



# Demand-supply Mismatch in TVET Academic Programmes: What Is It and What Should It Be?

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**Abstract:** Over the years, public and private higher education institutions in Malaysia have consistently produced many graduates. However, the employment rate among local fresh graduates remains low. Therefore, this study aims to clarify the demand-supply mismatch of the programmes offered by Malaysian Polytechnic Technical Vocational Education and Training (TVET) based on the perspectives of the employers, top management, lecturers, and students. This study adopted a semi-structured interview as the data collection method and utilised a purposive sampling method in approaching the respondents. This study conducted a thematic analysis using the ATLAS.ti 9 software. The findings of this study relating to the demand-supply mismatch can be classified into three, which are: i) the mismatch between industry demand and TVET programme supply; ii) the mismatch between student demand and TVET programme supply; and iii) the mismatch between institution readiness and TVET programme supply. Following these findings, this study proposed a realignment of the TVET programme by taking into consideration all stakeholders' necessities. As a result, the demand-supply will be balanced, thus increasing the employability of the local graduates. It is beneficial for future research to employ an appropriate framework of alignment when examining TVET academic programmes, taking into account the needs of all stakeholders to guarantee that TVET programmes remain relevant.

**Keywords:** Supply and demand, TVET, TVET programmes, needs analysis

## 1. Introduction

Ali et al. (2016) reported on the various innovative activities conducted by higher learning institutions to improve graduates' soft skills. For example, soft skills training programmes pre-and post-graduation (Chan & Ho, 2015; Cheong et al., 2016; Ghani, Rappa, & Gunardi, 2018; Rodzalan, 2018) and soft skills assessment in the curriculum design (Ali et al., 2016; Cheong et al., 2016; Ghani, Rappa, & Gunardi, 2018; Hanapi & Nordin, 2014; Rodzalan, 2018). Many scholars, however, have reported on the undiscovered of new skills demanded by the job market (Ali et al., 2016; Ghani, Rappa, & Gunardi, 2018; Hanapi & Nordin, 2014; Iradah et al., 2019; Kamaruzaman et al., 2019; Rodzalan, 2018; Salleh et al., 2020; Soon, Lim, & Ahmad, 2016; Turiman, Abdullah & Noor, 2018; Zahari et al., 2018). This situation is unaligned with the employability requirements that require graduates to increase their knowledge and skills to optimise their work performance (Ali & Mahmud, 2017; Bakar, Islam, & Lee, 2015; Cheong et al., 2016; Mamun et al., 2017; Kamaruzaman et al., 2019; Rodzalan, 2018; Zahari et al., 2018), and can be translated as the mismatch between supply and demand in the labour market. Thus, a high unemployment rate has been reported, particularly among TVET graduates (Yamada, Otchia, & Taniguchi, 2018). As highlighted by Schweri et al. (2020), this is due to

the inability of TVET institutes to meet the fast pace of change in the economic environment and the consequent change in skills demanded, which contributes to the mismatch between training and employers' expectations.

Earlier, Ayentimi, Burgess, and Dayaram (2018) and Cheong et al. (2016) also highlighted that the assignment system for students entering TVET programmes currently suffers from fragmentation under multiple regulations by various ministries, agencies, departments, and private institutions, leading to each institution developing different curricular and programmes. The government's failure to coordinate the TVET system's activities has resulted in a training mismatch between the TVET programmes and industries, institutions' readiness, and student needs. Similarly, mismatches are prominent between institutions and the industry. Although efforts have been made to increase access, improve infrastructure, and teach at all educational levels, quality issues are still a significant challenge (Suna et al., 2020). TVET institutions still do not support high-level professional technical skills and knowledge formation at the operational and middle management levels.

By referring to McGuinness, Pouliakas, and Redmond (2018) as well as Verhaest, Sellami, and Velden (2017), there are various types of mismatches, including (i) skills mismatch, (ii) horizontal mismatch, and (iii) vertical mismatch (overeducation, undereducation, overkilling, and underkilling). A skills mismatch is being in a job that does not utilise the individual's knowledge or skills. Several skills mismatches relate to employees, whereas others relate to employers and firm-level difficulties. In addition, technical skills and soft skills are closely affiliated and are vital elements for future job placement. Technical skills are essential for specific and practical jobs (Chan & Ho, 2015; Cheong et al., 2016; Iradah et al., 2019; Zakaria, 2019; Tan, Rahman, & Lim, 2019). Technical skills and knowledge mastery are pertinent to becoming a competitive and competent employee (Cheong et al., 2016; Kamaruzaman et al., 2019). Essential skills and competencies will ensure that individuals can compete in terms of trends and technology for employment in the labour market, particularly in this rapidly changing, virtual, automated world (Kamaruzaman et al., 2019). Nonetheless, soft skills play a vital role in producing spiritually, emotionally, and physically well-balanced graduates and improving their employability rates.

