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# An Integrated Approach in Empowering Technical and Vocational Education and Training (TVET) for Malaysian Asnaf in the IR4.0 Era

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### ABSTRACT

This paper considers the inclusion of TVET and skills in the Industrial Revolution 4.0 and analyses the integrated approach likely to impact TVET and skill systems. It argues that despite SDG implementation and monitoring challenges, the new emphasis on TVET, skills and lifelong learning will reinforce efforts of international, bilateral, and multilateral organizations. It concludes that the SDG targets relevant to TVET and skills development reflect existing priorities and normative principles adopted by development actors and mirrors the recent resurgence of interest in TVET and skills development more widely. In considering the various key drivers likely to influence the development of labour markets and TVET systems from now until 2030, the paper concludes that, while many of the emerging issues may have not been explicitly considered during the formulation of the SDGs, they too will have a potentially positive effect on SDG implementation.

## 1. Introduction

There is a new awareness among education policymakers in Malaysia about the critical role that TVET can play in national development. The increasing importance that the Malaysian government now attaches to TVET is reflected in the Fourth Industrial Revolution (IR4.0) which has been launched in 2021. The Malaysian Government launched the National 4th Industrial Revolution (IR4.0) Policy to enhance Malaysia's capabilities, thereby driving sustainable and competitive economic growth.

The National IR4.0 Policy was formulated using a humanitarian-oriented approach so that the people take advantage of technology, in addition to maintaining human, social, and cultural heritage values in line with the goals of the Shared Prosperity Vision (WKB) 2030. The IR4.0 policy contains four main thrusts that target three groups, namely society, business, and government to equip the people with knowledge and skill sets. The IR4.0 policy, forming a connected country through the

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development of digital infrastructure, provides regulations following future needs to be flexible to technological changes, as well as accelerate innovation and adoption of IR4.0 technology.

In facing this, the Ministry of Higher Education has laid out a foundation to ensure that public higher education institutions (IPT) in Malaysia continue to produce a well-developed workforce in line with IR4.0 [1]. Hence, national education policymakers similarly move forward with strategies that include IR4.0 as one of the agendas, as well as prepare a curriculum that respects the policy to advance in line with national requirements.

Initiative 7 in Strategies and initiatives of Policy Thrust 1 (IR4.0) states that to enhance IR4.0-related courses in higher education institutions (HEIs) and technical and vocational education and training (TVET) institutions through better program design and delivery. This is in line with the current demand in the Malaysian job market that emphasizes a skilled workforce rather than academic aspects in line with IR4.0 [2]. Through this initiative, a strategy is drawn up that will involve all stakeholders in facing future challenges, in line with the IR4.0 core that crosses the digital, physical, and biological domains toward achieving the status of a high-tech developed nation. The Malaysian Government acknowledges that enhancing its human capital base is essential for achieving its goals of becoming an advanced economy and an inclusive nation. With the increasing pace of global economic integration, the demand for a highly skilled workforce is becoming more significant. In 2017, high-skilled workers comprised only 27.5% of Malaysia's workforce, while semi-skilled and low-skilled workers accounted for 59.7% and 12.8%, respectively [30].

However, all the initiatives and programs are available. Yet, ASNAF people are not aligned with the mainstream. Not many studies have done issues pertaining to employability through the TVET program on Asnaf in Malaysia. Although the findings of previous studies talk about TVET for various groups, it is very difficult to find studies related to Asnaf in Malaysia. It is common knowledge that this group lacks profiling, which makes it difficult to research this group. Table 1 suggested that previous studies focus on Latin America, Australia, Russia, Nepal, Botswana and Namibia, Thailand, and Cambodia [3-9]. Although these groups are not many, they are significant in society and special attention should be given to them. This study will go beyond the government's policy in empowering the Asnaf group through a complementing approach with TVET skills.

**Table 1**  
 List of Previous Studies on TVET

Author	Title	Area
Tripney and Hombrados [3]	Technical and vocational education and training (TVET) for young people in low-and middle-income countries: a systematic review and meta-analysis	Latin America
Lamb [4]	TVET and the poor: Challenges and possibilities	Australia
Maltseva and Shabalin [5]	The non-bypass trajectory, or the boom in demand for TVET in Russia	Russia
Dahal [6]	Unequal access to TVET programmes in Nepal: Impact of neo-liberalism	Nepal
Galguera [7]	Globalization, Mass Education and Technical and Vocational Education and Training	Botswana and Namibia
Plubplueng and Patmasiriwat [8]	Vocational education choice and fiscal incentive for low-income families	Thailand
Chea [9]	Does higher education expansion in Cambodia make access to education more equal?	Cambodia
Weiwei [10]	Concepts and Practice Used in Vocational Education for International Development during COVID-19 in China	China
Joo [11]	The Excellence of Technical Vocational Education and Training (TVET) Institutions in Korea: Yeungjin College Case Study	Korea

Based on the above prior studies, it clearly shows that no existing study to the best of the researcher's knowledge has ever studies specifically addressed the study on how to empower the TVET for a marginalised group of people (asnaf) in Malaysia. Consequently, this also motivates the study. Furthermore, in the context of TVET education, there is no emphasizing the role of relevant agencies in strengthening the TVET for asnaf in Malaysia. Failure to strengthen the TVET programs in Malaysia may cause Malaysia not to have a sufficient labour force in the industry. It is due to TVET graduates in Malaysia are expected to increase to 7.98 million by the year 2030. However, it was only 6.6 million in 2015 and is expected to increase to almost 8 million in about 30 years. The TVET graduates might go as high as 96% while the figures for public and private universities in Malaysia stand at about 80% and 72% respectively. Consequently, the TVET labour supply and demands are imbalanced leading to Malaysia does not have enough TVET graduates for the industries [12].

