four hierarchical skill levels, ranging from Skill Level 1 (lowest) to Skill Level 4 (highest), which correspond broadly to levels of the International Standard Classification of Education (ISCED). These defined skill levels signify the typical knowledge and abilities deemed necessary to perform the tasks and duties of a particular job.

To assess skills mismatch, the actual skill level of an individual worker is proxied by their highest level of educational attainment, as reported in the SWS (2019). This educational attainment is then mapped to one of the four corresponding skill levels. This derived actual skill level of the worker is subsequently compared against the required skill level for their specific occupation, as stipulated by MASCO (2013).

It is pertinent to reiterate, as MASCO (2013) itself emphasises, that the linkage between educational categories and skill levels does not imply that requisite occupational skills are solely acquirable through formal education. Indeed, skills can be and frequently are developed through informal training and practical experience. The classification's emphasis remains on the competencies necessary to perform occupational tasks effectively, irrespective of the pathway through which those competencies were acquired. This understanding underpins the subsequent analysis of overskilling and underskilling within the Malaysian workforce.

Incidence of Skills Mismatch Based on Individual Characteristics

The incidence of skills mismatch is categorised as underskilling, skill-matching and overskilling across various individual characteristics within the Malaysian workforce as detailed in Figure 5. The data reveal a striking overall prevalence of underskilling at 59.86%, suggesting that a substantial majority of workers may not possess the full complement of skills deemed necessary for their occupational roles according to the job analysis method employed. Conversely, only 12.55% of workers are classified as skill-matched, with the remaining 27.60% being overskilled. These aggregate figures, however, mask significant variations across different demographic cohorts.

Analysis by gender indicates distinct patterns. Males exhibit a higher rate of underskilling (65.25%) compared to females (51.74%). This disparity may be partly attributable to a higher concentration of male employment in industries or occupations that traditionally rely on technical or manual skills, where formal skill certification or

alignment with MASCO-defined skill levels (proxied by education) might be less emphasised or rapidly evolving. In contrast, females demonstrate a substantially higher incidence of overskilling (37.02% versus 21.33% for males). This suggests that a greater proportion of female workers possess skill levels (again, proxied by education) exceeding those required for their current positions, potentially reflecting occupational segregation, glass ceiling effects, or challenges in securing roles that fully leverage their capabilities.

Concerning ethnicity, a high incidence of underskilling is observed across all major groups: Bumiputera (59.06%), Chinese (60.11%), Indians (65.84%) and Others (72.7%). This widespread underskilling may point to systemic issues such as disparities in access to quality education and relevant skill development opportunities that align with formal job requirements. Notably, Bumiputera (27.95%) and Chinese (27.92%) workers show relatively higher rates of overskilling compared to Indian workers (24.20%) and those in the 'Others' category (19.41%). This could indicate that a segment of Bumiputera and Chinese workers are in roles that underutilise their skill sets, possibly due to a mismatch between their field of education/skill acquisition and available job market opportunities or other labour market frictions.

Marital status also appears to correlate with skills mismatch. Never-married individuals report a high rate of underskilling (65.87%). This could suggest that this group, which may include a larger proportion of younger individuals or those with fewer accumulated resources, might have had less access to or opportunity for skill development, aligning with job requirements. Conversely, married individuals exhibit a lower rate of underskilling (55.64%) and a higher rate of overskilling (31.52%). While a more stable economic condition often associated with marriage might facilitate skill acquisition, the higher overskilling could also indicate that married individuals, potentially facing constraints such as work-life balance or geographical limitations, might accept positions that do not fully utilise their acquired skills. Widowed individuals (76.30%) or divorced/permanently separated (72.77%) show the highest rates of underskilling, potentially reflecting complex socio-economic factors impacting their engagement with the labour market and skill alignment.

