Available online at www.jlls.org

JOURNAL OF LANGUAGE AND LINGUISTIC STUDIES

ISSN: 1305-578X

Journal of Language and Linguistic Studies, 18(1), 761-774; 2022

Application of the analytic hierarchy process (AHP) on factors that affect students' enrollment in TVET based on TVET instructors and students' perspectives

Chia Ming Hong [a 1], Chee Keong Ch'ng [b], Teh Raihana Nazirah Roslan [c,d]

[a,b] *Department of Decision Science, School of Quantitative Sciences, Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia.*
[c] *Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, 50300 Kuala Lumpur, Malaysia.*
[d] *Institute of Strategic Industrial Decision Modelling, School of Quantitative Sciences, Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia.*

APA Citation:

Hong, C. M., Ch'ng, C.K.., & Roslan, T.R.N. (2022). Application of the analytic hierarchy process (AHP) on factors that affect students' enrollment in TVET based on TVET instructors and students' perspectives. *Journal of Language and Linguistic Studies, 18*(1), 761-774. Doi: 10.52462/jlls.218

Submission Date:10/09/2021

Acceptance Date:30/10/2021

Abstract

The world is undergoing a new era of growth known as technological transformation, which enhances economic and social development. The demand for Knowledge workers (K-workers) is increasing because they are the experts who will handle the advanced technologies. One of the channels to produce K-workers is through Technical and Vocational Education and Training (TVET). At present, the number of TVET graduates in Malaysia is not meeting the market demands based on the enrollment in TVET programs after completing their secondary school. Several contributing factors that affect students' tendency in enrolling vocational education are recognized namely students' interest, parents' perception, social perception, employers' perception, inexperienced TVET instructors, facilities in TVET institutions, current government policy, and vocational education cost. This paper aims to develop two Analytic Hierarchy Process (AHP) models, in determining the level of importance for these influential factors based on TVET instructors and TVET students' perceptions. In comparing the differences between two models, a statistical test known as *t-test* is conducted to validate the hypothesis statements. The findings reveal that parental influence is the most contributed factor in TVET student enrollment. In addition, it is also found that the null hypothesis fails to be rejected since the *p-value* (0.9998) is greater than 0.05. Hence, it can be concluded that both groups do not have significant difference on their population means.

Keywords: technical and vocational education and training; analytic hierarchy process; hypothesis testing; t-test; fourth industrial revolution

1. Introduction

The Fourth Industrial Revolution (IR4.0) is also known as "Smart Factory" in which it integrates cyber-physical technologies and socio-economy activities to trigger changes in industry. In facing the new era, different skills are needed in the market to ensure the workers sufficiency in handling the advanced technologies (Mohd Ishar, Wan Derahman & Kamin, 2020; Yusoff, Harun & Zakaria,

[1] Corresponding author.
E-mail address: carmenhongcm@gmail.com

2020). The establishment of Technical and Vocational Education and Training (TVET) aims to provide a comprehensive education platform to generate skilled workers with sufficient technical skills which can increase the qualified workforce in the industry (Subramaniam, Loganathan & Noordin, 2020). Based on the 11th Malaysia Plan (11MP), it is expected that 60% of new markets require TVET skills.

In Malaysia, school leavers can pursue their vocational education in Polytechnics, Community Colleges, National Youth Vocational Institute (IKBN), Council of Trust for Indigenous People (MARA), and even universities such as Malaysia Technical University Network (MTUN) and Universiti Tun Hussein Onn Malaysia (UTHM). Other than that, Ministry of Human Resources also provides the TVET programs in Industrial Training Institute (ITE), Advanced Technology Centers (ADTEC) and Japan Malaysia Technical Institute (JMIT) which offer 2 years diploma and advanced diploma courses (UNESCO, 2019). After graduating, TVET students are prepared for TVET job opportunities such as technician, electrician, aircraft maintainer, etc.

However, students nowadays are not interested in enrolling vocational education due to some factors such as students' interest, parental influence, facilities in technical institutions, social perception, current government's policy, employers' perception, high education cost, and inexperienced TVET instructors. This circumstance has reduced the number of TVET students' participation. Consequently, the current supply of TVET workforce is unable to meet the country's market demand. Therefore, those influential factors must be investigated further so that the government could implement proper and effective strategies to cater the problem. In all circumstances, failure to evaluate the potential factors according to the level of importance will inevitably affect all plans. Hence, determining the rank prior to any action is crucial. To rank them, multi-criteria decision-making (MCDM) technique will be applied in this study. AHP is one of the MCDM technique, developed by Saaty (1980). It is a useful method because it can create a hierarchical structure from a complex problem. For each given situation, AHP can give a simple and flexible solution to deal with it (Karthikeyan, Venkatesan & Chandrasekar, 2016; Chin, Ch'ng, Jamil & Shaharanee, 2018).

This study aims to develop two AHP models based on TVET students' perception and TVET instructors' perception, respectively. We compare their ranking factors from both models. Thus, *t-test* is used to determine if there is any significant difference between the population means of these two groups. The rest of this paper is structured as follows. The review of literatures concerns the influential factors which affect students' enrollment into TVET, AHP and hypothesis testing in education field are discussed in Section 2. The methodology in conducting an AHP model and the steps to develop hypothesis testing is given in Section 3. Results and discussions are presented in Section 4. Section 5 discusses about the conclusion and recommendations based on the results.