The horizontal mismatch source is demand-related when a related job is unavailable. This mismatch can be a negative phenomenon given that students choose a field of study with the expectation of finding something related (Alam & Roslan, 2020; Schweri et al., 2020; Verhaest, Sellami, & Velden, 2017). The horizontal mismatch often has unfavourable effects on employees' earnings, occupational status, and job satisfaction. Horizontal mismatch also increases the likelihood of experiencing programme regret, which is associated with substantial costs. This type of mismatch also causes graduates to work outside their field of study. Failure to employ workers with practical skills is a critical issue on an individual and national scale. From this perspective, horizontal mismatch reveals that the skill formation process and the labour market skill allocation are sub-optimal. On the other hand, individuals with higher educational levels than the job requirements are termed "overeducated," "underemployed," "overqualified," and collectively referred to as "vertically mismatched." Moreover, overeducation mismatches are discrepancies between education levels and job requirements, while mismatches also include incompatible educational fields of study for the work nature. Nevertheless, Robst (2007) studies postulate that an individual can be mismatched in more than one form.

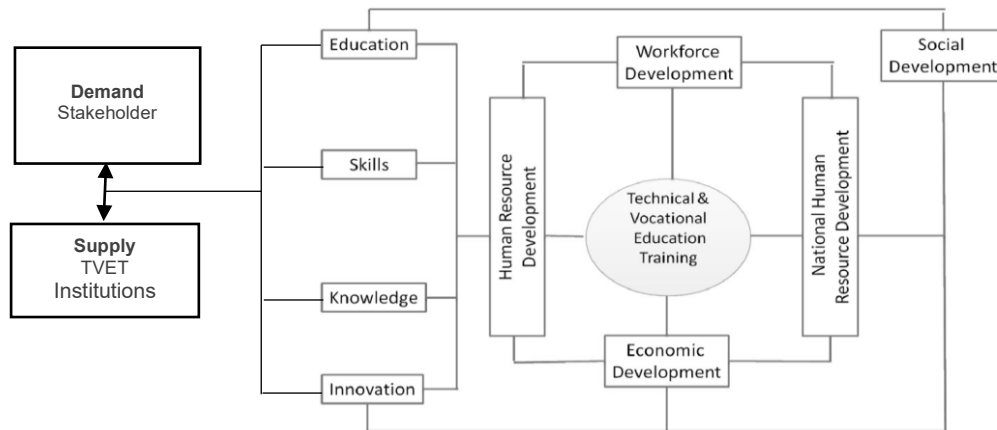
Then, although studies have been conducted on the nature of the link between TVET and the labour market in Malaysia (Ali & Mahmud, 2017; Bakar, Islam, & Lee, 2015; Ghani, Rappa, & Gunardi, 2018; Hanapi & Nordin, 2014), Suna (2020) found that little research has occurred on the reasons for the mismatch between TVET graduates and academic programmes. A few scholars also highlighted the immense responsibility of higher learning institutions in educating students and ensuring that the programmes, curriculum, and components offered align with the current requirements of the workforce (Ali & Mahmud, 2017; Bakar, Islam, & Lee, 2015; Ghani, Rappa, & Gunardi, 2018; Hanapi & Nordin, 2014). In 2016, Polytechnic was the largest supply in TVET Malaysia's employment market, with 25 percent of polytechnic graduates employed by 1,392 companies (Department of Polytechnic Education, 2018), TVET programmes at polytechnics will become irrelevant unless supply-demand TVET programme offerings are enhanced, aligned, and transformed, as well as strong industry engagement. By considering these statements, this study attempts to shed light on the supply-demand mismatch in the programmes offered by Malaysian Polytechnic from the employers', top management's, lecturers', and students' viewpoints.

## **2. Related Works**

### **2.1 Reasons for Mismatch in the TVET Academic Programme**

As stated by Suna et al. (2020) and Szmielińska-Pietraszek and Szymańska (2015), employers are searching for employees with knowledge, skills, qualifications, experience, high interpersonal competencies, manners, responsibility, hardworking, independence, honesty, and the ability to learn quickly. In the TVET system, there are four essential components required to produce a self-reinforcing virtuous cycle of growth and development, which are: i) skills, ii) education, iii) knowledge, and iv) innovation (Alagaraja, Kotamraju, & Kim, 2014). Stakeholder theory arose in the 1980s as a reaction to the increasing dynamism and complexity of the environment in which organisations perform. All individuals or parties having a stake in the organisations are considered in strategic management under the strategy, and the organisation is managed with the goal of providing value for its clients, suppliers, owners, workforce, and communities (Freeman et al., 2020). In this situation, the primary stakeholders (the students, TVET institutions, and

industries) play a significant role in ensuring that the academic programmes meet demand and supply needs. The TVET system's performance is determined by the strength of the relationship between education and employment. Figure 1 illustrates TVET as an integrative framework for catalysing sustainable human resource development by linking TVET supply and demand stakeholders with the TVET system components adapted from Alagaraja, Kotamraju, and Kim (2014). The relationships between these two main stakeholders and the four TVET components fundamentally address and harmonise human resource development at the organisational, regional, and national levels. In addition, skill development fulfils stakeholders' supply and demand needs, raises knowledge acquisition, and enables continuous innovation.