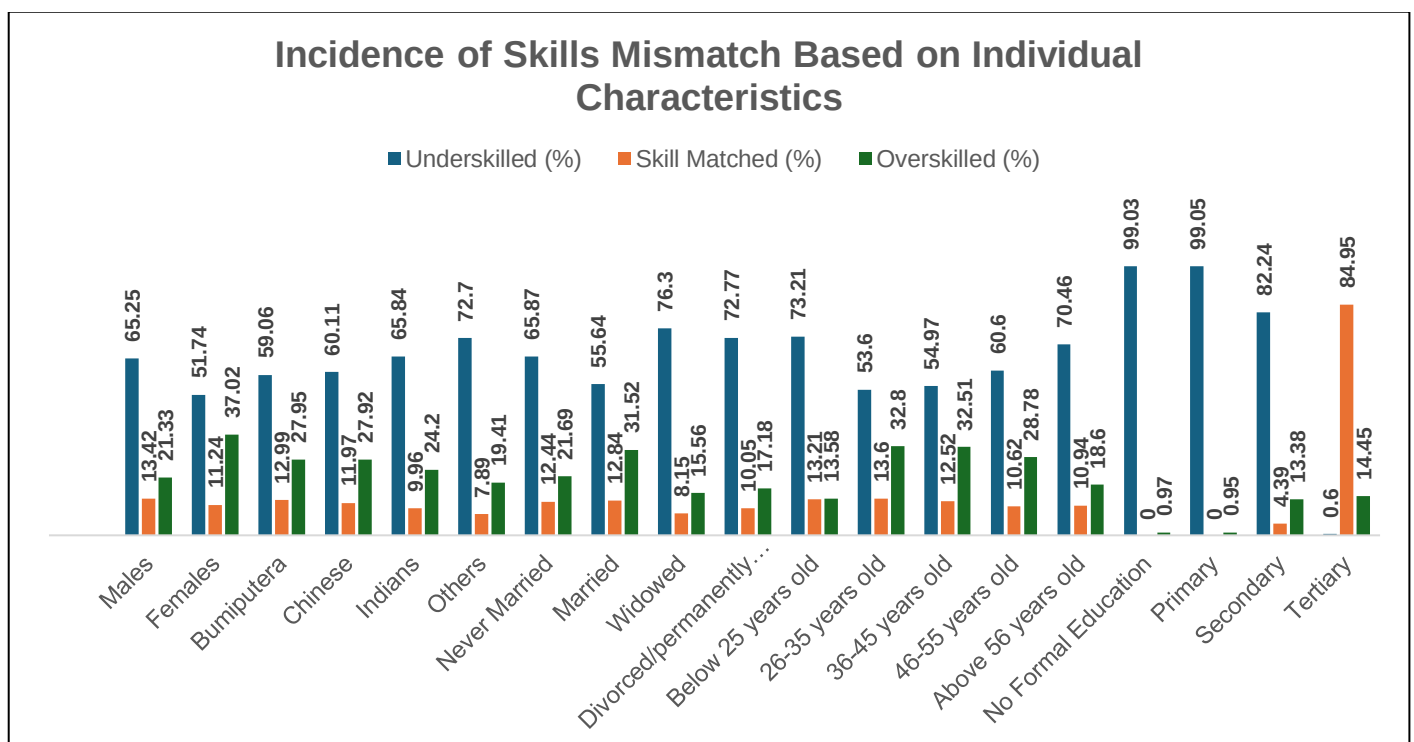


Figure 5. Incidence of Skills Mismatch Based on Individual Characteristics

The incidence of skills mismatch also varies considerably across age cohorts. Younger workers (below 25 years) demonstrate the highest rate of underskilling (73.21%), suggesting that many are entering the workforce without the full spectrum of skills or experience typically required for their roles, or that their educational qualifications do not yet map to higher skill levels as defined by the job analysis framework. Individuals in the prime working age groups of 26-35 years (32.80% overskilled) and 36-45 years (32.51% overskilled) show the highest rates of overskilling. This may reflect the accumulation of skills and experience throughout their

careers, potentially exceeding the requirements of their current jobs. Older workers (46-55 years: 60.60% underskilled and above 56 years: 70.46% underskilled) exhibit a resurgence in high underskilling rates, possibly indicating challenges in maintaining skill currency in the face of technological advancements and evolving job demand or that their qualifications are benchmarked at lower skill levels compared to job requirements.

Finally, skills mismatch is starkly differentiated by education level, which serves as the proxy for workers' actual skills in this analysis. Individuals with no formal education (99.03% underskilled) or only primary education (99.05% underskilled) are almost universally classified as underskilled when their skill proxy is compared against MASCO-defined job skill levels. Those with secondary education also show a very high rate of underskilling (82.24%), although a segment is overskilled (13.38%). In stark contrast, individuals with tertiary education exhibit minimal underskilling (0.60%) and a very high rate of being skill-matched (84.95%). This indicates that, according to the job analysis framework comparing education-proxied skills to MASCO job requirements, higher education qualifications generally align with or exceed the skill levels required for the jobs held by this group. Nevertheless, a notable proportion of tertiary-educated workers (14.45%) are classified as overskilled, suggesting that even among the highly educated, some find themselves in roles that do not fully utilise their advanced qualifications.

Thus, Malaysia's skills gap analysis using job analysis with education level as a proxy for worker skills underscores significant disparities across demographic characteristics. The severe underskilling gap average gaps more pronounced among men and older and younger workers, those with lower credentials, and certain ethnic and marital status groups, suggesting a striking portion of the workforce is overqualified, lacking the formal qualifications commensurate with the skills associated with their jobs. This scenario might hinder productivity, innovation and career progression on an individual level. On the other hand, the pronounced over-skilling gaps among women and prime-age workers, married people and a portion of the tertiary educated imply that underutilised human capital is a major concern, leading to dissatisfaction and inadequate economic engagement.