This situation will become worst if the TVET institutions facing with limited funding in terms of materials and facilities. The TVET curricular requirement of 70% hands-on practical training and 30% of theory [13]. It is important to ensure a need for a skilled workforce to be competent and competitive in the labour market and expected that to serve the graduates with both technical and vocational skills as well as employability skills that play a pertinent role in the preparation for employment and career development [14]. Given the above, to ensure reliable skills in TVET programs, various strategies need to be integrated into the program mainly focusing on practical oriented are taught to the students via pragmatic teaching techniques i.e., demonstration, problem-solving, lecture, discussion, field trips, role play and internship programs [15]. Having those teaching strategies brings them into their own life experiences and encourages them to actively participate in the teaching and learning process. Not limited to that, an effective TVET framework should be developed properly to achieve predetermined expectations by the government in Malaysia. Some of the elements that can be integrated into strengthening the TVET framework by looking at the strategic policy framework, fostering collaboration between various parties such as industries, government, and academia, developing an effective ecosystem and so forth.

Moreover, as emphasized by Abd Khafildz and Subri [16], expanding the distribution of zakat aid for education is an important matter in upholding the Islamic religion because when more and more Muslims are left behind in a field of study, the implication is that the expertise of Muslims in some fields such as doctorate and engineering is decreasing. This expansion program will also be improved from time to time involving several other critical areas such as TVET, entrepreneurship, and digital technology. In addition, allocations for educational development programs were also created to give injections to selected ASNAF groups in programs that are particularly beneficial to their learning outside of lectures so that they are not only focused on teaching in the lecture room. Besides that, the extensive awareness and promotion related to the TVET programs in Malaysia should be well addressed since many inaccurate perceptions from parents or even graduates think that a TVET qualification is a second-class career and workforce rather than a career and workforce working in the white-collar sector. Because of the above discrepancies, this study tends to further depict the continuing relevance of TVET, especially in a developing country such as Malaysia that specifically focuses on the group of marginalised groups of people i.e Asnaf. Therefore, the main objective of this study is to integrate relevant approaches in empowering TVET for Malaysia Asnaf in the era of IR 4.0. It is because the impact of global change and rapid technological advancement had created a need for a skilled labour force to be competent and ready to fulfil the demand from the industries [17]. Consistent with the Knowledge-based economy theory (K-economy) whereby knowledge is an addition to the labour, land, entrepreneur, and physical capital is one of the production key factors to facilitate economic development with the latest technologies and innovations created through the application of knowledge that has been embedded in the TVET Program.

The study is structured into several sections. First, this study investigates past reviews related to the linkages of TVET and IR 4.0, the latest TVET status in the context of Malaysia scenarios, and TVET areas such as in the wide range of several fields and industries, including engineering, manufacturing, construction, agriculture, and services. Then, followed by TVET key strategic issues and TVET program for Asnaf Employability. Second, the study proceeds to the discussion of key policy issues, policy recommendations, strategy implementation and national policy towards IR 4.0. The third section of the study, focuses on the findings of the strategic policy framework, developing a skilled and competent workforce, enhancing the adoption of IR4.0 technologies and practices, fostering collaboration between industry, government, and academia, building an enabling ecosystem, and promoting entrepreneurship and innovation to empowering the TVET in Malaysia mainly for the Asnaf. Finally, is the conclusion.

## **2. Literature Review**

Studies have shown that the development of a skilled and competent workforce is essential for the successful implementation of IR4.0 technologies and practices [18]. TVET institutions play a critical role in developing the necessary skills and competencies in workers to operate and maintain IR4.0 technologies and practices [19]. Furthermore, research has shown that the adoption of IR4.0 technologies and practices is dependent on the availability of a skilled and competent workforce [20]. As a result, TVET institutions are playing an increasingly important role in providing training and upskilling opportunities for workers to develop the necessary skills and competencies to operate and maintain IR4.0 technologies and practices [19].

The integration of IR4.0 technologies and practices into the operations of companies requires the support of the government and other stakeholders to build an enabling ecosystem [18]. TVET institutions can play a critical role in this process by providing training and upskilling opportunities for workers and promoting collaboration and partnerships between industry, government, and academia [19]. The past literature review of TVET and IR4.0 highlights the importance of TVET in driving the development and adoption of IR4.0 technologies and practices. The development of a skilled and competent workforce, the support of government and other stakeholders to build an enabling ecosystem, and the promotion of collaboration and partnerships between industry, government, and academia are critical components of the successful implementation of IR4.0 technologies and practices.

### *2.1 Current Status of TVET in Malaysia*

TVET stands for Technical and Vocational Education and Training. According to UNESCO's definition, technical and vocational education is used as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life.