**Fig. 1 - Integrative framework for TVET supply and demand stakeholders linking the TVET system components (Source: Alagaraja, Kotamraju, & Kim, 2014)**

However, Verhaest, Sellami, and Velden (2017) stated that the supply and demand imbalances in study fields, educational institutions, and labour market conditions contribute to the mismatches. Suna et al. (2020) explained that the supply and demand mismatch is an essential performance indicator between education (the TVET system) and the workforce. According to Yamada, Otchia, and Taniguchi (2018), this mismatch occurs due to limited interaction between the supply and demand stakeholders. Previous literature postulates various causes of supply and demand imbalances. The TVET institutions aim to produce many graduates without a strategy, causing the supply mismatch. The number of university graduates steadily increases, although potential vacancies differ in skills, leading to various students completing their studies in fields with limited demand (Verhaest, Sellami, & Velden, 2017).

Despite producing many graduates, it was apparent that the same graduates had difficulties obtaining jobs as there were too many graduates with the same qualifications being produced. As mentioned by Cheong et al. (2016) as well as Hanapi and Nordin (2014), this situation can be attributed to the proliferation of public and private higher learning institutions offering similar programmes, which inevitably leads to competition and an increase in graduate unemployment rates. To further exacerbate this situation, higher learning institutions have made minimal effort to determine whether the programmes offered comply with the current needs or industry demands; and whether the training provided aligns with the rapidly developing technology. Therefore, the students' acquired skills were not equivalent, compatible, or relevant to the current industry needs (Husain et al., 2020; Pankhuri, 2019; Sehgal & Nasim, 2020; Teixeira et al., 2016; Vladimirovna & Nikolaevna, 2016; Yamada, Otchia, and Taniguchi 2018).

Currently, graduates face issues as prospective employers find the skills or knowledge possessed by the graduates irrelevant or incompatible with industry requirements. There is still a lack of coordination and alignment between TVET providers, industries, and potential industries (ElObeidy, 2016; Valiente, Zancajo, & Jacovkis, 2020; Vladimirovna & Nikolaevna, 2016; Yamada, Otchia, & Taniguchi, 2018). Consequently, the labour market cannot provide sufficient local human resources to meet the demands. Valiente, Zancajo, and Jacovkis (2020) explained that higher education institutions can be considered successful if they are able to align their programmes to the economic skill requirements, making their degrees more valuable and a better investment for youths entering the labour market. Thus, closer cooperation between the industry and higher learning institutions is crucial in addressing the mismatch of supply and demand between graduates and the industries. A futile attempt to supply graduates without collaborating with demand decreases employment opportunities (Ngcwangu, 2015).

The failure to coordinate the TVET system activities has resulted in a training mismatch between the programmes and industry skills requirements. Similarly, these mismatches are also prominent between universities, polytechnics, and industry (Ayentimi, Burgess, & Dayaram 2018). Additionally, higher learning institutions have a pertinent responsibility to educate students and ensure that the curriculum and educational components align with workplace requirements (Ali & Mahmud, 2017; Bakar, Islam, & Lee, 2015; Ghani, Rappa, & Gunardi, 2018; Hanapi & Nordin,

2014). Nevertheless, past literature postulates that higher learning institutions have failed to ensure that the educational syllabus is qualified, skilful, and meets the industries and current workplace needs (Luke & Heyns, 2019; Valiente, Zancajo, & Jacovkis, 2020).

Ngcwangu (2015) opined that these higher learning institutions have developed fault and failure curriculum models, and according to a few scholars (to name a few: Ali & Mahmud, 2017; Christenko, Martinaitis, & Gaussas, 2019; Cobo, 2013; Hanapi & Nordin, 2014; Sehgal & Nasim, 2020), this situation hampered the quality of graduates. A well-developed syllabus and curriculum will not guarantee high-quality graduates if the higher education resources employed are not qualified. Therefore, Hedayati and Laanpere (2015) as well as Remington (2017) suggest upgrading TVET institutions is vital to sustain rapid technological change and globalization.

On the other hand, Schwere et al. (2020) stated that even if TVET institutions successfully facilitate the graduate's transition into the labour market, they may become obsolete rapidly. Thus, Hanapi and Nordin (2014) explain that TVET institutions must meet the quality of education and employ high-quality teaching and learning processes, educational facilities and infrastructure, well-planned curriculums, and effective curriculum implementation. The lecturers need to be aware that these skills are essential and should be acquired by the graduates. The credibility of educational institutions is highlighted based on the current development of future human resources. For example, educational institutions that do not recognise the need to employ excellent educators who provide conducive learning environments and critical reference educational materials have low credibility. Consequently, lecturers and educational institutions should contribute to producing capable and qualified graduates (Hanapi & Nordin, 2014).

Meanwhile, the TVET education system is frequently regarded as second to academic education, and changing the mindset of students, parents, the community, and other stakeholders is difficult. These stakeholders tend to view TVET negatively and perceive TVET education as a course for those who have failed in society. Furthermore, Teixeira et al. (2016) disclosed that most parents want to see their children become engineers, doctors, or lawyers, and they perceive that these occupations provide better employment opportunities. This notion is a significant obstacle to improving TVET social status. Besides, Teixeira et al. (2016) also added that the socioeconomic backgrounds of the TVET students also influence TVET enrolment, where higher enrolment is observed in students from lower-income families compared to students from higher-income families that prefer enrolling in universities. Students' decisions to pursue TVET programmes are influenced by a lack of guidance and information on labour market demands (Suna et al., 2020; Valiente, Zancajo, & Jacovkis, 2020); ineffective career guidance from families and schools (Kim & Park, 2020; Vladimirovna & Nikolaevna, 2016); and lower wages and poorer working conditions (Valiente, Zancajo, & Jacovkis, 2020).