Incidence of Skills Mismatch Based on Occupational Characteristics

The distribution of skills mismatch across major occupational groups in the Malaysian labour market, as detailed in Figure 6, reveals significant contrasts. A predominant pattern emerges in which workers in higher-echelon occupations, such as managers and professionals are overwhelmingly classified as overskilled, whereas those in lower-level occupations exhibit exceptionally high rates of underskilling when their educational attainment (as a proxy for skill) is compared against the skill levels defined by MASCO 2013 for their respective roles.

Specifically, Managers (97.98% overskilled) and Professionals (99.79% overskilled) demonstrate near-universal overskilling, with virtually no underskilling reported (0.00% for both). This suggests that individuals in these occupational categories possess educational qualifications and by proxy, skill levels that significantly exceed the formal skill level designated for their broad occupational group by MASCO. Such a high prevalence of overskilling could be indicative of several factors, including a potential oversupply of highly educated individuals relative to the availability of jobs demanding the highest echelons of skill within these categories, the rapid expansion of tertiary education in Malaysia outpacing job creation at equivalent skill levels, or the signalling value of advanced degrees in competitive segments of the labour market.

In contrast, Technicians and Associate Professionals present a more varied skills mismatch profile. While a majority (59.60%) are skill-matched and underskilling is minimal (2.26%), a substantial proportion (38.14%) are classified as overskilled. This relatively more balanced distribution might suggest that vocational training and technical education programs are to a degree, aligned with the skill requirements of this occupational tier. However, the significant presence of overskilled individuals indicates potential underutilisation of skills or qualifications. These individuals might be occupying roles beneath their full capability due to a scarcity of higher-level professional opportunities or are using these positions as career stepping-stones. As Malaysia continues its economic transformation, ensuring precise alignment between evolving technical skill demands and educational outputs remains a critical challenge.

A dramatically different picture is observed in the remaining occupational categories, which are characterized by pervasive underskilling. For instance, Clerical Support Workers show a 72.31% rate of underskilling. This trend intensifies in roles such as Service and Sales Workers (90.40% underskilled), Skilled Agricultural, Forestry, Livestock and Fishery Workers (92.81% underskilled), Craft and Related Trades Workers (95.00% underskilled) and Plant and Machine Operators and Assemblers (96.84% underskilled). The highest incidence of underskilling is recorded among Elementary Occupations, where 99.62% of workers are classified as such.

This extensive underskilling across these occupational groups suggests that a vast majority of incumbents possess educational qualifications (and therefore proxied skill levels) below those formally associated with their job roles by MASCO 2013. Such widespread mismatch could stem from various interconnected factors, including limited access to quality education and vocational training that directly aligns with formal occupational skill requirements, or structural labour market characteristics where the demand for labour in these occupations is met by individuals who have acquired skills through non-formal or experiential pathways not captured by an education-based skill proxy. It may also reflect insufficient employer investment in formal on-the-job training and upskilling initiatives that would lead to qualifications aligning with the MASCO skill levels. This pronounced underskilling, if indicative of genuine skill deficits, could have significant implications for productivity and operational efficiency in these sectors.