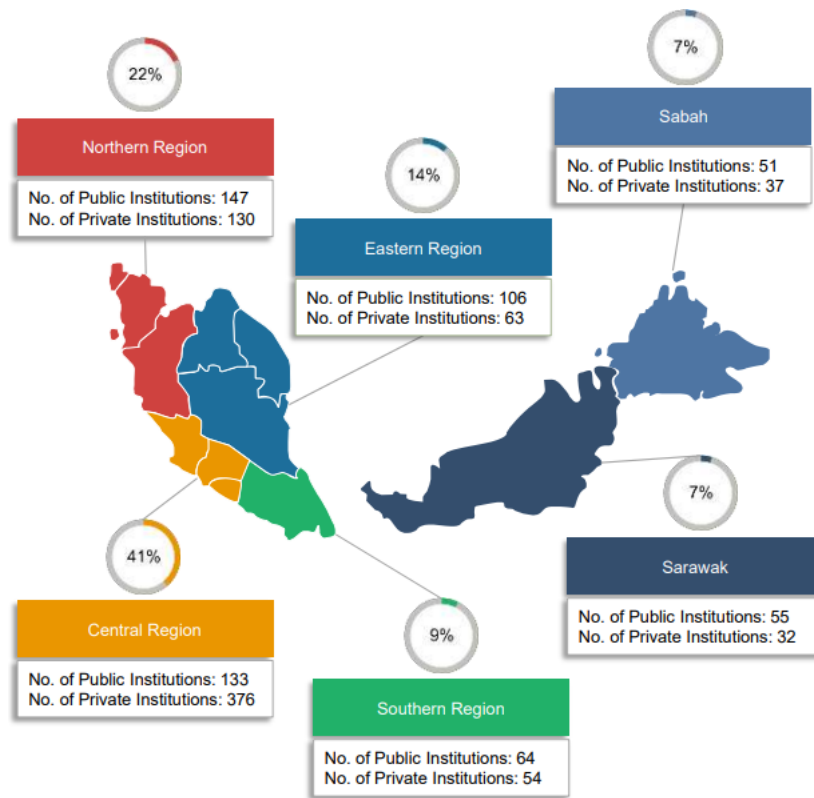
TVET is not something new in Malaysia. Only that TVET is often misunderstood as a second option and is only eligible for individuals who are less outstanding in terms of academic achievement. The stigma has become obsolete because now TVET graduates are getting more and more attention from employers. TVET in Malaysia was given a new lease of life on 27 Sept 2017 with the launch (and branding) of TVET Malaysia by the former Prime Minister, YAB Dato's Sri Mohd Najib b Abdul Razak to change the parents' negative perception of TVET skills. This stigma is common given that many of us have been placing more emphasis on academics all this while.

In Malaysia TVET has been a focus of the government for many years, intending to create a skilled workforce that can contribute to the country's economic development. According to the Ministry of Education Malaysia (MOE), TVET is seen as a vital component of the education system, with the government investing heavily in the development of TVET institutions and programs. This could refer to Figure 1 on regional distribution of TVET Institutions in Malaysia. The scope of TVET should be based on Occupational Standards such as the National Occupational Skills Standards (NOSS), with an emphasis on practical components, psychomotor skills, and exposure to training in the industry. In 2020, the MOE allocated RM 5.5 billion (approximately 1.3 billion USD) for the development of TVET institutions and programs. The MOE also states that TVET programs in Malaysia are designed to be industry-relevant, with a focus on providing practical skills and knowledge to students. This is achieved through close collaboration between TVET institutions and industry partners, to ensure that graduates are well-prepared for the workforce.

According to a report by the World Bank, TVET in Malaysia has seen significant progress in recent years, with enrolment in TVET programs increasing from 22% in 2010 to 31% in 2017. The report also states that TVET graduates in Malaysia have a higher employment rate compared to those with only primary or secondary education. However, there are also challenges facing TVET in Malaysia. A study by the Technical and Vocational Education and Training Council (TVETC) found that there is a perception among employers and the public that TVET graduates are less skilled and less employable than graduates from academic programs. The study also found that there is a lack of awareness among students and parents about the opportunities available in the TVET sector.

The Asia-Pacific Conference on Education and Training (ACET) was held in Kuala Lumpur, Malaysia, from August 3 to August 5, 2015. The conference, which was hosted by UNESCO and the Ministries of Education and Higher Education on behalf of the Government of Malaysia, sparked policy discussion and debate on a variety of issues, including the use of ICT in TVET, partnerships, and greening TVET. The acceptance of the Kuala Lumpur Declaration on Quality Education and Skills Development for a Sustainable Future was one of the conference's major results. The Declaration outlines a transformational vision of TVET in the area and emphasises TVET's ability to contribute to the achievement of the SDGs. Member States urged the UNEVOC Network to promote and operate as an active platform for peer learning, knowledge generation and dissemination, and exchange of experience and promising practises. making TVET a priority on national agendas and transforming TVET to maximise its potential to stimulate innovation and support vibrant societies.

TVET in Malaysia is seen as a vital component of the education system, with the government investing heavily in the development of TVET institutions and programs. There has been significant progress in recent years, with enrolment in TVET programs increasing and TVET graduates having a higher employment rate compared to those with only primary or secondary education. However, there are also challenges facing TVET in Malaysia, such as a perception among employers and the public that TVET graduates are less skilled and less employable than graduates from academic programs, and a lack of awareness among students and parents about the opportunities available in the TVET sector.