2. Literature Review

This section consists of three main parts (a) Review on TVET, (b) Review on AHP and (c) Review on hypothesis testing in education field.

2.1. Review on TVET

TVET is an education process which focuses on the practical aspects and targets to equip students with working skills for future employment. TVET is also known as workforce training which is to prepare the students with the core skills to face the world's competitiveness. Generally, students can learn core skills such as communications, Information and Communication Technology (ICT), problem solving etc. The importance of TVET is apparent due to the fact that, a country's economic development relies on its population's education and technical expertise. However, TVET currently is

still not popular and is not taken seriously by the local secondary school students. Because of this, the number of TVET graduates are still below expectation even though the number of TVET institutions have been increasing (Aziz, 2019). As discussed by Law (2018), most students preferred taking non-vocational courses through other education pathways such as universities and private colleges due to job opportunity and security.

Previously, researchers had uncovered the potential factors which hindered students' interest from pursuing vocational education. Affero and Hassan (2013) had discussed that the main factor which influenced student's vocational choice is their interest, followed by the sub-factors such as the demographic profiles, personality, talents, and others. Students who had the vocational talents should be cultivated so that their talents would be fully utilized (Bahtiar et al, 2015). The reason that they had these talents was mostly influenced by their family members who indulged earlier in technical careers. Furthermore, the facilities in TVET institutions were one of the factors affecting students' enrolment. Researchers found that the facilities in TVET institutions were insufficient to meet the demands of students (Amedorme & Fiagbe, 2013; Bakar, 2011). These consist of machines or tools, and the classrooms. Due to the expensive cost, some institutions were unable to afford the machines. Other than that, Bakar (2011) discussed that, some TVET institutions did not provide a good environment for students' training process. For instance, the size of the classroom was limited in spaces, and not all the classrooms were well equipped with air-conditioner.

Furthermore, the perception of others towards TVET graduates was one of the factors that triggered the low enrollment number in TVET (Omar, Rauf, Ismail, Rashid, Mohd Puad & Zakaria, 2020; Chan, 2018; Sabtu, Noor, Mohd & Isa, 2016; Rasul, Ashari, Azman & Rauf, 2015). This can be seen when our society had negative perception towards TVET students and often doubtful on their qualification (Abdul-Aziz, Zulkifli, Nashir & Karim, 2020). In social perception, TVET students were categorized as low achievers whom have been rejected by university (Affero & Hassan, 2013; Amedorme & Fiagbe, 2013). Zeleke (2018) discussed that this scenario would cause the student to lose confidence in their life. As a consequence, parents were resisted in encouraging their children to enrol in vocational education. Hussin, Mohamad, Hassan and Omar (2017) found that, parents' perception was a very significant factor in affecting students' enrolment in TVET. It could be observed that students usually choose their fields of study based on parents' guidance and suggestion. On the other hand, most parents would support their children to enrol in non-vocational courses which they felt could ensure high-paid wages and good reputation (Koya, 2019).

Besides that, TVET graduates' qualification were often judged by workspace employers, which further lead to the unemployment issues. Chan (2018) stated that employers had a negative perception towards TVET graduates based on the thought that TVET graduates were the students who did not score in academics. Furthermore, the salary given by employers was one of the concerns because TVET graduates normally received lower salary compared to graduates from other courses (Law, 2018). Other than that, TVET instructors played an important role because they had direct connection to the students in the lectures. However, the number of TVET instructors were insufficient in the institutions (Mohamad, Saud & Ahmad, 2009). Most of the instructors preferred careers with higher salary (Ismail, 2019). Apart from the insufficient staff's issue, Affero and Hassan (2013) claimed that, some instructors were found lacking of teaching experience since they had not been exposed to the industry. They also lack of specific skills like ICT and English skills (Ismail, Nopiah, Rasul & Leong, 2017).

Apart from that, the current government policy is one of the factors that affect students' enrolment into TVET. There are two accreditation bodies, namely Malaysia Qualification Agency (MQA) and Department for Skill Development (DSD) which are responsible to give accreditation for the TVET students (Khirotdin, Ali, Nordin & Mustaffa, 2019). Some students would get confused when they

wanted to study in the institutions under different accreditation bodies (Mohd Amin, 2016). Additionally, different accreditation may result in employers feel doubtful towards the quality of TVET graduates, and having trouble in determining the salaries for graduates (Rasul, Ashari, Azman & Rauf, 2015). Next, the education cost for technical course was proven to be costly. Blinov and Esenina (2019) and Tsang (1997) discussed that the training cost is high because of the expenses used to maintain the technologies, salary of instructors, cost duration and size of operation. Even though there was an allocation provided by the Malaysia government in the National Budget, the amount was still not enough due to the high inflation rate and cost of operation ("Thanks, but RM5.9bil", 2019).

To wrap them up, eight significant factors are identified and extracted which are students' interest, facilities in TVET institutions, social perception, parental encouragement, employers' perception, TVET instructors, current government's policy and high technical education cost.

2.2. Review on Analytic Hierarchy Process (AHP)

AHP is developed by Saaty (1980). It is one of the multi-criteria decisions making (MCDM) techniques which is useful to assist researchers in comparing the level of importance. There are three levels for AHP structure, consisting of level 0 (goal or objective), level 1 (criteria), and level 2 (alternative). The structure of AHP is depicted in Figure 1.