However, Vladimirovna and Nikolaevna (2016) stated that the current TVET system's guidance on supply and demand does not aid students in forming competent assessments according to their inclinations, in line with the current labour market and society's needs. The TVET education system focuses on professional competencies and pays significantly less attention to personal qualities and interests than it does to opportunities. As a result, this reduces employment satisfaction, potential, and innovation in graduates. The TVET system's mistrust has led to vocational qualifications not being valued by employers, decreasing the ability of graduates to be employed. Higher learning institutions have implemented multiple collaboration models to strengthen the existing TVET network, which is comprised of industries and other educational institutions. Nonetheless, this strategic partnership must enhance cooperation between industries and potential industries to ensure the availability of highly skilled, knowledgeable graduates with excellent social skills that can enhance labour productivity. Strategic partnerships must develop competent graduates that can adapt to the fast-paced work environment (Husain et al., 2020; Remington, 2017) and a strong synergy is needed between TVET institutions and industries. Through this synergy, graduate competence can be maintained and aligned with industry needs.

The disparity between TVET institutions and industry will still occur. Industries prefer to train their new employees through short courses within their facilities rather than collaborate with TVET institutions (Valiente, Zancajo, & Jacovkis, 2020). Additionally, this lack of alignment is contributed to by the misalignment between TVET providers and company needs (ElObeidy, 2016; Valiente, Zancajo, & Jacovkis, 2020; Vladimirovna & Nikolaevna, 2016; Yamada, Otchia, & Taniguchi, 2018), companies' lack of confidence in TVET graduate qualifications (Valiente, Zancajo, & Jacovkis, 2020), market failure in matching skills to employment opportunities (Cobo, 2013; Ngcwangu, 2015); the changing productive sector requirements (Cobo, 2013; Husain et al., 2020), and rapid technological advancement and globalisation (ElObeidy, 2016; Kaboski, 2009; Kranz, 2006; Remington, 2017). The location of businesses and their future needs must be considered when reorganising TVET programmes in order to improve education quality and lessen the chance of geographical mismatch (Suna et al., 2020).

## 2.2 Needs in TVET Supply and Demand

The relationship between TVET institutions and the other stakeholders is crucial for graduate employability. A mandatory planning process must be executed to ensure that the existing programmes offered align with the supply and demand to ensure TVET graduates meet the market needs (Alagaraja, Kotamraju, & Kim, 2014; Ngcwangu, 2015; Valiente, Zancajo, & Jacovkis, 2020). Various approaches can be employed in the planning process. For example, Kaufman (2019) explained that proactive managers utilise needs assessments to develop and implement diverse

practical solutions for individuals, workgroups, and organisations. Based on Figure 2, the conceptual framework utilises the gaps and needs concepts adapted from Kaufman's (2014) and Watkins, Meiers, and Visser's (2012) studies. Needs are defined as the gap between "what is" and "what should be" or the gap between current and desired results (Kaufman, 2018a; Watkins, Meiers, & Visser, 2012). Conversely, needs are categorised into two types: i) needs in "processes" or methods, and ii) needs in "input" or resources (Kaufman, 2014, 2019). In addition, this framework provides a practical and rational reason for the need for "what to change" as well as "what to continue" (Guerra - López, 2021).

Needs assessments are generally incorporated into planning duties across disciplines (Lee, 2019; Moseley & Heaney, 1994) and are utilised in strategic planning and decision-making. It is the formal process of identifying gaps between the current and desired results and highlighting priority areas. It is also determined based on the cost of satisfying each need versus ignoring it. The vital needs that need to be reduced or eliminated are then selected. In the education sector, the implementation of needs assessments has benefited the interdisciplinary education field as it encompasses a capital-intensive sector aspiring to provide equal returns to individuals, organisations, and the nation. Therefore, stakeholders' needs assessment must be accompanied by knowledge to sustain long-term profits in the TVET education sector.

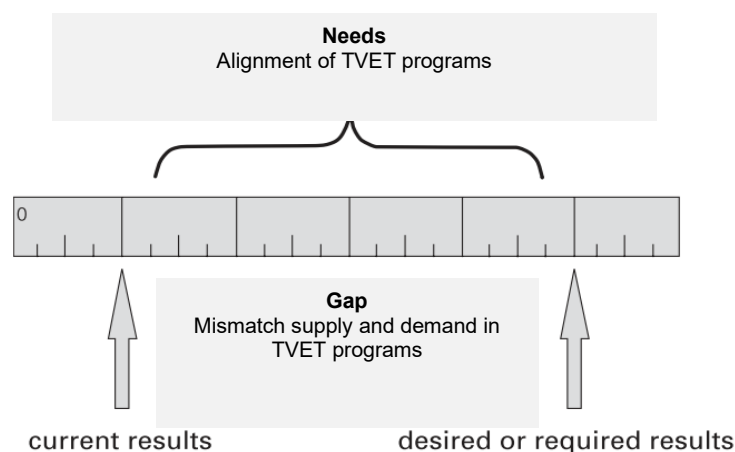


Fig. 2 - Conceptual framework (Source: Kaufman, 2018; Watkins, Meiers, & Visser, 2012)

