

Strategies to Enhance TVET Students' Participation in the Malaysian Construction Industry

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Abstract

The construction sector is one of the key contributors to Malaysia's economic development and infrastructure. However, the participation of Technical and Vocational Education and Training (TVET) students in the construction industry remains low, despite the availability of numerous career opportunities. This issue is attributed to several factors, including negative perceptions of 3D jobs (Dirty, Dangerous, and Difficult), a mismatch between TVET training and industry requirements, and concerns about safety and career prospects. Therefore, this study is conducted to identify the factors that influence the participation of TVET students, examine the effectiveness of TVET training in providing the technical skills needed in the construction industry, and to propose improvement strategies to enhance their participation in the Malaysian construction industry. A quantitative approach was employed, using a questionnaire administered to 187 students from six vocational colleges in Johor offering construction-related programs. The analysis revealed that industry engagement through mentoring, structured training (dual learning), and curriculum updates with current technologies such as BIM and IBS enhance students' confidence, technical skills, and employability. Continuous TVET promotion, family support, and active industry involvement proved to be the key strategies to attract students to the construction sector while developing a skilled and competitive local workforce. Strategic collaboration between TVET institutions, industry, and the government is essential to foster student interest in construction and build a competent local workforce.

1. Introduction

The construction industry is one of the fastest-growing sectors and a major contributor to national economic development. In Malaysia, the sector plays a significant role in providing infrastructure such as residential and commercial buildings as well as public facilities. It also acts as a catalyst for socioeconomic growth and generates employment opportunities for both local and foreign worker. The construction industry is one of the major contributors to Malaysia's economic growth and infrastructure development. The sector contributes significantly

to the national economy through the development of residential, commercial, and public infrastructure projects while also creating employment opportunities for local and foreign workers (CIDB, 2022). However, despite the rapid growth of the industry, Malaysia continues to rely heavily on foreign labor, particularly in the construction sector. According to the Department of Statistics Malaysia (DOSM, 2023), the shortage of skilled local workers remains one of the major challenges affecting the sustainability of the industry. Technical and Vocational Education and Training (TVET) plays an important role in producing skilled and competent graduates to meet industrial demands. In Malaysia, TVET institutions such as Vocational Colleges, Polytechnics, Industrial Training Institutes (ILP), and MARA Skills Institutes provide technical and practical training aligned with industry needs (UNESCO, 2015). Nevertheless, the participation of TVET graduates in the construction industry remains relatively low despite the increasing availability of career opportunities in the sector.

Several studies have identified factors contributing to this issue, including negative perceptions toward construction careers, which are often associated with 3D jobs (Dirty, Dangerous, and Difficult), low salary expectations, limited career advancement opportunities, and mismatch between TVET training and industry requirements (Ismail et al., 2019; Rashid, 2021). In addition, insufficient exposure to current technologies and limited industrial experience may reduce students' confidence and readiness to work in the construction sector (Mohamad et al., 2019).

Therefore, this study aims to identify the factors influencing TVET students' participation in the construction industry, examine the effectiveness of TVET training in providing relevant technical skills, and propose strategies that can enhance TVET students' participation in the Malaysian construction industry. This study contributes to the existing literature by highlighting practical strategies involving curriculum enhancement, industry collaboration, and industrial exposure programs to strengthen local workforce participation in the construction sector.

2. Literature Review

2.1 TVET and the Construction Industry in Malaysia

Technical and Vocational Education and Training (TVET) is an education system designed to equip students with technical knowledge, practical skills, and employability competencies required by industries (UNESCO, 2015). In Malaysia, TVET has become an important component in supporting economic growth and human capital development under the National TVET Policy and Shared Prosperity Vision 2030. The construction industry requires a highly skilled workforce due to the increasing use of modern technologies such as Building Information Modeling (BIM), Industrialized Building System (IBS), and automation systems. However, the participation of TVET graduates in this sector remains limited due to various challenges, including societal perceptions and training mismatches with actual industry needs (Rashid, 2021).