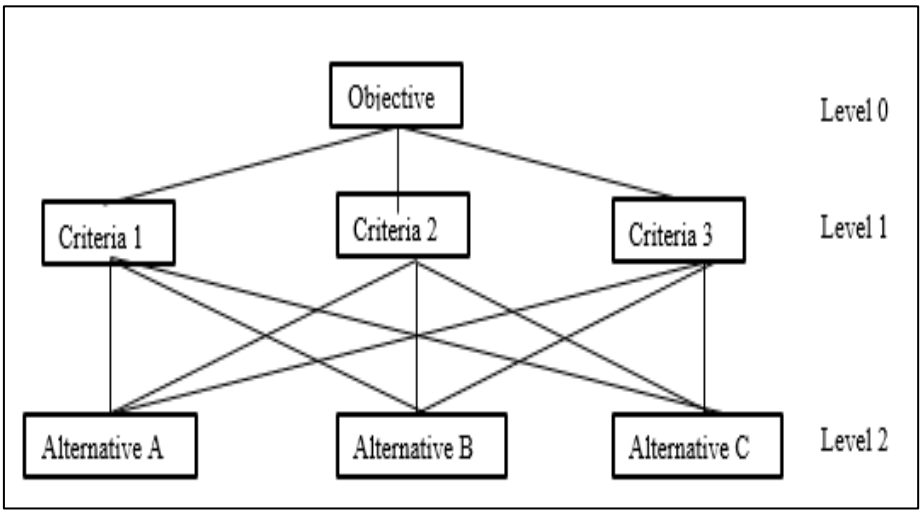

Figure 1. AHP structure

Level 0 is the goal or objective for the study, whereas level 1 and level 2 represent the criteria and alternatives, respectively. By using AHP, the observations can be converted into numerical score before substituting into the matrix form. The weights for the criteria are then calculated to determine which criteria contributes the most in achieving the goal before performing the likelihood of the alternatives using probability. The alternative with the higher value of likelihood has the higher possibility to satisfy the goal (Vargas, 2010).

Haji, Azmani and Harzli (2017) developed an Information Technology (IT) model based on AHP that could help students to determine their potential training pathways. There were three criteria used in the study namely professional inclination, sub-passions, and personality traits. For the alternatives, there were four alternatives for each criterion, namely "Education and Teaching", "Health and Medicine", "Agriculture", and "Nature and Environment". The result showed that the student's profile gained the best match with the alternatives of Health and medicine, followed by Education & Teaching. Other than that, AHP was also used to determine the level of importance of the criteria which affect students' attitude in university. They considered five criteria which affect the students'

character, namely campus facility, promotion, teachers, service, and co-curricular activities. Among these five criteria, "promotion" had the highest level of importance which is more than 52%, followed by "teacher" (21.80%), "service" (11.90%), "campus facilities" (10.60%) and "co-curricular activities" (3.40%). This model had a consistency ratio of 0.08 so it can be accepted (Anam, Haque & Chowdhurry, 2015).

Furthermore, Zia et al. (2019) developed an AHP model in analyzing the level of importance of secondary school students when choosing their tertiary education. The researchers considered three criteria that were covering 15 sub-criteria that made of internal factors (IF), external factors (EF) and social influence factor (SIF). For the alternatives, there were five alternatives for each criterion, namely "Aptitude", "Career", "Aspiration", "Seeking new knowledge", and "Improving social skill" under internal factor; "Courses", "Financial Aids", "Costs", "Facilities" and "Reputation" under external factor; and "Parents", "Teachers", "Siblings", "Friends" and "Extended Family" under social influence factor. The "internal factors" was the highest priority criteria with consistency ratio of 0.0368, followed by external factors. The least influence factor was "social". This AHP model was accepted because the consistency ratio is smaller than 0.1.

Furthermore, to solve the issue of limited education resources for postgraduate students, MCDM techniques can be used for the institutions. AHP was used along with Weighted Product (WP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), in choosing the postgraduate students to enroll in university. The results showed that AHP performed the best among these three techniques (Altunok, Özpeynirci, Kazançoğlu & Yılmaz, 2010). Furthermore, Önder, Önder, Kuvat and Taş (2014) applied AHP in determining the criteria for the students in nursing school. The respondents of the study were students and their parents. In determining the students' career path, "academic staff", "want nursing profession", and "job guarantee" were recognized as important criteria from parents' perception, whereas "security of nursing school", "income of nursing profession", and "developing profession" were the more important criteria from students' perception. The next section will discuss about the studies related to hypothesis testing in education field.