### 3. Methodology

While this study attempts to understand the demand-supply mismatch in the programmes offered by Malaysian Polytechnic Technical Vocational Education and Training (TVET), semi-structured interviews were conducted with 19 respondents. These respondents include (i) seven top management officers from related departments, (ii) four officers in charge of student recruitment, (iii) two academicians, (iv) two polytechnic students, and (v) four industries. A purposive sampling technique was used to reach them. As explained by Merriam and Tisdell (2016), the selection of a semi-structured interview as the data collection method allows this study to elicit rich information from the respondents about this matter. A pre-test of the research tools was carried out to ascertain the appropriateness of the interview questions before the final data collection. All the interviews were audio-recorded and transcribed line by line. To address validity concerns, triangulation was employed by utilising purposive sampling from various related information. Similarly, the transcribed data was reconfirmed with the respondents to ensure credibility. Then, the qualitative data from the interview was analysed using a thematic analysis. Clark and Braun (2013) refer to thematic analysis as the process of identifying patterns and constructing themes to illustrate a thorough understanding of the subject. This study utilised the ATLAS.ti 9 software in managing the data.

### 4. Result and Discussion

This section contains two themes: i) The mismatch of supply and demand between TVET programmes and TVET stakeholders (What is it?) and ii) Needs in dealing with these mismatches (What should it be?). Figure 3 shows the reasons why there is a mismatch between the supply and demand of TVET programmes.

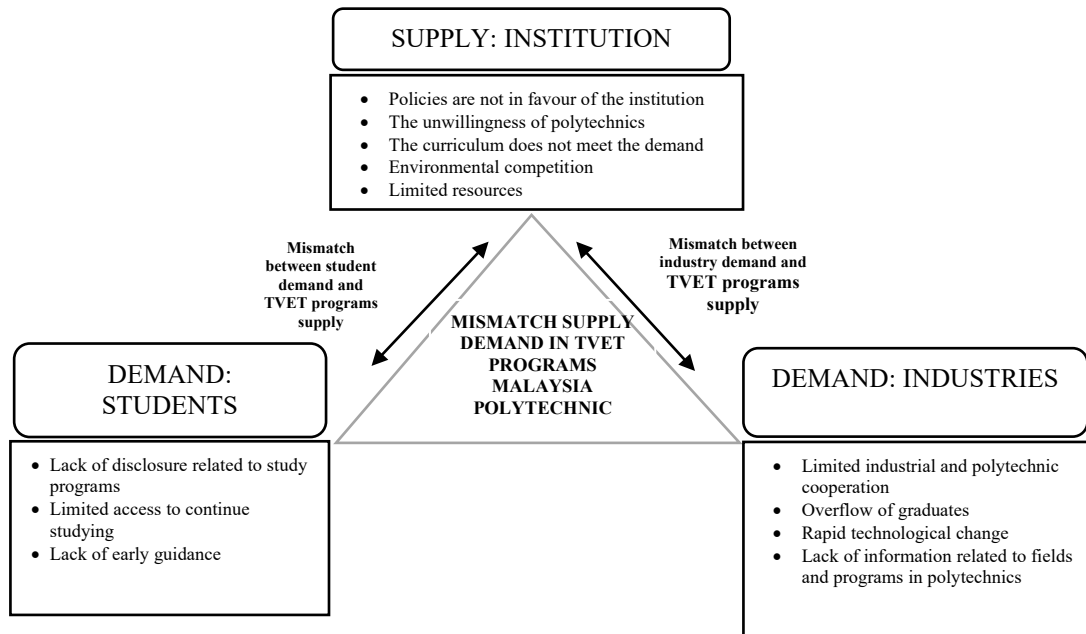


Fig. 3 - Demand-supply mismatch in TVET academic programmes

#### 4.1 Mismatch between Industry Demand and TVET Programme Supply

The TVET programmes offered at polytechnics must meet industry requirements. Thus, closer cooperation between the industry and higher learning institutions is crucial in addressing the mismatch of supply and demand between graduates and the industries. However, this study found that even though Malaysian employers are unlikely to hire TVET employees, they do have a wide selection of graduates from various higher learning institutions. In 2019, there are approximately 1,026 TVET institutions nationwide, including private TVET institutions and 20 public universities (ILMIA, 2019). In addition, there are 813 private TVET institutions registered with the Skills Development Department (JPK) and 12 state skills development centres offering programmes with various standards. The polytechnic respondent corroborated that:

*“They are unbothered about developing us because they can source future employees from various other institutions”- (RI\_Institution)*

Besides, this study also found that Malaysian government policies do not promote a close relationship between higher learning institutions and industry, unlike in other developed countries. This statement is acknowledged by the polytechnic and industry respondents. They stated that:

*“There are differences compared to developed countries. For example, Malaysia utilises the model from Germany but does not internalise the greeting methods.” - (RI\_Institution)*

*“So, the industry... should collaborate with us to help the youth and the community. The industry should be patriotic enough to prefer Malaysians.”- (RI\_Institution)*

In the meantime, higher learning institutions have implemented multiple collaboration models to strengthen the existing network between the TVET industry and other educational institutions. For example, Polytechnic Malaysia utilised an integrated intervention collaborative model, designed to expand the collaboration with the industry. This model includes the implementation of work-based learning (WBL) and the Industry on Campus (IOC) programmes to produce a highly skilled workforce (Ali & Mahmud, 2017). As a result, a few scholars (to name a few: Ali et al., 2016; Othman et al., 2018; Rani et al., 2019; Rodzalan, 2018) opined that this strategic partnership is the culmination of government recommendations to the government. According to them, this is to produce highly demanded and industry-driven programmes to ensure the availability of highly skilled and knowledgeable graduates with excellent social skills.