**Fig. 1.** Regional distribution of TVET Institutions in Malaysia [21]

Malaysia recognizes the importance of Technical and Vocational Education and Training (TVET) in developing a skilled and competent workforce to drive the country's economic growth and competitiveness. The Malaysian government has implemented various policies and initiatives to support the development and growth of TVET in the country. One of the key initiatives is the National TVET Policy, which was launched in 2016 to provide a comprehensive framework for the development and growth of TVET in Malaysia. The policy aims to provide access to quality TVET education and training for all Malaysians, to develop a highly skilled and competent workforce, and to align TVET with the needs of the economy and industry.

The government has also implemented several programs to promote the uptake of TVET education, including the 1Malaysia Skills Training Program and the Malaysia Technical Vocational Education and Training (TVET) Council. These programs aim to provide training and upskilling opportunities for workers to develop the necessary skills and competencies to operate and maintain Industry 4.0 technologies and practices. In conclusion, Malaysia recognizes the importance of TVET in driving the country's economic growth and competitiveness and has implemented various policies and initiatives to support the development and growth of TVET in the country.

## 2.2 TVET Areas

TVET in Malaysia encompasses a wide range of fields and industries, including engineering, manufacturing, construction, agriculture, and services. According to the Ministry of Education Malaysia (MOE), the government has been working to develop TVET programs in these areas to meet the needs of the workforce and support the country's economic development. STEM education in Malaysia focuses more on developing students' theoretical knowledge and technical skills in science, technology, engineering, and mathematics, whereas Technical and Vocational Education and Training

(TVET) is more practical-oriented, providing hands-on training and industry-specific skills for various trades and occupations [35,36].

TVET can be classified into four main types according to its location in the education and employment system. First, is secondary school vocational education, the second is post-secondary technical and vocational education, the third is short courses training programs as part of active labour market policies targeting youth and the unemployed and lastly is employer-sponsored training or on-the-job training [22,38]. In the engineering field, the MOE states that there are programs available in areas such as electrical, mechanical, and mechatronics engineering. These programs are designed to provide students with the skills and knowledge needed for careers in fields such as manufacturing, construction, and maintenance. While in the manufacturing field, TVET programs are available in areas such as welding, machining, and automation. These programs are aimed at providing students with the skills needed for careers in the manufacturing sector, which is a key contributor to the country's economy.

Whereas in the construction field, TVET programs are available in areas such as building construction, civil engineering, and architecture. These programs are designed to provide students with the skills and knowledge needed for careers in the construction industry, which plays a vital role in the country's economic development. While in the agriculture field, TVET programs are available in areas such as animal husbandry, plant science, and agribusiness. These programs are aimed at providing students with the skills and knowledge needed for careers in the agricultural sector, which is an important contributor to the country's economy.

In the services field, TVET programs are available in areas such as tourism, hospitality, and beauty therapy. These programs are designed to provide students with the skills and knowledge needed for careers in the services sector, which is a key contributor to the country's economy. However, in a world that is always dynamic, there will soon be some new specialities that will appear and the need for TVET in the new field will always be there. It will appear in parallel with human civilization and the development of thinking in line with the needs of skilled technical personnel at that time.

### *2.3 Key Strategic Issue*

One key strategic issue facing TVET in Malaysia is the perception that TVET graduates are less skilled and less employable than graduates from academic programs. This perception can create barriers for TVET graduates in finding employment and can discourage students and parents from pursuing TVET education. According to a study by the Technical and Vocational Education and Training Council (TVETC), employers and the public often view TVET education as less valuable than academic education and view TVET graduates as less skilled and less employable than graduates from academic programs. Figure 2 below illustrates about the Malaysian Qualification Framework that has been practiced in the educational system in Malaysia for a long time.