2.3. Review on hypothesis testing

A hypothesis testing is a procedure that investigate the specific prediction that arise from the following theories (Frost, 2020). For two mutually exclusive theories, null hypothesis (H_0) can be defined as the default theory whereas alternative hypothesis (H_1) has significant effect towards the null hypothesis. Statistical tools play an important role in validating the hypothesis. There are two types of error namely Type I errors and Type II errors in the statistical hypothesis testing. Type I error is also known as false positive error, and it happens when the researchers do not accept the true null hypothesis. Significance level ($\propto$) is a measure of strength of evidence that must be included in your experiment before rejecting the null hypothesis and making conclusion. The formula of significance level can be shown as,

$$\propto = 1 - C \quad (1)$$

where C is confidence level. Next, Type II error is called as false negative error where the researchers fail to reject the false null hypothesis. The probability of Type II error is presented as,

$$Power = 1 - B \quad (2)$$

where B is confidence level. In addition, *t-test* and *z-test* are the statistical analysis in hypothesis testing. *t-test* works well for research with small sample size and unknown variance whereas *z-test* suits for research with large sample size and known variance.

t-test is frequently applied in the education field in comparing the population means. Kasmad, Mustakim and Sunarsi (2020) studied on the factors such as price, promotions, and service quality to investigate their children's interest in enrolling vocational education. There were three hypotheses made to investigate the effects of those factors in joining vocational education. The findings revealed that three factors showed significant influence on the students' interest. Among the three factors, promotion had the highest correlation (36.9%), followed by price (32.50%) and service quality (30.20%)

Furthermore, Wicaksana and Fitrian (2020) had carried out a hypothesis testing by using *t-test* to determine the significance of experimental and control group. The findings found that the *p-value* was 0.034 (less than 0.05), revealing that the result from these two groups was significantly different. Wiyarsi, Pratomo and Priyambodo (2020) aimed to investigate how context-based learning (CBL) affected the chemical literacy of vocational high school students when it came to petroleum topics. *t-test* was applied in this study to find out the significance difference between the variables. The finding revealed that there was significant difference between chemical literacy levels between experimental and control group.

3. Method

The methodology flowchart of this study is displayed in Figure 2.

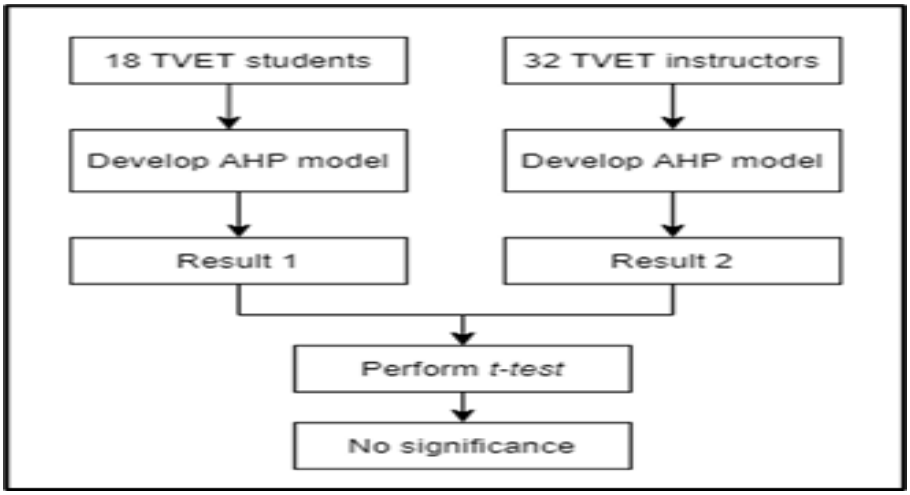

Figure 2. Methodology flowchart

The data collection process involved 18 TVET students and 32 TVET instructors. The samples are selected from National Youth Vocational Institute (IKBN) in Northern part of Malaysia. With their point of views, it can empower us to discover the real concerns of this issue.

In analysing the data obtained in the questionnaire, AHP is used to find out the ranking of the factors. Brunelli (2015) discussed that there are three vital steps in performing AHP. First, forming the hierarchical structure with 3 layers. The top layer is the "goal" followed by "criteria" and "alternative". The study aims to sort the influential factors which affect students' tendency in enrolling TVET. Eight criteria will be ranked, such as students' interest, parents' perception, social perception, employers' perception, inexperienced TVET instructors, facilities in TVET institutions, current governments' policy, and vocational education cost. This study only focusses on the goal and criteria. The next step is to develop the matrix by using pairwise comparison. The pairwise comparison scale starts from 1 until 9, which is defined in Table 1 (Saaty, 1994).

Table 1. Pairwise comparison scale

Level of importance	Definition	Explanations
1	Equally importance	Both factors contribute equally to the goal.
3	Moderately importance	One factor has moderate importance than the other.
5	Strongly importance	One factor has strong importance than the other.
7	Very strongly importance	One factor has very strong importance than the other.
9	Extreme importance	One factor has extreme importance than the other.
2, 4, 6, 8	Intermediate values	They are employed to compromise between two judgments.

After filling the value for each criterion, the geometric mean is obtained from the formula,

$$Geometric\ mean = \sqrt[n]{(x_1 x_2 \dots x_n)} \quad (3)$$

where x is the elements and n is number of respondents. Next, the matrix is normalized by computing the average of each row. The total row average is equal to the weight of each criterion, which is also used to rank the level of importance of criterion. The next step is to conduct a consistency test where the consistency index (CI) aims to check the consistency degree in pairwise comparison. The formula of consistency index is presented as,

$$Consistency\ index = \frac{Avg\ of\ cons.measure - n}{n-1} \quad (4)$$

where $Avg\ of\ cons.measure$ is the multiplication of row average and row of complete comparison matrix and n is number of variables. If consistency index equals to 0, this result illustrates that the consistency degree is perfect. Else, the consistency ratio will be calculated to determine the level of consistency. If the consistency ratio is not more than 0.1, so the model can be accepted. The formula of consistency ratio (CR) is displayed as follow,

$$Consistency\ ratio = \frac{Consistency\ index}{Random\ index} \quad (5)$$

The value of random index is presented in the Table 2 with their respective matrix size. The number of variables can be defined as the matrix size. For example, if there are eight variables in the issue, the random index will be equal to eight.