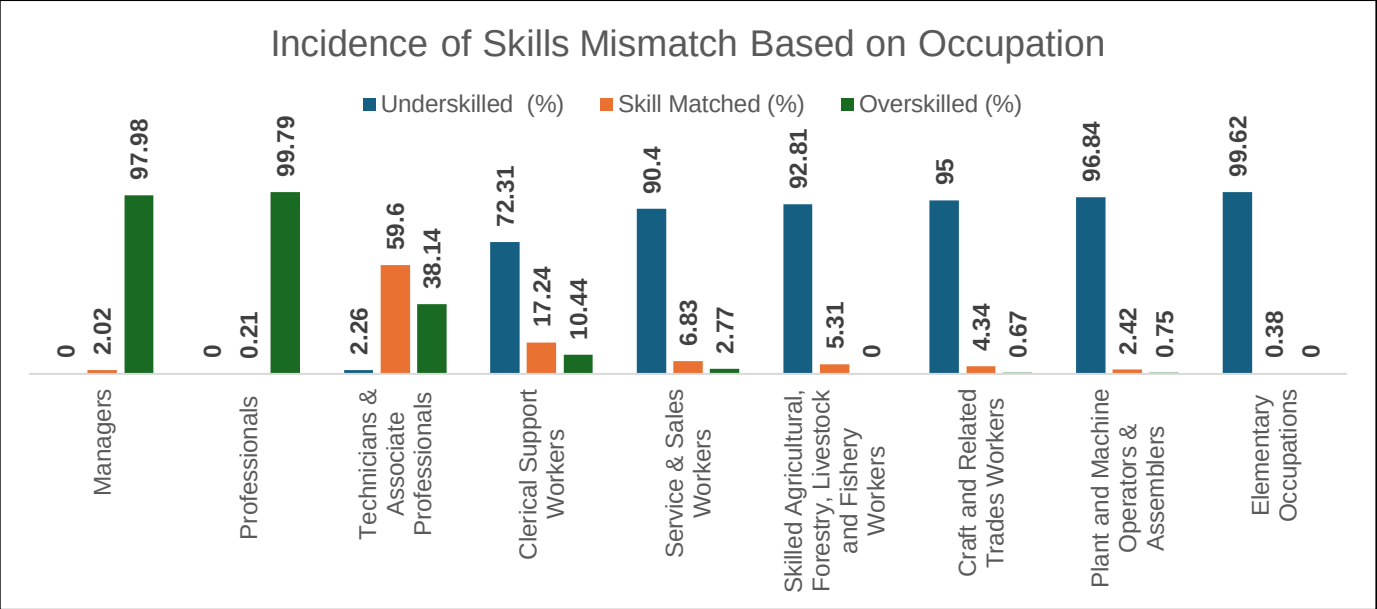


Figure 6. Incidence of Skills Mismatch Based on Occupational Characteristics

Incidence of Skills Mismatch Based on Industry Characteristics

The distribution of skills mismatch across various industries in Malaysia, as presented in Figure 7, reveals considerable heterogeneity. The findings underscore that certain sectors are characterised by high levels of underskilling, where workers' educational attainment (serving as a proxy for their skill level) falls below the skill levels defined for their occupations by MASCO 2013. Conversely, other sectors demonstrate a better alignment between workforce qualifications and job requirements.

A pronounced rate of underskilling is evident in the Agriculture, Forestry and Fishing sector, where 85.85% of workers are classified as underskilled. This likely reflects the sector's traditional reliance on practical, manual skills and experiential knowledge, where formal educational qualifications may not align with the MASCO-defined skill levels for many roles, especially if these roles are evolving to require new technical competencies. The Administrative and Support Service Activities sector also reports a very high underskilling rate at 86.73%.

Similarly, high incidences of underskilling are observed in Accommodation and Food Service Activities (85.15%), Transportation and Storage (78.59%) and Construction (76.66%). The Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles sector also shows a significant underskilling rate of 75.08%. Even the Manufacturing sector, a critical component of the Malaysian economy, records a substantial underskilling

rate of 66.67%. While this sector also has moderate proportions of skill-matched (18.13%) and overskilled (15.20%) workers, the high underskilling suggests that many employees may not possess the educational qualifications corresponding to the technical skill levels increasingly demanded by technological advancements and evolving production processes. In contrast, several industries exhibit higher rates of skill-matching or more varied mismatch profiles. The Education sector stands out with the highest rate of skill-matching (81.71%) and comparatively low underskilling (14.02%) and overskilling (4.28%). This is anticipated, given that employment in this sector typically requires specific educational credentials that align closely with job functions.