Nonetheless, after almost a decade, the programme has experienced several difficulties. The bilateral relations between industry and educational institutions caused the varied implementation of the WBL, and any impediment issues that existed in the WBL programme impacted the implementation and execution, thus hindering the objectives. One polytechnic respondent complained that:

*“This is why WBL cannot be. WBL can only be sustained for one or two semesters when he enters the second year, the third year, he has a difficult time.” - (R2\_ Institution)*

Based on the complaint, some industry stakeholders find it difficult to cooperate with the institutions as they do not understand the objectives of working with the institutions. The respondents explained that:

*“Half of them that do not care as long as they make money... they are not interested in contributing...and more interested in finding clients” - (R1\_ Industry)*

*“I would say this is the biggest issue in Malaysia because the industries do not want to be more proactive when working with us.” - (R1\_ Institution)*

*“The industry is always demanding, waiting until our students graduate to interview them. When they find the graduates are not up to the standard, they complain, complain, and complain.” - (R2\_ Institution)*

*“That is right what you said... I've been through a lot of fun, I must be called, and other people will not go.” - (R2\_ industry)*

The industry also stated that the polytechnic is less active in promoting the industry. On the other hand, some industries also have limited knowledge of polytechnics. Thus, one of the respondents suggested the polytechnic be more aggressive in establishing and strengthening relationships with industry. He mentioned that:

*“Only now I see a loophole, the industry doesn't know that the polytechnic has a field, therefore... when the students come for industrial training in factories... oohh this polytechnic offers this field...” - (R3\_ industry)*

Besides, industry stakeholders also offered their total commitment to strengthening the relationship with TVET institutions. However, this approach is a failure due to some constraints, such as time and location. One respondent explained that:

*“We look forward to the industry partners from Kuala Lumpur, who are from large organisations, as the programme is in dire need of constant industry involvement. However, it is difficult for industries to visit often.” - (R2\_ Institution)*

The relationship status will be the determining factor for the success or failure of the academic programmes. Moreover, if TVET institutions were left independently without trying to find solutions through an in-depth study, this would put the stakeholders, especially the graduates, at a disadvantage.

## **4.2 Mismatch between Student Demand and TVET Programme Supply**

The Ministry of Higher Education Malaysia (MOHE) aims to increase higher education enrolment by providing equal access to higher education. Therefore, through strategic planning, the Ministry has intensified efforts to ensure that the polytechnic TVET programme meets the demand and has a great relationship with the industry. This is because the TVET programmes' relevance will encourage students and parents to choose polytechnics as their first choice. Polytechnic management must ensure that students enrol in polytechnics to pursue TVET higher education to meet industry demands. This is corroborated by the response below:

*“He is related, feeder with that...no matter what programme we choose, it is beneficial for the country, but not necessarily people will study near there” - (R3\_ Institution)*

In the meantime, polytechnic courses aim to balance the programmes that best suit students' unique talents and build talent in national priority areas. Nevertheless, current trends indicate that students prefer enrolling in non-engineering TVET programmes. One of the respondents commented that:

*“Plant programme (Diploma in plantation), Diploma in Mechanical Engineering. There are limited students but high industry demand...high graduate salaries. Where is the harm? Not finished...” - (R3\_ Institution)*

Other than that, the Institute of Labour Market Information and Analysis, through the Critical Occupations List 2018/2019, reported that the labour market needs are focused on engineering fields compared to non-engineering fields, except for the less skilled labour market. This raises serious concerns as polytechnic graduates do not meet the field demands and obtain occupations that are irrelevant to their qualifications. Based on the findings reported by ILMIA (2018), 31% of TVET graduates work, study, or own a business outside their study field. Meanwhile, the Department of Polytechnic Education in 2017 also reported that 15% of polytechnic graduates work, and 23.5% study outside their study field. In addition, the Department of Polytechnic postulated that there are fewer than 10 popular polytechnic programmes offered from 2015 to 2019, such as the Diploma in Mechanical Engineering (Packaging), the Diploma in Mechanical Engineering (Materials), the Diploma in Mechanical Engineering (Plastic), the Diploma in Engineering Electronics (Optoelectronics), and the Diploma in Mechanical Engineering (Plant). Conversely, ILMIA (2018) also argued that these programmes are contradictory to the country's needs. According to ILMIA, the country highlighted five key TVET areas by 2030, namely agriculture (1,945,000 jobs), manufacturing (1,334,000 jobs), mining (40,000 jobs), construction (655,000), and services (4,009,000 jobs, including engineering and non-engineering). However, most of the listed jobs involve engineering as opposed to non-engineering. The difficulties faced by students in choosing technical fields are corroborated by the response below.