Table 2. Random index

Matrix size	Random index, RI
1	0.00
2	0.00
3	0.58
4	0.90
5	1.12
6	1.24
7	1.32
8	1.41
9	1.45
10	1.49

The AHP findings are examined using the hypothesis testing to determine the population mean for TVET instructors and TVET students. In doing so, there are five main steps in conducting hypothesis testing using *t-test*,

1. The researcher must identify the hypothesis that they want to test. There will be two hypotheses namely, null hypothesis, H_0 and alternative hypothesis, H_1. H_0 is stated as there is no significance difference of population mean between TVET instructors and TVET students, whereas H_1 is stated as there is significance difference of population mean between TVET instructors and TVET students.

2. The researcher has to set the criteria of judgement for the decision which refers to the level of significance, α. The examples of popular levels of α are 0.1, 0.05, 0.01, 0.005 and 0.001. When the probability of sample mean is not more than the level of significance, so we can reject the H_0. This will be known as "statistically significant".

3. Next, the researcher has to compute the test statistic to determine the critical value (*p-value*). There are many test statistics available such as *z-test, t-test* etc. In this study, *t-test* is the best method for the small sample size and the population variance is unknown. To perform the calculation, the researchers need to determine the mean, standard deviation, and number of samples. The formula for *t-test* is,

$$t = \frac{x_A - x_B}{\sqrt{\frac{{S_A}^2}{N_A} + \frac{{S_B}^2}{N_B}}} \tag{6}$$

where x_A is mean of TVET students, x_B is mean of TVET instructors,S_A is standard deviation of TVET students, S_B is standard deviation of TVET instructors, N_A is number of TVET students, N_B is number of TVET instructors.

4. The test statistics obtained is used to decide to see whether to reject or not to reject H_0. By using the p-value calculator, we can get the *p-value* by inserting the *t-score* and degree of freedom. The degree of freedom is given by,

$$Deg\ of\ freedom = sum\ of\ sample - 2 \tag{7}$$

5. If the *p-value* is less than α, we will reject H_0. Otherwise, we cannot reject if the *p-value* is more than α. In short, the researchers can make two decisions based on the *p-value*,

(a) Reject H_0, if the *p-value* is less than α,

(b) Cannot reject H_0, if the *p-value* is more than α.

4. Results and Discussion

This section will discuss about two parts, (a) findings obtained from TVET students and TVET instructors, (b) hypothesis testing to compare the population mean from TVET students and TVET instructors.

4.1. Findings obtained from two AHP models

The AHP model from TVET students' perception, together with its row average are exhibited in Table 3. Meanwhile, Table 4 displays the AHP model with its row average from TVET instructors' perception. Further, the weightage of influential factors from both models are displayed in Table 5 and Table 6.

From the TVET students' perception, parental influence gains the highest weight (31.87%), followed by "TVET instructors" (19.78%), "employers" (12.77%), "students' interest" (8.97%), "education cost" (7.77%), "facility" (7.74%), "government's policy" (6.89%), and "public perception" (4.21%). Whereas from the TVET instructors' perception, "parental influence" gains the heaviest weight which is 18.81%, followed by "facility" (18.56%), "education cost" (16.57%), "government's policy" (13.10%), "TVET instructors" (8.45%), "employers" (7.40%), and the least is "social perception" (7.21%).

Furthermore, the consistency ratio of students' perception and TVET instructors' perception are 0.0380 and 0.0416 respectively. Since both consistency ratios are less than 0.1, the AHP models are accepted. In order to determine whether there is significant difference between these populations, *t-test* is performed.

Table 3. AHP model from TVET students' perception

Factors	Student	Public	Instructors	Employers	Parents	Facility	Cost	Policy	Total	Average
Student	0.0875	0.1226	0.0899	0.0701	0.0800	0.0831	0.0861	0.0983	0.7176	0.0897
Public	0.0329	0.0461	0.0471	0.0296	0.0876	0.0284	0.0258	0.0399	0.3372	0.0421
Instructors	0.1814	0.1823	0.1863	0.3671	0.1673	0.2124	0.1646	0.1209	1.5824	0.1978
Employers	0.1202	0.1498	0.0488	0.0962	0.1030	0.1670	0.1693	0.1672	1.0214	0.1277
Parents	0.3704	0.1782	0.3772	0.3163	0.3388	0.3556	0.2937	0.3191	2.5494	0.3187
Facility	0.0690	0.1064	0.0574	0.0377	0.0624	0.0655	0.1282	0.0929	0.6195	0.0774
Cost	0.0753	0.1324	0.0838	0.0421	0.0855	0.0379	0.0741	0.0906	0.6216	0.0777
Policy	0.0633	0.0821	0.1096	0.0409	0.0755	0.0502	0.0582	0.0711	0.5510	0.0689