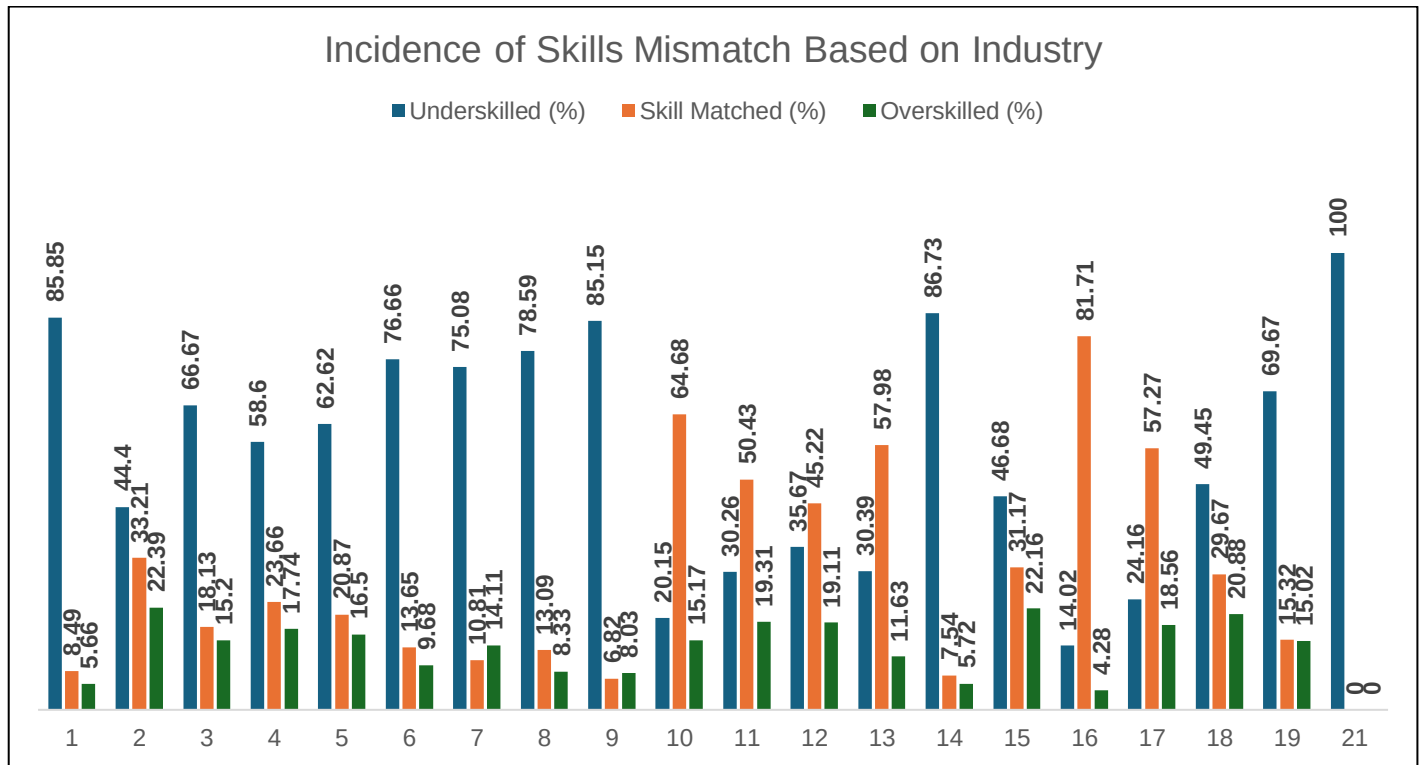


Figure 7. Incidence of Skills Mismatch Based on Industry

The Information and Communication sector also demonstrates strong skill alignment, with 64.68% of workers being skill-matched and a relatively low underskilling rate of 20.15%. Similarly, Professional, Scientific and Technical Activities (57.98% skill-matched, 30.39% underskilled) and Human Health and Social Work Activities (57.27% skill-matched, 24.16% underskilled) show a majority of workers with skills aligned to their job requirements, reflecting the importance of specialised knowledge and formal qualifications in these fields. The Financial and Insurance/Takaful Activities sector has 50.43% of its workforce skill-matched, with underskilling at 30.26%. Real Estate Activities present a similar profile, with 45.22% skill-matched and 35.67% underskilled. The Mining and Quarrying sector displays a more mixed distribution: underskilling is at 44.40%, while skill-matching is 33.21% and overskilling is 22.39%. This may suggest that while the sector demands specific technical skills, a segment of the workforce meets these via education-proxied skills, another segment possesses qualifications beyond the norm and a substantial portion has qualifications below the typical level for their roles.

The analysis of skills mismatch by industry in Malaysia reveals significant disparities in how workers' educational qualifications (as a proxy for skills) align with the skill levels defined for their jobs across different sectors. The high rates of underskilling observed in primary sectors like agriculture, as well as in key secondary sectors like construction and manufacturing and several service industries, suggest a potential gap. Many workers in these industries may possess educational levels below what is formally associated with the technical and operational demands of their roles, particularly if these roles are modernising. This could be attributed to a traditional reliance on experiential learning and vocational skills that may not be fully captured or aligned with the formal educational proxies used in this job analysis method, or a lag in the educational system's responsiveness to evolving industry needs.

Conversely, sectors such as education, information and communication and professional, scientific and technical activities exhibit considerably higher rates of skill-matching. This pattern reflects the intrinsic importance of formal education and specialised training in these industries, where there are often well-defined educational pathways and certifications that align more closely with job requirements as defined by MASCO 2013. These findings highlight the sector-specific nature of skills mismatch and underscore the need for tailored strategies to address these imbalances, considering the unique characteristics and developmental trajectories of each industry.

Incidence of Skills Mismatch Based on Geographical Characteristics

The geographical distribution of skills mismatch across Malaysia, analysed by urban-rural classifications and major administrative regions, is detailed in Figure 8. These findings reveal significant spatial disparities in the alignment between workers' educational attainment (as a proxy for skill level) and the skill requirements of jobs as defined by MASCO 2013.