*“The current trend of students towards TVET is declining.” - (R4\_ Institution)*

In the meantime, the students cannot also apply for engineering programmes as they did not pass the admission requirements established, particularly in mathematics and science subjects. Besides, there are numerous study opportunities present in higher learning institutions and students lack proper guidance to choose appropriate study programmes. Therefore, family and friends are their primary references when selecting a study programme. This was acknowledged by a student below:

*“If the career path is unclear, then we will be hesitant to choose that field... it does not matter if it is TVET or another course.” - (R4\_ Institution)*

Following this issue, all information related to the field study must be communicated systematically to ensure that it continuously reaches the students. The delivery methods, target groups, and collaboration must be strategically planned to follow the current evolving student interests. Polytechnics also need to ensure the student capacity and the programmes provided can attract students to sustain their studies at the polytechnic. Nevertheless, the Department of Polytechnic Education and Community Colleges (2018) also reported that the enrolment statistics of Malaysian polytechnic students in 2018 indicate approximately 22,130 vacancies. According to ILMIA (2018), Ministry of Education Malaysia (2015) and Rafiq (2019), this situation happened due to the students' perception of TVET programmes as a second choice and their perception of them as less attractive than conventional university education. Consequently, the number of TVET students remains low, and thus, drastic measures need to be taken to attract students to recognise the TVET programmes offered. This explanation was based on the respondents' comments as below:

*“Just in terms of enrolment, that is what he was ... he was not interested.” - (R3\_ Institution)*

*“We know our enrolment is declining. We do not know their interest.” - (R5\_ Institution)*

Moving forward, the cooperation between TVET institutions and schools should also be strengthened. The intervention and support from various ministries and top-level management are essential for the TVET programme's success. Top-level management should also refrain from blaming each other and unite behind common goals. While the current generation has rapidly evolved according to technological development, unlike the older generations, these changes have impacted attitudes, knowledge, and skills. Nowadays, they prefer entertainment, and this attitude must be addressed to meet the national supply and demand needs. Therefore, the government must employ efficient planning strategies to ensure that the TVET study programmes provide equal access and opportunities for students to pursue higher education.

### **4.3 Mismatch between Institution Readiness and TVET Programmes Supply**

Previously, Cheong et al. (2016) explained that multiple public agencies in the Malaysian TVET education system have affected the overall programme and delivery effectiveness due to limited interagency coordination. Besides, the declared policies have also been found to be implemented incompetently and have merely focused on utilising the allocations granted. Other than that, non-government stakeholders also have a limited ability to actively participate in developing TVET programmes for the labour market. As a result, the public-private partnerships were conducted on an ad hoc basis, with little or no consultation with other stakeholders, such as workers who are potential beneficiaries. Not only that, but the public perceives TVET programmes as a refuge for students with poor SPM qualifications who are



not eligible for universities, and indeed, the TVET system is populated by poorly performing students. One of the respondents stated that:

*“In many TVET institutions, students can drop anytime they want....” - (R2 \_ Institution)*

Next, hasty action without groundwork, data, and comprehensive studies involving the programme demand can significantly impact students’ careers and the economic development of the country. Therefore, TVET institutions must provide students with high-quality infrastructure, curriculum, and human capital development while enduring significant financial implications. An acute understanding of the outcome and return on investment (ROI) must be established. Improvements to planning should be made and one of the respondents' complaints is that:

*“You have it backwards. What does that mean? You do not study demand.” - (R6 \_ Institution)*

Previously, a few scholars (to name a few: Ali & Mahmud, 2017; Bakar, Islam, & Lee, 2015; Ghani, Rappa, & Gunardi, 2018; Hanapi & Nordin, 2014) highlighted that higher learning institutions have an enormous responsibility to ensure that the curriculum components offered align with the workplace requirements. Nonetheless, previous studies also postulate that even with robust cooperation between TVET institutions and the industry, the curriculum developed fails to generate qualified and skilful graduates that fulfil industry and labour market needs (Ali & Mahmud, 2017; Hanapi & Nordin, 2014). In addition, the programmes offered must undergo quality assurances that are approved by several polytechnic boards. Only TVET institutions equipped with quality equipment, space, infrastructure, lecturers, and documentation must be approved.

Based on the student enrolment in 36 polytechnics, the Department of Polytechnic Education and Community Colleges (2018) reported that students tend to prefer polytechnics located in urban areas compared to rural areas, such as Betong, Mukah, and Muadzam. Based on the Malaysian Polytechnic supply and demand research corridor report, the student application data indicates that the Diploma in Mechanical Engineering programme in the Northern Corridor is highly favoured among students at the Seberang Perai Polytechnic (PSP). Alternatively, the same corridor received a 44% less response at the Ungku Omar Polytechnic (PUO), Tuanku Sultanah Bahiyah Polytechnic (PTSB), Sultan Azlan Shah Polytechnic (PSAS) and Sultan Abdul Halim Mu'adzam Shah Polytechnic (POLIMAS) polytechnics (Department of Polytechnic Education and Community Colleges, 2018). Meanwhile, the Department of Polytechnic Education and Community Colleges (2018) also reported in the Eastern Corridor that the Sultan Haji Ahmad Shah Polytechnic (POLISAS) is the polytechnic of choice for SPM graduates compared to the Sultan Mizan Zainal Abidin Polytechnic (PSMZA), which received 44% fewer applications. This popularity difference is partly due to the geographical location of the institution (IMLIA, 2018). Therefore, the programmes offered must consider location and proximity to the industries and other TVET competitors. One respondent narrates this:

*“Animation courses are in Teluk Intan right...while the players are all in the Klang Valley. Did you notice? I do not know this thing, so it is an issue again. Film making is made in Politeknik Tuanku Syed Sirajuddin (PTSS) campus in Arau, Perlis.” - (R6 \_ Institution)*

A well-developed syllabus and curriculum will not guarantee stability in producing quality graduates if the resources used are unqualified. Hanapi and Nordin (2014) argued that the quality of education depends on the teaching and learning quality, educational facilities and infrastructure, a well-planned curriculum, and effective curriculum implementation. Conversely, polytechnics need to proactively address the supply and demand mismatch in TVET programmes by identifying weaknesses and rebranding.

#### **4.4 Needs in Offering TVET Academic Programmes**

The academic programmes offered in higher education institutions must align with the supply and demand requirements. Additionally, it is imperative to continuously perform planning needs assessments throughout different periods and ensure the design of TVET programmes aligns with changes in the sector. This explanation is based on the comment from one respondent who mentioned that:

*“Don't we have something that can be aligned? Don't we have an actually absolute programme? We have to get rid of it and level up the existing programmes so that he is back in line, won't we?” - (R1 \_ Institution)*

All stakeholders in supply (the institution, department, and ministry) and demand (students and industries) must cooperate to overcome the issues faced. Moreover, periodical planning processes must be applied based on modern and scientific principles. Every planning step needs to involve all stakeholders’ input and not just particular individuals only. This was corroborated by the respondent below:

*“The plague we see... we cannot be biased towards an industry... but the decision needs to be comprehensive. In terms of other stakeholders, there are needs to be met.” - (R3\_ Institution)*

Earlier, Lee (2019) explained that researchers have recognised needs assessment as a front-end step in planning an intervention design. Thematic analyses conducted by Stefaniak and Sentz (2020) also suggest that sufficient data from clients and other project stakeholders must be incorporated when identifying internal and external project needs. Furthermore, a surge in demand across needs assessments indicates that data gathering, and analysis processes carried out during preliminary studies could address clients’ needs (Stefaniak et al., 2018). Below is a comment from the industry respondent:

*“The only thing I observe is when a new field is to be implemented, created, or established. There needs to be thorough analysis.” - (R3\_ Industry)*

Despite the availability of various journal articles concerning needs assessments, the implementation methods remain unknown. Limited studies have examined the needs assessment implementation in technical and vocational higher education due to the lack of resources, including budgets, time, expertise, and knowledge (Lee, 2019; Stefaniak et al., 2018). Besides, Adam, Baaki and Stefaniak (2021) and Carliner et al. (2015) also found that the time, budgets, and resource constraints challenge the needs assessment implementation. Consequently, accurate data measured through reliable instruments is a key predictor in ensuring accuracy.

The lack of innovative approaches to simplify the needs assessment processes contributes to the lack of adoption among stakeholders (Stefaniak et al., 2018). Moreover, future research emphasising the executive roles of managers and administrators should consider higher education and the broader education field. The needs assessment strategies that provide preliminary information must be implemented. Furthermore, Comito, Haub, and Licht (2018) and Lee’s (2019) studies argued that needs assessments are similar to the Rapid Needs Assessment Model, which encourages widespread adoption of needs assessments. Therefore, future needs assessments that encompass a holistic education view can improve the socioeconomic wellbeing of graduates. A government officer corroborated this.

*“We find out that not only the pathway is not clear, but some of our programmes in polytechnics are already outdated.” - (R1\_ Institution)*

## 5. Conclusion

Various studies have been conducted to evaluate and enhance the programmes to overcome unemployment in Malaysia. Unfortunately, the unemployment rate is still increasing. Therefore, relevant stakeholders, such as institutions, departments, and ministries, must cooperate to overcome these issues. It would be prudent to learn from successful programmes implemented in other countries.

In Polytechnic Malaysia, the TVET programme requirements need to be aligned with other TVET higher education programmes. Further assessment is necessary when planning the TVET academic programmes to ensure the programme offered meets the requirements. Moreover, the TVET programme needs assessment should not only focus on training needs, instructional, and curriculum development but should also consider the stakeholder needs (the students, TVET institutions, and industries). The direction of the TVET programme must be outlined clearly to ensure smooth management. All collaborative programmes with the industry, such as work-based learning, need to be revamped to allow feedback and additional industry engagement to improve the syllabus and curriculum content that meet the industry’s needs. Additionally, management is expected to provide the required facilities and research equipment, especially in the information technology and communications fields. Alternatively, authorities must motivate employees, managers, and experts to progressively learn strategic management and ensure they are up-to-date with current knowledge relevant to their field. This review recommends that future studies utilise a suitable framework of alignment to study polytechnic TVET academic programmes, including all stakeholders' needs, to ensure that TVET programmes are always relevant.

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