Table 4. AHP model from TVET instructors' perception

Factors	Student	Public	Instructors	Employers	Parents	Facility	Cost	Policy	Total	Average
Student	0.0976	0.1472	0.0869	0.0396	0.1272	0.0906	0.1100	0.0927	0.7917	0.0990
Public	0.0478	0.0721	0.0813	0.0483	0.1165	0.1036	0.0560	0.0512	0.5767	0.0721
Instructors	0.0886	0.0699	0.0789	0.0978	0.1150	0.0603	0.0518	0.1136	0.6758	0.0845
Employer	0.1479	0.0895	0.0488	0.0600	0.0770	0.0649	0.0582	0.0460	0.5922	0.0740
Parents	0.1662	0.1338	0.1486	0.1686	0.2166	0.2939	0.2231	0.1539	1.5046	0.1881
Facility	0.1920	0.1239	0.2330	0.1649	0.1313	0.1781	0.2632	0.1981	1.4846	0.1856
Cost	0.1429	0.2075	0.2454	0.1662	0.0602	0.1090	0.1612	0.2335	1.3259	0.1657
Policy	0.1169	0.1561	0.0770	0.2548	0.1562	0.0997	0.0766	0.1110	1.0483	0.1310

Table 5. Weightage of criteria from TVET students' perception

Criteria	Weights
Parents	31.87%
Instructors	19.78%
Employer	12.77%
Student	8.97%
Cost	7.77%
Facility	7.74%
Policy	6.89%
Public	4.21%

Table 6. Weightage of criteria from TVET instructors' perception

Criteria	Weights
Parents	18.81%
Facility	18.56%
Cost	16.57%
Policy	13.10%
Student	9.90%

Instructors	8.45%
Employer	7.40%
Public	7.21%

4.2. Hypothesis testing

In order to perform t-test, overall means for two groups are computed as showed in Table 7 and the mean, standard deviation and number of respondents are stated in Table 8.

Table 7. Total of row

	TVET students	**TVET instructors**
Student	0.7176	0.7917
Public	0.3372	0.5767
Instructors	1.5824	0.6758
Employer	1.0214	0.5922
Parents	2.5494	1.5046
Facility	0.6195	1.4846
Cost	0.6216	1.3259
Policy	0.5510	1.0483

Table 8. Mean, Standard deviation and number of respondents for both population

	TVET students	**TVET instructors**
Mean	1.0000125	0.9999750
Standard deviation	0.7318	0.3950
Number of respondents	18	32

In performing hypothesis testing, we need to construct two hypotheses namely H_0 and H_1.

$$H_0 : \mu_{TVET\ student} = \mu_{TVET\ instructor}$$

$$H_1 : \mu_{TVET\ student} \neq \mu_{TVET\ instructor}$$

The formula of *t-test* is presented as,

$$t = \frac{1.0000125 - 0.999975}{\sqrt{\frac{0.7318^2}{18}} + \sqrt{\frac{0.3950^2}{32}}} = 0.0002$$

The *p-value* with t-score of 0.0002 is 0.99984. Since the *p-value* is larger than 0.05, therefore the null hypothesis cannot be rejected. It indicates that both populations have no difference.

5. Conclusion

This study uses AHP method to sort the possible factors that influence TVET enrolment by the school leavers in Malaysia. The results of both AHP models showed that the perceptions from both groups (instructors and students) are slightly different. However, both groups agreed that parental factor played the biggest role in determining the propensity of their children to join the vocational training. In between, both groups consented that public stigmatization or misperception contributed the least among eight factors. Although the results obtained appeared to be different in terms of sequence; the *t-test* results proved that the perceptions of these two groups are in fact similar. Hence, the

statement that "the means of both populations are equal" failed to be rejected. In other words, both groups have similar thoughts in this issue.

Acknowledgements

This research was supported by Ministry of Higher Education (MoHE) of Malaysia through Fundamental Research Grant Scheme (FRGS/1/2020/SSI0/UUM/02/18).

References

Abdul Aziz, S. N., Zulkifli, N., Mat Nashir, I., & Abdul Karim, N. A. H. (2019). Pull and push factors of students' enrolment in the tvet programme at community college in Malaysia. *Journal of Technical Education and Training*, *12*(1). Retrieved from https://publisher.uthm.edu.my/ojs/index.php/JTET/article/view/4374

Affero, I., & Hassan, R. (2013). Issues and challenges of technical and vocational education & training in Malaysia for knowledge worker driven. In *National Conference on Engineering Technology 2014*. DOI: 10.13140/2.1.4555.2961

Amedorme, S., & Fiagbe, Y. (2013). Challenges facing technical and vocational education in Ghana. *International Journal of Scientific & Technology Research, 2*(6), 253-255. Retrieved from https://ghanaskills.org/sites/default/files/2017-04/Challenges-Facing-Technical-And-Vocational-Education-In-Ghana.pdf

Altunok, T., Özpeynirci, Ö., Kazançoğlu, Y., & Yılmaz, R. (2010). Comparative analysis of multicriteria decision making methods for postgraduate student selection. *Eurasian Journal of Educational Research, 40,* 1-15. Retrieved from https://www.researchgate.net/publication/289196833_Comparative_Analysis_of_Multicriteria_Decision_Making_Methods_for_Postgraduate_Student_Selection