A clear divergence in skills mismatch patterns is observed between urban and rural areas. Urban locales exhibit a lower rate of underskilling (56.52%) compared to their rural counterparts. This may suggest comparatively better access to education, vocational training and a higher concentration of employment opportunities demanding advanced skills. However, urban areas also report a substantial rate of overskilling (30.00%), indicating that a significant segment of the urban workforce possesses qualifications exceeding the requirements of their current roles. This overskilling could be a consequence of a highly competitive job market where individuals may accept positions below their skill capacity.

Conversely, rural areas demonstrate a markedly higher incidence of underskilling, with 69.82% of workers classified as such. This finding potentially reflects more limited access to diverse educational and training opportunities that align with formal job skill requirements, contributing to a workforce whose educational qualifications may not match the defined skill levels for available jobs. The lower rate of overskilling in rural areas (20.42%) further suggests a smaller pool of highly qualified individuals, possibly due to the outmigration of more educated workers to urban centres seeking better employment prospects.

The analysis by major administrative regions further underscores the heterogeneity of skills mismatch. The Central Region, encompassing Malaysia's economic heartland of Selangor, W.P. Kuala Lumpur and W.P. Putrajaya, displays the lowest rate of underskilling nationwide at 44.74%. However, it simultaneously records the highest rate of overskilling at 41.36%. This pattern reflects the region's status as a prime destination for highly educated and skilled individuals, attracted by a wide array of job opportunities. The intense competition in this economic hub may lead to a significant proportion of these individuals occupying roles that do not fully utilise their acquired skills, resulting in pronounced overskilling..

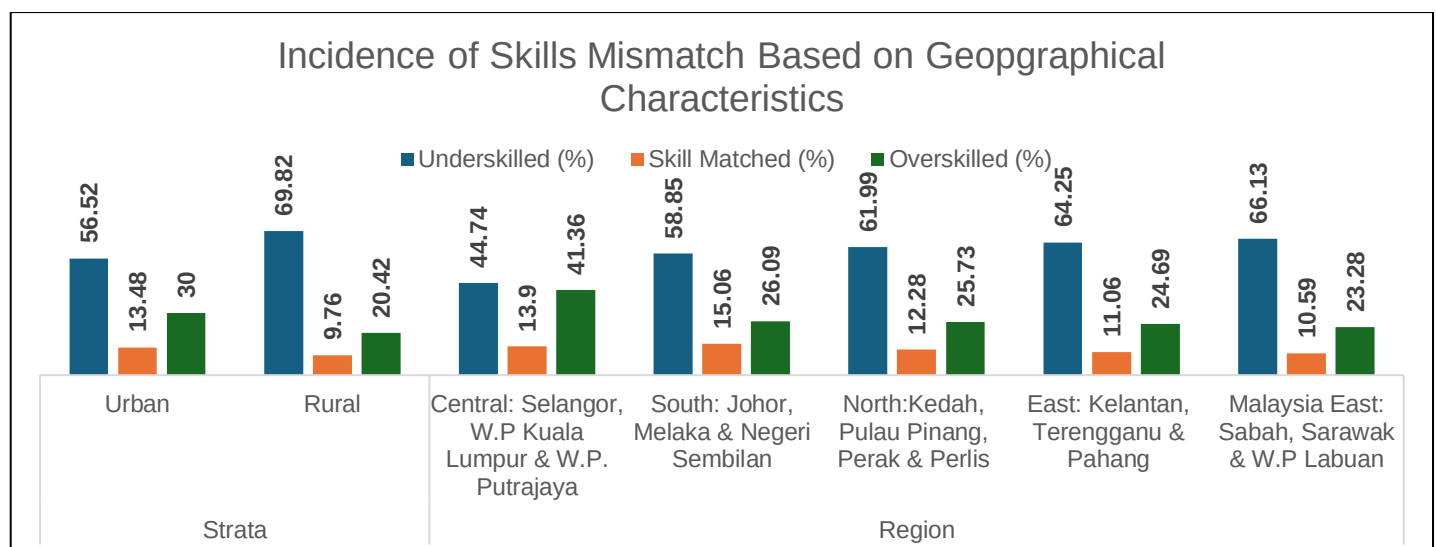


Figure 8. Incidence of Skills Mismatch Based on Geographical Characteristics using Objective Method Job Analysis

The South Region (Johor, Melaka, Negeri Sembilan) reports an underskilling rate of 58.85% and overskilling at 26.09%. The North Region (Kedah, Pulau Pinang, Perak, Perlis) exhibits a slightly higher underskilling rate of 61.99%, with overskilling at 25.73%. The East Region of Peninsular Malaysia (Kelantan, Terengganu, Pahang) shows a further increase in underskilling to 64.25%, while overskilling stands at 24.69%. This trend of escalating underskilling as one moves from the Central to other Peninsular regions may indicate varying levels of economic development, industrial structure and accessibility to quality education and skill development programs aligned with formal job requirements.