2.2 Factors Influencing TVET Students' Participation

Students' participation in the construction industry is influenced by several internal and external factors. Family support has been identified as one of the important factors influencing students' career decisions. Ahmad and Jamaluddin (2020) stated that positive encouragement from family members can increase students' confidence in pursuing technical careers.

Negative perceptions toward construction careers also significantly affect students' interest. Construction jobs are often viewed as dirty, dangerous, and physically demanding occupations (Ismail et al., 2019). Such perceptions discourage students from considering the construction industry as a long-term career option.

In addition, exposure to industry-based training programs such as Work-Based Learning (WBL) and industrial training can improve students' understanding of actual work environments while increasing their motivation and employability (Rahmat et al., 2020).

2.3 Effectiveness of TVET Training

The effectiveness of TVET training depends on curriculum relevance, instructor competency, training facilities, and collaboration between educational institutions and industry players. According to Abu Hassan et al. (2020), instructors with industrial experience are better able to deliver practical and industry-relevant knowledge to students.

Furthermore, the integration of current technologies into TVET training is essential to ensure graduates remain competitive. Mohamad et al. (2019) highlighted that limited exposure to modern construction technologies reduces graduates' readiness to meet current industry demands.

Strong collaboration between TVET institutions and the construction industry is also important in reducing the gap between institutional training and actual workplace requirements (Yaacob et al., 2021).

3. Research Methodology

This study employed a quantitative research approach using a descriptive survey design. The quantitative method was considered appropriate as it enables the systematic collection and objective analysis of respondents' perceptions and opinions related to the study variables (Creswell, 2014). The population comprised students enrolled in Construction Technology programmes at six Vocational Colleges in Johor, namely Batu Pahat Vocational College, Kluang Vocational College, Kota Tinggi Vocational College, Muar Vocational College, Segamat Vocational College, and Tanjung Puteri Vocational College, with a total population of 600 students.

The sample size was initially determined based on the sampling table developed by Krejcie and Morgan (1970), which recommended a minimum sample of 234 respondents for a population of 600. However, only 187 completed questionnaires were successfully returned and deemed usable for analysis. Despite this, the obtained sample size was still considered adequate for the study. To verify the sufficiency of the sample, a statistical power analysis was conducted using G*Power software. Based on Cohen's (1988) recommendation for a medium effect size ($f^2 = 0.15$), significance level of 0.05, and statistical power of 0.80, the minimum required sample size for the analysis was lower than the 187 responses collected. Therefore, the final sample was considered sufficient to provide reliable and statistically meaningful findings for this study.

4. Findings Analysis

4.1 Data Collection and Reliability Test

This study used a questionnaire method to collect data from a population of TVET students in the Construction field, totaling 234 students. Out of this number, 187 questionnaires were returned and could be analyzed, while the remaining 47 questionnaires were not returned, indicating a response rate of 79.9%. This high response rate reflects good respondent cooperation and enhances the reliability of the research findings. Therefore, the data obtained are sufficient and appropriate for analysis in achieving the research objectives.

Table 4.1 Response rate of TVET student questionnaires (Construction field) TVET student (Construction field)

Questionnaires	N	Response Rate (%)
Questionnaires Distributed	234	100
Questionnaires Returned	187	79.9
Questionnaires Not Returned	47	20.1

In addition to the response rate, this study also evaluated the reliability of the questionnaire instrument using the Cronbach's Alpha method, which is a standard method in quantitative research for measuring the internal consistency of questionnaire items (Shamsuddin, 2015). The higher the Cronbach's Alpha value, the higher the reliability of the instrument.

Table 4.2 Reliability statistics of the research instrument

Section	Number of Items (n)	Cronbach's Alpha (α)	Reliability Level
Section B	6	0.774	Acceptable
Section C	9	0.839	Good
Section D	6	0.802	Good

4.2 Data Analysis and Discussion

This chapter presents the research findings based on quantitative data analysis from 187 TVET students in the construction field who responded to the online questionnaire. The data analysis covers four main sections: respondent demographics, factors influencing participation in the construction industry, perceptions of the effectiveness of TVET training, and suggested improvement strategies.