Anam, S., Haque, M., & Chowdhury, S. (2015). Ranking of the determinants affecting students' attitude of a higher education institution: Application of AHP. *International Journal of Human Resource Studies*, *5*(2). DOI: 10.5296/ijhrs.v5i2.6040

Aziz, A. (2019, July 24). Govt struggles to overcome vocational education misconception. *The Malaysian Reserved.* Retrieved from https://themalaysianreserve.com/2019/07/24/govt-struggles-to-overcome-vocational-education-misconception/

Bahtiar, R. A., R., Mustapha, R., Sharif, A. M., Azman, M. N. A, Tee, T. K., & Minghat, A.D. (2015). Identification of vocational talent among students. *Journal of Asian Vocational Education and Training, 8,* 45-58. Retrieved from https://www.researchgate.net/publication/328412826_Identification_of_Vocational_Talent_among_Students_Theoretical_Perspectives

Bakar, A. R. (2011). *Roles of technical and vocational education and training (tvet)*. Selangor: Universiti Putra Malaysia Press.

Blinov, V., & Esenina, E. (2019). Dual vet in Russia: Progress, problems and perspectives. *TVET @ Asia, 13, 1-15.* Retrieved from *http://tvet-online.asia/issue/13/blinov-et-al/*

Brunelli, M. (2015). Introduction to the analytic hierarchy process. Cham: Springer International Publishing.

Chan, Y. S. (2018, November 23). We need to change perception of tvet. *The Star Online.* Retrieved from https://www.thestar.com.my/opinion/letters/2018/11/23/we-need-to-change-perception-of-tvet

Chin, W. Y., Ch'ng, C. K., Jamil, J. Mohd., & Shaharanee, I. N. Mohd. (2017). Analyzing the factors that influencing the success of post graduates in achieving graduate on time (GOT) using analytic hierarchy process (AHP). *Proceedings of the 13th IMT-GT International Conference on Mathematics, Statistics and Their Applications*. Kedah, Malaysia. DOI: 10.1063/1.5012197

Frost, J. (2020). *Hypothesis Testing: An Intuitive Guide for Making Data Driven Decisions*. PA, USA: Statistics by Jim Publishing.

Haji, E. E., Azmani, A., & Harzli, M. E. (2017). Using AHP method for educational and vocational guidance. *International Journal of Computer Applications, 9*(1), 9-17.

Hussin, A., Mohamad, M., Hassan, R., & Omar, A. (2017). Technical vocational education training branding from perspective of stakeholder (parent) in Malaysia. *Advanced Science Letters, 23*(2), 1216-1219. DOI: 10.1166/asl.2017.7543

Ismail, K., Nopiah, Z., Rasul, M., & Leong, P. (2017). Malaysian teachers' competency in technical vocational education and training: A review. *Regionalization and Harmonization in TVET*. DOI: 10.1201/9781315166568-15

Ismail, S. A. (2019). Importance and challenges of tvet policy issues in Kurdistan region-Iraq. *Journal of Humanity Science, 23*(4), 285-293. DOI: 10.21271/zjhs.23.4.17

Karthikeyan, R., Venkatesan, K., & Chandrasekar, A. (2016). A comparison of strengths and weaknesses for analytic hierarchy process. *Journal of Chemical and Pharmaceutical Sciences, 9*(3), 12-15. Retrieved from https://www.jchps.com/issues/Volume%209_Issue%203/CSE%2042.pdf

Kasmad, Mustakim, M., & Sunarsi, D. (2020). Influences of price, promotion, and service quality on communities' interest in choosing vocational high school. *Journal of Educational Science and Technology, 6*(2). DOI: 10.26858/est.v6i2.15340

Khirotdin, R. K., Ali, J. M., Nordin, N., & Mustaffa, S. E. S. M. (2019). Intensifying the employability rate of technical vocational education and training (tvet) graduates: A review of tracer study report. *Journal of Industry, Engineering and Innovation, 1*(1), 1-5. Retrieved from https://fazpublishing.com/jiei/index.php/jiei/article/view/3

Koya, Z. (2019, July 4). Tvet courses are not for those who are academically weak, Kula tells parents. *The Star Online*. Retrieved from https://www.thestar.com.my/news/nation/2019/07/04/tvet-courses-are-not-for-those-who-are-academically-weak-kula-tells-parents

Law, C.S. (2018). Malaysia public universities' graduate employability policies: An analysis of first degree graduates unemployment and underemployment issues. *International Journal of Social Science and Humanities Research, 6*(4), 480-489. DOI: 10.5281/zenodo.2589702

Mohamad, M. M., Saud, M. S., & Ahmad, A. (2009). The need in training and retraining for tvet teachers in Malaysia. *Journal of Technical Education and Training, 1(1),* 51-57. Retrieved from https://www.researchgate.net/publication/266881455_The_Need_In_Training_And_Retraining_For_TVET_Teachers_In_Malaysia

Mohd Amin, J. (2016). Quality assurance of the qualification process in tvet: Malaysia country. *TVET@Asia, 7.* Retrieved from http://tvet-online.asia/issue/7/mohdamin/