Malaysia East (Sabah, Sarawak and W.P. Labuan) presents the highest regional rate of underskilling at 66.13%, while overskilling is 23.28%. This pronounced underskilling likely reflects persistent challenges in access to higher education and specialised training, compounded by geographical factors and potentially lower levels of economic diversification compared to Peninsular Malaysia. The comparatively lower overskilling rate suggests a smaller concentration of individuals with advanced qualifications, which could be linked to outmigration to regions with more abundant high-skilled job opportunities.

The geographical analysis of skills mismatch in Malaysia underscores significant disparities in how workers' educational qualifications (as a proxy for skills) align with job requirements across different areas. Urban areas and the economically advanced Central Region generally exhibit lower rates of underskilling but higher rates of overskilling. This suggests better overall access to education and training, leading to a more qualified workforce, but also points to potential underemployment where available skills are not fully utilised, possibly due to intense job market competition.

In contrast, rural areas and less developed regions, notably the East Coast of Peninsular Malaysia and Malaysia East, are characterised by substantially higher rates of underskilling. This indicates that a larger proportion of the workforce in these areas may lack the formal educational qualifications typically associated with the skill demands of their jobs. Such patterns could be attributed to limited access to quality education and diverse training opportunities, coupled with job markets that may be more reliant on primary industries or lower-skilled service roles. The lower prevalence of overskilling in these regions may also indicate an outmigration of more highly qualified individuals to areas with greater economic dynamism and opportunities for skilled employment. These geographical imbalances in skills mismatch highlight the need for spatially targeted policies aimed at enhancing human capital development and ensuring a more equitable distribution of skilled employment opportunities across the nation.

DISCUSSION

This study's comprehensive analysis of the Malaysian labour market, leveraging the SWS (2019) dataset, reveals intricate patterns of education and skills mismatch across diverse demographic, occupational, industrial and geographical strata. By employing the realised matches (RM) method for educational mismatch and a job analysis (JA) approach for skills mismatch based on MASCO 2013, the findings quantify significant imbalances that warrant targeted policy attention.

The research identified a notable prevalence of overeducation (29.31%) relative to undereducation (9.21%) across the Malaysian workforce. This phenomenon, particularly pronounced among female workers, aligns with international literature suggesting that gender-based occupational segregation and constrained access to high-level positions contribute significantly to educational mismatches and the gender pay gap (Blau & Kahn, 2020; Kapsal & Fana, 2021). In the Malaysian context, despite advancements in female educational attainment, systemic barriers may channel highly qualified women into roles that do not fully leverage their credentials, perpetuating the underutilisation of human capital (World Bank, 2023). The Malaysia Gender Gap Index (2023) underscores persistent wage disparities, with overeducation among women being a contributing factor, as they may accept positions below their qualification levels due to restricted opportunities in traditionally male-dominated, higher-paying sectors. Recent studies by Abdullah and Rahman (2023) also highlight that female graduates in Malaysia are increasingly facing overeducation upon labour market entry, impacting their early career wage trajectories.

Ethnic disparities in educational mismatch were also evident, with Bumiputera exhibiting slightly higher overeducation rates, while Chinese and Indian workers reported greater incidences of undereducation. These patterns likely reflect differential access to quality education, varied socio-economic backgrounds and distinct

occupational distributions among ethnic groups (Ng, 2013; Lee & Farhadi, 2022). As Sloane and Mavromaras (2020) argued, overeducation is not merely a labour market anomaly but a factor that can exacerbate existing socio-economic inequalities if not addressed. The persistence of such ethnic-based disparities calls for policies that ensure equitable educational opportunities and promote inclusive labour market practices (Sari & Ismail, 2024).

Age-related dynamics further complicate the mismatch landscape. Younger workers (below 25) demonstrated better educational alignment, a finding consistent with recent educational outputs being more attuned to contemporary job market demands (Cheong & Goh, 2023). However, prime working-age individuals (26-45) were more susceptible to overeducation, possibly reflecting initial job market entry below their qualification levels or a "job shopping" phase. Conversely, older workers (above 56) faced escalating undereducation, underscoring the challenges of skill obsolescence and limited retraining avenues in the face of evolving job requirements (Pitan & Adediji, 2020; OECD, 2021).

Marital status also emerged as a significant correlate. Never-married individuals, often younger, showed better education-job alignment. In contrast, married individuals, particularly women, may encounter higher overeducation or overskilling. This could be attributed to career interruptions, increased family responsibilities influencing job choices, or strategic pursuit of higher education for enhanced family financial security, sometimes leading to acceptance of jobs not fully commensurate with their qualifications (Hamjediers & Schmelzer, 2021; Tan, 2024).