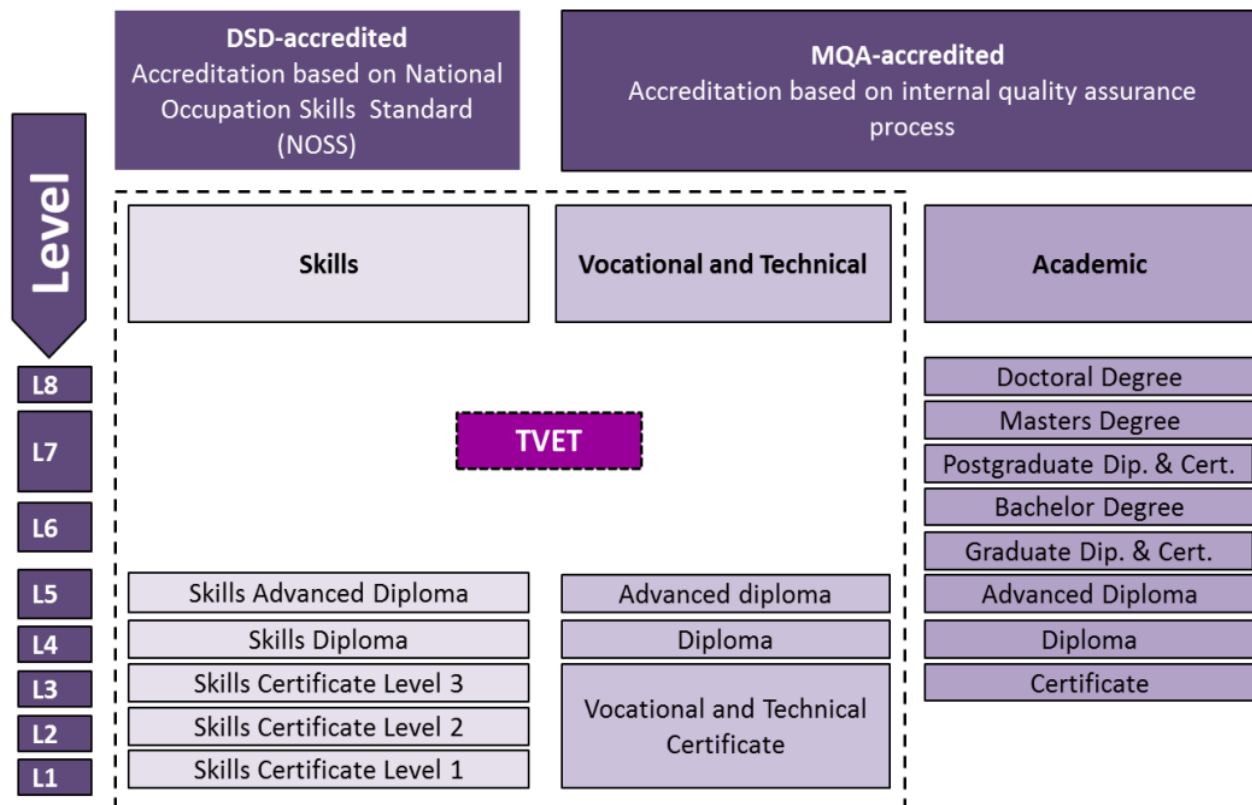


Fig. 2. Malaysian qualification framework [23]

Another key strategic issue is the lack of awareness among students and parents about the opportunities available in the TVET sector. This can result in students and parents overlooking the benefits of TVET education, and instead focusing on traditional academic programs. This lack of awareness can also lead to a lack of interest in pursuing TVET programs, which can result in a shortage of skilled workers in certain fields and industries.

To address these strategic issues, the government and TVET institutions need to take steps to promote the value and benefits of TVET education, and to improve the perception of TVET graduates among employers and the public. This can be done through increased collaboration between TVET institutions and industry partners, as well as through targeted campaigns to raise awareness about the opportunities available in the TVET sector. Additionally, the government and TVET institutions need to work to ensure that TVET programs are industry-relevant and meet the needs of the workforce, to increase the employability of TVET graduates.

#### 2.4 TVET Program for Asnaf Employability

Low-income households in this study are referred to as Asnaf, who are the children of needy and poor households. The families are more deprived during the childbearing stage and unemployment of the parents. The children are more vulnerable to poverty during their adolescence, as they need more aid during the social placement period (adolescent stage). The poor economic condition has caused some families to encounter economic hardship. Thus, the economic status of a family is affected by the labour forces of life cycle changes which can improve the economic status of the family. The government agency in Malaysia, namely, Islamic Religious Council States has initiated several programmes for educational support and ongoing assistance that can improve the national economy.



Recent policy has included TVET to focus on entrepreneurship to cultivate and breed more students' entrepreneurs and graduate's entrepreneurs. Nevertheless, this program is not well enough to equip and support students to fit into paid employment careers as competent-skilled workers and job creators. As concluded in DKN (2019), Shariff *et al.*, [24] and Rofa and Ngah [25] stated that all education sectors had been merged with entrepreneurial education, including Technical and Vocational Education and Training (TVET). It is a program that the Ministry of Education originated to provide employment options for technically skilled students. This is in line with the Government's aim towards high-income nations that capitalize on the high technology that fulfils the recent demand supply imparity in numerous industries with the employment of approximately 3.3 million competent workforces [26,37]. The education system of TVET is essential in crafting entrepreneurial potential via entrepreneurial traits. The entrepreneurial traits would complement the required competent human resources, modern tools and equipment that would meet the student's entrepreneurial needs, materials, stimulating workshop environment, and adequate financing [27-29].

Rani *et al.*, [30] suggested that the government needs to play a role by setting specific targets in the asnaf program. Similarly, from the aspect of the asnaf program budget, specific allocations are provided and do not only depend on applications and requests from the asnaf group only. The government does not only give business exposure to small-scale asnaf or subsistence forms only. They need to be trained to reach the level of the entrepreneur category.

### 3. Discussion

This TVET field is a very comprehensive field that includes several job disciplines in various industries. In debating the IR4.0 era TVET issue, several key points have been identified and need further discussion more subtly. This matter has been thoroughly identified and will open the dimension of a more comprehensive discussion space on TVET.

#### 3.1 Key Policy Issues

One key policy issue in TVET in Malaysia is the alignment of TVET programs with the needs of the workforce and the economy. According to a study by the World Bank, TVET programs in Malaysia have not always been well aligned with the needs of the workforce and the economy, which has resulted in a mismatch between the skills of TVET graduates and the needs of employers. This can result in graduates facing difficulties in finding employment and can also lead to a shortage of skilled workers in certain fields and industries. Table 2 showed the percentage of job vacancies landscape in Malaysia in quarter 1 and quarter 2 in 2022.