Mohd Ishar, M. I., Wan Derahman, W. M. F., & Kamin, Y. (2020). Practices and planning of ministries and institutions of technical and vocational educational training (tvet) in facing the industrial revolution 4.0 (ir4.0). *Malaysian Journal of Social Sciences and Humanities, 5*(3), 47–50. DOI: 10.47405/mjssh.v5i3.374

Omar, M. K., Rauf, M. A., Ismail, N., Rashid, A. M., Mohd Puad, M. H., & Zakaria, A. (2020). Factors on deciding tvet for first choice educational journey among pre-secondary school student. *European Journal of Molecular & Clinical Medicine*, *7*(3), 609–627. Retrieved from https://ejmcm.com/article_1543_6e7c9d3dc8529416980762760085 7ca3.pdf

Önder, E., Önder, G., Kuvat, Ö., & Taş, N. (2014). Identifying the importance level of factors influencing the selection of nursing as a career choice using AHP: Survey to compare the precedence of private vocational high school nursing students and their parents. *Procedia - Social and Behavioral Sciences, 122*, 398–404.

Rasul, M. S., Ashari, Z. H. M., Azman, N., & Rauf, R. A. A. (2015). Transforming tvet in Malaysia: Harmonizing the governance structure in a multiple stakeholder setting. *TVET@Asia, 4*. Retrieved from https://www.researchgate.net/publication/283624938_Transforming_TVET_in_Malaysia_Harmonizing_the_Governance_Structure_in_a_Multiple_Stakeholder_Setting

Saaty, T. L. (1980). *The analytic hierarchy process.* New York: McGraw Hill.

Saaty, T. L (1994). *Fundamentals of decision making and priority theory, with the analytical hierarchy process.* Pittsburgh, PA: RWS Publications.

Sabtu, H. H., Noor, W. S. W. Mohd., & Isa, M. F. M. (2016). Student attrition at technical and vocational educational training (TVET) institutions: The case of XCel Technical College in Malaysia. *Asian Social Science*, *12*(12), 197. DOI: 10.5539/ass.v12n12p197

Subramaniam, M., Loganathan, N., & Noordin, M. K. (2020). Tvet education for students in Malaysia: A systematic literature review. *Journal of Social Transformation and Education*, *1*(1), 64–74. Retrieved from http://journals.theapra.org/index.php/jste/article/view/4

"Thanks, but RM5.9bil not enough for TVET". (2019, October 12). *The Star Online*. Retrieved from https://www.thestar.com.my/news/nation/2019/10/12/thanks-but-rm59bil-not-enough-for-tvet

Tsang, M.C. (1997). The cost of vocational training. *International Journal of Manpower, 18*(1/2), 63-89. DOI: 10.1108/01437729710169292

UNESCO. (2019). *TVET Country Profiles-Malaysia*. Retrieved from https://unevoc.unesco.org/wtdb/worldtvetdatabase_mys_en.pdf

Vargas, R.V. (2010). Using the analytic hierarchy process (ahp) to select and prioritize projects in a portfolio. *PMI® Global Congress 2010—North America, Washington, DC.* Newtown Square, PA: Project Management Institute.

Wicaksana, B., & Fitriani, E. (2020). The effectiveness of role-play towards vocational school students' speaking skill. *Journal of English Language and Pedagogy*, *3*(2), 74-80. DOI: 10.33503/journey.v3i2.1081

Wiyarsi, A., Pratomo, H., & Priyambodo, E. (2020). Vocational high school students' chemical literacy on context-based learning: a case of petroleum topic. *Journal of Turkish Science Education, 17*(1), 147-161. Retrieved from https://www.tused.org/index.php/tused/article/view/878

Yusoff, R. M., Harun, A., & Zakaria, A. M. (2020). Tvet in Malaysia: Capabilities and challenges as

viable pathway and educational attainment. *Journal on Technical and Vocational Education*, *5*(1), 52–58. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3705146

Zeleke, T.G. (2018). The social perception of technical and vocational education and training in Ethiopia: A critical review. *International Journal of Research Publications, 3*(1). DOI:100315201882

Zia, A., Tan, P. L., & Subramaniam, G. (2019). Criteria and priorities of secondary school students in choosing their educational pathway: A selection process by analytic hierarchy process. *Malaysian Journal of Consumer and Family Economics, 22*(2), 233-247. Retrieved from https://www.majcafe.com/wp-content/uploads/2019/10/2019-Vol-22-S2-Article-15.pdf

AUTHOR BIODATA

Chia Ming Hong completed her Bachelor of Decision Science in Hons in the Universiti Utara Malaysia (UUM) and she is currently pursuing Master of Decision Science in the same university.

Chee Keong Ch'ng received his Bachelor of Decision Science in Hons and PhD in Decision Science from the Universiti Utara Malaysia (UUM), Malaysia. He is a Senior Lecturer in the Department of Decision Science, School of Quantitative Sciences, Universiti Utara Malaysia. His main research interests are understanding behaviour in the big data with multi measurements, operational research and data mining. He also involves in applied research that aim to resolve practical problems.

Teh Raihana Nazirah Roslan is a Senior Lecturer in Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, Malaysia. She completed her Doctoral Degree in Financial Mathematics at Auckland University of Technology, New Zealand in year 2016. Currently, she is actively researching issues related to financial mathematics and stochastic modelling, as well as mathematical and statistical applications in business and industry.