(a) Respondents' Background

Table 4.4 details the background of the 187 respondents based on gender, age, TVET institution, level of study, and industrial training experience. The majority of respondents were male (142 students, 75.9%), while 45 respondents (24.1%) were female. In terms of age, the 21–23 years group recorded the highest percentage, followed by respondents aged 24 years and above, and 18–20 years. Respondents were from six Vocational

Colleges in Johor, with the highest contribution from Muar Vocational College and Kota Tinggi Vocational College, while the remaining colleges recorded percentages ranging between 9.0% and 17.5%. Regarding the level of study, Diploma students formed the majority, followed by Certificate students. The distribution of industrial training experience was nearly balanced, with some respondents having undergone industrial training while others had not. Overall, the data indicate that most respondents were male students aged 21–23 years, from various Vocational Colleges, primarily at the Diploma level, and with mixed industrial training experience. This profile provides a clear overview of the study population and serves as a basis for further analysis.

Table 4.4 *Summary of respondent background*

No	Item type	Description	Frequency (Respondents)	Percentage (%)
1	Gender	Female	45	24.1
		Men	142	75.9
2	Age	18 - 20 years old	19	10.2
		21 - 23 years old	158	84.5
		24 years and above	10	5.3
3	TVET Institutions	Batu Pahat Vocational College	45	24.1
		Kluang Vocational College	19	10.2
		Kota Tinggi Vocational College	31	16.6
		Muar Vocational College	35	18.7
		Segamat Kolej Vocational	26	13.9
		Tanjung Puteri Kolej Vocational	31	16.6
4	Level of study	Certificate	22	11.8
		Diploma	165	88.2
5	Industrial training experience	Yes	3	1.6
		No	184	98.4

(b) Mean, Standard Deviation, and Ranking Analysis Results Based on Section B

Table 4.5 *Table of results mean, standard deviation, and ranking analysis results based on factors influencing TVET students' participation in the construction industry table mean, standard deviation, and ranking analysis results based on factors influencing TVET students' participation in the construction industry*

No.	Item Statement	Mean	Standard Deviation	Mean Interpretation Level	Ranking
B1	I am interested in working in the construction industry after graduation.	4.02	0.534	High	6
B2	Family support influences my interest in construction.	4.17	0.392	High	2
B3	The construction industry is often associated with dirty, dangerous, and difficult work.	4.03	0.543	High	4
B4	The construction industry offers structured and progressive career pathways.	4.04	0.552	High	3
B5	Work-Based Learning (WBL) should be expanded in TVET programs.	4.03	0.543	High	4
B6	Continuous TVET promotion can increase students' interest in construction.	4.31	0.464	High	1

Table 4.5 presents the frequency, percentage, and mean score analysis of factors influencing TVET students' participation in the construction industry, involving 187 respondents. Overall, all items in Section B recorded a high level of mean interpretation, with mean scores ranging from 4.02 to 4.31, indicating positive student perceptions of the factors studied. The item continuous TVET promotion recorded the highest mean score (mean = 4.31), indicating that promotional efforts are effective in increasing students' interest in the construction field. This was followed by family support (mean = 4.17), which was also identified as an important factor influencing student interest. Students' perceptions of structured career pathways in the construction industry (mean = 4.04) and awareness of job challenges in the sector (mean = 4.03) also showed high agreement. Support for the implementation of Work-Based Learning (mean = 4.03) was similarly high, while students' interest in working in the construction industry after graduation recorded a mean score of 4.02. Overall, the findings demonstrate that external factors such as TVET promotion and family support play an important role in influencing TVET students' participation in the construction industry. These findings suggest that social support and effective promotional strategies can encourage student involvement while supporting the construction industry's need for skilled workers.