Another key policy issue is the lack of funding and resources for TVET institutions. According to the World Bank, funding for TVET institutions in Malaysia is relatively low compared to funding for academic institutions, which can result in a lack of resources and infrastructure for TVET institutions. This can limit the ability of TVET institutions to offer high-quality programs and to attract and retain students.

**Table 2**  
 Job Vacancies Landscape in Malaysia [31]

Total Job Vacancies	STEM	TVET
Q1 2022	159,148	38,928
Q2 2022	202,102	49,887
	24.5%	24.7%
	108,616	140,104
	68.2%	69.3%

A third key policy issue is the lack of collaboration and coordination between TVET institutions and industry partners. According to the World Bank, collaboration, and coordination between TVET institutions and industry partners are relatively weak in Malaysia, which can limit the ability of TVET institutions to offer industry-relevant programs and ensure that graduates are well-prepared for the workforce. This can also limit the ability of industry partners to access the skilled workers they need to support economic growth and development.

To address these policy issues, the government and TVET institutions need to take steps to align TVET programs with the needs of the workforce and the economy, increase funding and resources for TVET institutions, and improve collaboration and coordination between TVET institutions and industry partners. This can be done through increased investment in TVET institutions, as well as through targeted policies and initiatives to promote collaboration and coordination between TVET institutions and industry partners.

### *3.2 Policy Recommendation*

To address the key policy issues facing TVET in Malaysia, several recommendations can be made based on the literature studies as well as in-depth research into this field. The most basic thing to deal with is to align TVET programs with the needs of the workforce and the economy. The government and TVET institutions should work closely with industry partners to ensure that TVET programs are aligned with the needs of the workforce and the economy. This can be done through regular consultation and engagement with industry partners, as well as using data and analysis to identify the skills and qualifications that are in demand in the workforce.

The second thing that should be emphasized is to increase funding and resources for TVET institutions. The government should increase funding and resources for TVET institutions to improve the quality and availability of TVET programs. In today's world, funds and donations are very much needed, not to mention involving the technical field. This can be done through targeted investment in infrastructure, equipment, and staffing, as well as through initiatives to improve the financial sustainability of TVET institutions.

The next important thing that needs to be emphasized is to improve collaboration and coordination between TVET institutions and industry partners: The government and TVET institutions should work to improve collaboration and coordination between TVET institutions and industry partners. This can be done through initiatives such as industry-based training, apprenticeships, and work-integrated learning programs, as well as through the development of formal partnerships and agreements between TVET institutions and industry partners.

At the same time, the policymakers and operators of institutions that offer TVET should raise awareness about the benefits of TVET education. The government and TVET institutions should take steps to raise awareness about the benefits of TVET education and to improve the perception of TVET graduates among employers and the public. This can be done through targeted campaigns and initiatives, as well as through the sharing of success stories and best practices from the TVET sector. The role of social media can also be fully integrated to achieve this goal.

Another thing that is rarely talked about is the factor of implementing a credit transfer system. The government should implement a credit transfer system that allows students to transfer credits from TVET programs to academic programs and vice versa. This will help to reduce the barriers between TVET and academic education, and to improve the mobility and employability of TVET graduates. And at the same time reduce students' time in formal studies at higher education institutions.

### *3.3 Strategy Implementation*

To implement the policy recommendations for TVET in Malaysia, several structures can be put in place and at the same time the responsible parties must join hands to shoulder the responsibility together. The most important basic thing to establish first is to establish a National TVET Coordination Unit. This unit can be established within the Ministry of Education to coordinate and oversee the implementation of TVET policies and initiatives. It can be responsible for working with industry partners, TVET institutions, and other stakeholders to align TVET programs with the needs of the workforce and the economy and to promote collaboration and coordination between TVET institutions and industry partners.

The second thing that needs to be considered to succeed in TVET aspirations is to set up a TVET Funding and Resource Allocation Committee. These committee members can be appointed among those who are professionals and have abilities from backgrounds in various fields. This committee can be established to oversee the allocation of funding and resources for TVET institutions. It can be responsible for reviewing funding proposals and allocating resources based on the needs and priorities of the TVET sector.

The next thing that should be emphasized is to develop industry-Based Training and Apprenticeship Programs. These programs can be established to promote collaboration and coordination between TVET institutions and industry partners. These programs can provide students with hands-on training and experience in real-world settings and can help to ensure that TVET graduates are well-prepared for the workforce.

In the meantime, an effort needs to be mobilized comprehensively to develop and make the community aware of TVET Promotion and Awareness Campaign. This campaign can be launched to raise awareness about the benefits of TVET education and to improve the perception of TVET graduates among employers and the public. With this campaign, it is hoped to open minds and new dimensions to career opportunities through TVET. The campaign can be run by the National TVET Coordination Unit and can include targeted advertising, public relations, and social media initiatives.

As discussed above, developing a credit transfer system is very necessary for an education system like in Malaysia. A Credit Transfer System can be established to allow students to transfer credits from TVET programs to academic programs and vice versa. This can be done through the creation of a national credit transfer database, as well as through the development of agreements and partnerships between TVET institutions and academic institutions.