While this study's cross-sectional design effectively maps the incidence of mismatch, it does not permit a deep exploration of its causal relationships or long-term consequences, a key area for further inquiry. For instance, the high prevalence of overeducation and overskilling identified, particularly among women and in the central economic region, likely translates into significant wage penalties and lower job satisfaction, as workers' full productive capacities are underutilised (Sloane & Mavromaras, 2020). Conversely, the pervasive underskilling in sectors like manufacturing and construction raises concerns about potential productivity losses, constrained innovation and mobility barriers for workers trapped in low-skill equilibria. Understanding these dynamics, how mismatch affects wages, firm productivity and career trajectories over time is critical for grasping the full economic cost of these labour market frictions.

A critical finding of this study is the pervasive nature of underskilling (59.86%) compared to overskilling (27.6%). This signals a substantial deficit between the skills possessed by the workforce and those demanded by employers. Males exhibited higher rates of underskilling, potentially linked to their concentration in industries such as construction and manufacturing, where rapid technological shifts demand new technical competencies and formal certification pathways may lag (ILO, 2022). Conversely, the higher incidence of overskilling among females suggests an underutilisation of their acquired skills, possibly reflecting persistent glass ceilings or entry into roles with lower skill demands (McGuinness et al., 2018; European Commission, 2023). The high underskilling among younger workers and those with lower educational attainment is particularly concerning, as it can impede productivity, limit career progression and suppress wage growth (CEDEFOP, 2022).

The Job Competition Theory offers a lens through which to interpret some of these findings, particularly overeducation. Individuals may acquire higher educational qualifications to improve their position in the job queue, even if these qualifications exceed the objective requirements of available jobs (Thurow, 1975; Borghans & de Grip, 2000). While higher education is generally associated with better skill matching, the persistence of overskilling among the highly educated (Allen & Van der Velden, 2011; McGuinness, 2013) indicates that educational attainment alone does not guarantee optimal skill utilisation, especially in labour markets where signalling value of degrees might outweigh actual skill deployment (Verhaest & Sellami, 2019; Lim & Cho, 2023). Rapid technological advancements further compound this, demanding continuous upskilling and reskilling beyond formal education (Autor, 2022).

Sectoral analysis revealed pronounced overeducation in managerial and professional roles, potentially indicating credential inflation or a surplus of graduates in these fields. In contrast, elementary occupations and manual skill-based roles exhibited high underskilling. Industries such as agriculture and manufacturing reported significant underskilling, highlighting a need for enhanced vocational training and technology

adoption support (Quintini, 2014; Sellami et al., 2017; Rasiyah & Yap, 2023). Conversely, high-skill service sectors like education, information & communication and professional services demonstrated better skill alignment, likely due to more clearly defined qualification pathways and skill requirements (Ghani & Nordin, 2022).

Geographical disparities were also significant. Urban areas, with better access to educational institutions and diverse job markets, showed lower underskilling but higher overskilling. This suggests that while urban centres attract skilled individuals, the competitive environment may lead some to accept jobs for which they are overqualified (Farooq, 2011; Tran, 2023). The central region, Malaysia's economic nucleus, exemplified this with the lowest underskilling yet the highest overskilling. Rural areas and less developed regions like East Malaysia exhibited higher undereducation and underskilling, reflecting challenges in educational access, quality and fewer high-skilled employment opportunities (Yusof & Hamdan, 2021).

In conclusion, the heterogeneous nature of education and skills mismatch in Malaysia necessitates a multi-pronged policy approach. To effectively support Malaysia's aspiration of becoming a high-income, knowledge-driven economy, policy recommendations must be targeted and robust. This includes developing stronger labour market information systems to provide real-time data on skill demands, thereby improving signals to both job seekers and educational institutions. Furthermore, fostering stronger and more structured industry-education partnerships is essential to ensure that curricula, from universities to Technical and Vocational Education and Training (TVET) institutions, are co-designed with industry and remain relevant to evolving needs. Crucially, targeted reskilling and upskilling programs must be developed for underemployed or underskilled groups, particularly older workers and those in industries undergoing rapid technological change. Addressing gender and ethnic disparities through these programs and ensuring that regional development strategies incorporate human capital development are also paramount for enhancing overall labour market efficiency.

A significant limitation of the current analysis is its reliance on cross-sectional data, which provides a static snapshot of the labour market. Therefore, a key direction for future research is the development and analysis of longitudinal datasets. Such data would allow for tracking the persistence of mismatch over an individual's career, identifying triggers for entering or exiting mismatched states and more accurately estimating the long-term impacts on wages, career mobility, and overall economic well-being, thereby informing more sustainable and dynamic labour market policies. Future research could also delve deeper into the wage penalties associated with these mismatches in the Malaysian context and evaluate the effectiveness of specific policy interventions in mitigating them.

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