The last step was to establish a TVET Advisory Council consisting of academicians, industry players as well as other stakeholders. A TVET Advisory Council can be established to provide advice and guidance to the government on TVET policies and initiatives. The council can be composed of representatives from industry, government, and TVET institutions, and can be responsible for providing feedback and recommendations on TVET policies and initiatives. These structures can work together to ensure the effective implementation of the policy recommendations and the betterment of the TVET sector in Malaysia. The author believes that if this fact is understood holistically by all parties who are interested in making policy, it will certainly yield maximum results for the industry.

### *3.4 National Policy on IR4.0*

The National Policy on Industry 4.0 (IR4.0) is a strategic policy framework put in place by the government of Malaysia to drive the country's economic growth and competitiveness through the adoption and integration of Industry 4.0 technologies and practices. The policy aims to support the

country's transition to an innovation-driven economy and to enhance the competitiveness and productivity of the manufacturing and services sectors.

The government of Malaysia has implemented several initiatives and programs to support the implementation of the National Policy on IR4.0, including the establishment of the National Industry 4.0 Strategic Action Plan, the implementation of the Industry4WRD program, and the creation of the Industry4WOW centre. It is a financial support facility for Malaysian SMEs in the manufacturing and related services sectors to embrace Industry 4.0. This Fund is eligible for all SMEs which have completed the government funded Industry4WRD Readiness Assessment (RA) programme.

The Malaysia National Policy on Industry 4.0 (IR4.0) has a significant impact on Technical and Vocational Education and Training (TVET) in the country. One of the key pillars of the policy is to develop a skilled and competent workforce, which is crucial for the successful implementation of IR4.0 technologies and practices. To achieve this, the government has implemented several initiatives and programs to provide training and upskilling opportunities for workers in TVET institutions.

One such initiative is the Industry4WRD program, which focuses on providing training and upskilling opportunities for workers in the manufacturing and services sectors. The program also provides support for companies to adopt and integrate IR4.0 technologies and practices, such as automation, artificial intelligence, and the Internet of Things. Another initiative is the establishment of the Industry4WOW centre, which is a national centre for industry 4.0-related research and development activities. The centre provides training and upskilling opportunities for workers, as well as support for companies to adopt and integrate IR4.0 technologies and practices.

The National Policy on IR4.0 also focuses on fostering collaboration and partnerships between industry, government, and academia. This includes the establishment of partnerships between TVET institutions and companies to provide training and upskilling opportunities for workers, as well as to support the adoption and integration of IR4.0 technologies and practices.

In conclusion, the Malaysia National Policy on IR4.0 has a significant impact on TVET in the country, as it focuses on developing a skilled and competent workforce, providing training and upskilling opportunities, and fostering collaboration and partnerships between industry, government, and academia.

## **4. Findings**

### *4.1 Strategic Policy Framework*

The Strategic Policy Framework refers to a comprehensive and integrated set of policies and programs that are designed to achieve specific goals and objectives. The framework defines the policies, strategies, and actions that are necessary to achieve these goals and provides a roadmap for implementation. In the context of the National Policy on Industry 4.0 (IR4.0) in Malaysia, the Strategic Policy Framework outlines the policies and strategies necessary to drive the country's economic growth and competitiveness through the adoption and integration of Industry 4.0 technologies and practices.

### *4.2 Developing A Skilled and Competent Workforce*

Developing a skilled and competent workforce is one of the key components of the Strategic Policy Framework under the National Policy on Industry 4.0 (IR4.0) in Malaysia. This component focuses on providing training and upskilling opportunities for workers in TVET institutions to ensure that they are equipped with the necessary skills and knowledge to succeed in the industry 4.0 era. The policy recognizes that the adoption of IR4.0 technologies and practices will require workers to

have new and different skills and knowledge and that it is critical to provide them with the necessary training and upskilling opportunities to keep pace with the rapidly changing technological landscape.

To achieve this, the government has implemented several initiatives and programs, such as the Industry4WRD program, which provides training and upskilling opportunities for workers in TVET institutions. The government has also established the Industry4WOW centre, which provides training and support for the adoption and integration of IR4.0 technologies and practices. Developing a skilled and competent workforce is critical to the success of the National Policy on Industry 4.0 (IR4.0) in Malaysia, and the government has implemented several initiatives and programs to support this objective. By providing training and upskilling opportunities for workers in TVET institutions, the government is ensuring that they are equipped with the necessary skills and knowledge to succeed in the industry 4.0 era.

#### *4.3 Enhancing the Adoption of IR4.0 Technologies and Practices*

Enhancing the adoption of Industry 4.0 (IR4.0) technologies and practices is another key component of the Strategic Policy Framework under the National Policy on IR4.0 in Malaysia. This component focuses on providing support for companies to integrate IR4.0 technologies and practices into their operations, to improve their competitiveness and efficiency.

The government recognizes that the adoption of IR4.0 technologies and practices can be a challenge for companies, particularly small and medium enterprises (SMEs), due to the cost and technical expertise required. As a result, the government has implemented several initiatives and programs to provide support and assistance to companies in adopting and integrating IR4.0 technologies and practices into their operations.

One such initiative is the Industry4WRD program, which provides financial and technical support for companies to adopt and integrate IR4.0 technologies and practices into their operations. The government has also established the Industry4WOW centre, which provides training and support for companies to adopt and integrate IR4.0 technologies and practices into their operations.

In conclusion, enhancing the adoption of IR4.0 technologies and practices is critical to the success of the National Policy on IR4.0 in Malaysia. The government has implemented several initiatives and programs to provide support and assistance to companies, particularly SMEs, in adopting and integrating IR4.0 technologies and practices into their operations, to improve their competitiveness and efficiency.

#### *4.4 Fostering Collaboration between Industry, Government and Academia*

Fostering collaboration and partnerships between industry, government, and academia is another key component of the Strategic Policy Framework under the National Policy on Industry 4.0 (IR4.0) in Malaysia. This component focuses on promoting collaboration and partnerships between the key stakeholders to drive the development and adoption of IR4.0 technologies and practices.

The government recognizes that collaboration and partnerships between industry, government, and academia are critical to the success of the National Policy on IR4.0. Collaboration and partnerships enable the sharing of expertise and resources and promote the development and commercialization of IR4.0 technologies and practices.

To achieve this, the government has implemented several initiatives and programs that encourage collaboration and partnerships between industry, government, and academia. For example, the Industry4WRD program provides funding and support for collaboration and partnerships between industry, government, and academia. The government has also established

the Industry4WOW centre, which serves as a platform for collaboration and partnerships between industry, government, and academia.

In conclusion, fostering collaboration and partnerships between industry, government, and academia is critical to the success of the National Policy on IR4.0 in Malaysia. By promoting collaboration and partnerships, the government is creating an environment that enables the sharing of expertise and resources and drives the development and commercialization of IR4.0 technologies and practices.

#### *4.5 Building an Enabling Ecosystem*

Building an enabling ecosystem that supports the development and commercialization of Industry 4.0 (IR4.0) technologies and practices is a key component of the Strategic Policy Framework under the National Policy on IR4.0 in Malaysia. This component focuses on creating an environment that supports the development and commercialization of IR4.0 technologies and practices.

The government recognizes that a supportive ecosystem is critical to the development and commercialization of IR4.0 technologies and practices. As a result, the government has implemented several initiatives and programs to build an enabling ecosystem that supports the development and commercialization of IR4.0 technologies and practices.

One such initiative is the Industry4WRD program, which provides financial and technical support for the development and commercialization of IR4.0 technologies and practices. The government has also established the Industry4WOW centre, which provides training and support for the development and commercialization of IR4.0 technologies and practices. In conclusion, building an enabling ecosystem that supports the development and commercialization of IR4.0 technologies and practices is critical to the success of the National Policy on IR4.0 in Malaysia. The government has implemented several initiatives and programs to create an environment that supports the development and commercialization of IR4.0 technologies and practices, which is essential for the long-term success of the policy.

#### *4.6 Promoting Entrepreneurship and Innovation*

Promoting entrepreneurship and innovation in the industry 4.0 (IR4.0) space is a key component of the Strategic Policy Framework under the National Policy on IR4.0 in Malaysia. This component focuses on supporting the commercialization of research and development activities and encouraging innovation in the IR4.0 space. Even so, the government as a major stakeholder has played an important role with recognizes that entrepreneurship and innovation play a critical role in driving the development and commercialization of IR4.0 technologies and practices. As a result, the government has implemented several initiatives and programs to promote entrepreneurship and innovation in the IR4.0 space.

One such initiative is the Industry4WRD program, which provides funding and support for the commercialization of research and development activities and encourages innovation in the IR4.0 space. The government has also established the Industry4WOW centre, which provides training and support for entrepreneurship and innovation in the IR4.0 space. Promoting entrepreneurship and innovation in the IR4.0 space is critical to the success of the National Policy on IR4.0 in Malaysia. By supporting the commercialization of research and development activities and encouraging innovation in the IR4.0 space, the government is creating an environment that drives the development and commercialization of IR4.0 technologies and practices, which is essential for the long-term success of the policy.

## 5. Conclusions

The National Policy on Industry 4.0 in Malaysia emphasizes the significance of Technical and Vocational Education and Training (TVET) in promoting the progress and commercialization of IR4.0 technologies and practices. The government has launched various initiatives and programs to support IR4.0 technologies and practices in TVET institutions and establish a conducive ecosystem for the development and commercialization of IR4.0 technologies and practices.

The Strategic Policy Framework under the National Policy on IR4.0 targets a skilled workforce, better adoption of IR4.0 technologies and practices, an enabling ecosystem, collaboration and partnerships, and entrepreneurship and innovation. These components establish an environment for the successful implementation of the policy in the long run. To achieve Malaysia's objectives, the Government, TVET Institutions, and Industry need to work collaboratively and create a sustainable ecosystem. Malaysia has made significant progress in developing TVET, and the focus should now be on effectively utilizing existing resources to improve the quality of education and generate high-income opportunities for students and workers from asnaf groups. In conclusion, the National Policy on IR4.0 recognizes the importance of TVET in promoting the development and adoption of IR4.0 technologies and practices, and the government has implemented initiatives and programs to support this development. The close relationship between IR4.0 and TVET plays a crucial role in driving the commercialization of IR4.0 technologies and practices.

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