(c) Mean, Standard Deviation, and Ranking Analysis Results Based on Section C

Table 4.6 *Table of results mean, standard deviation, and ranking analysis results based on the effectiveness of TVET training in providing technical skills required in the construction industry*

No.	Item Statement	Mean	Standard Deviation	Mean Interpretation Level	Ranking
C1	The TVET curriculum content aligns with the actual needs of the construction industry.	4.01	0.529	High	8
C2	Industrial attachment programs for instructors should be expanded.	4.14	0.367	High	4
C3	The use of modern technology improves the employability of TVET graduates.	4.02	0.534	High	5
C4	Collaboration between TVET institutions and the construction industry is satisfactory.	4.16	0.363	High	2
C5	The dual training system is effective in producing skilled workers.	4.02	0.534	High	5
C6	The subjects I study align with the actual needs of the construction industry.	4.15	0.377	High	3
C7	Instructors have experience and knowledge in the construction industry.	4.02	0.534	High	5
C8	Training equipment and technology are comparable to those used at construction sites.	4.28	0.449	High	1
C9	Industrial training provides students with real work exposure.	4.00	0.558	High	9

Table 4.6 presents the analysis of students' perceptions of the effectiveness of TVET training in developing construction technical skills. Overall, all items in Section C recorded high mean interpretation levels, with mean scores ranging from 4.00 to 4.28, indicating positive perceptions of TVET training implementation in terms of curriculum, facilities, instructors, and industry collaboration. The item training equipment and technology comparable to those used at construction sites recorded the highest mean score (mean = 4.28), indicating that training facilities and technology are relevant to industry needs. This was followed by collaboration between TVET institutions and the construction industry (mean = 4.16) and alignment of subjects with actual industry requirements (mean = 4.15). Support for industrial attachment programs for instructors (mean = 4.14) was also high. Meanwhile, use of modern technology, effectiveness of the dual-training system, and instructors' industry experience each recorded mean scores of 4.02, while curriculum alignment (mean = 4.01) and industrial training exposure (mean = 4.00) also remained at a high interpretation level. Overall, the findings indicate that the alignment of training equipment and technology with real industry practices is a key factor contributing to the effectiveness of TVET training. This helps reduce the gap between institutional training and actual construction industry requirements, thereby improving students' technical skills and confidence.

(d) Mean, Standard Deviation, and Ranking Analysis Results Based on Section D**Table 4.7** Mean, standard deviation, and ranking analysis results based on improvement strategies to increase TVET students' participation in the construction industry

No.	Item Statement	Mean	Standard Deviation	Mean Interpretation Level	Ranking
D1	There should be closer collaboration between TVET institutions and construction companies.	3.99	0.554	High	6
D2	Mandatory industrial training in construction companies can increase students' interest.	4.14	0.376	High	3
D3	TVET study modules should be updated in line with the latest industry technologies.	4.15	0.372	High	2
D4	Institutions should organize more construction site visits and industry seminars.	4.02	0.534	High	4
D5	Mentoring programs with contractors can help students understand industry realities.	4.16	0.377	High	1
D6	Incentives such as certificates or practical benefits can attract more students to join this field.	4.02	0.534	High	4

Table 4.7 presents the analysis of improvement strategies to increase TVET students' participation in the construction industry. Overall, all items recorded high mean interpretation levels, indicating strong agreement among respondents regarding the proposed strategies. The mentoring program with contractors recorded the highest mean score (mean = 4.16), followed by updating TVET study modules in line with current industry technology (mean = 4.15) and mandatory industrial training in construction companies (mean = 4.14). Other strategies, such as organizing more construction site visits and industry seminars, providing incentives, and strengthening collaboration between TVET institutions and construction companies, also recorded high levels of agreement. Overall, these findings suggest that industry collaboration, curriculum updates, and practical exposure programs are key strategies for increasing student participation in the construction sector. These efforts can enhance students' understanding of the industry while strengthening their readiness for employment.

5. Conclusion and Recommendations

5.1 Summary of Research Findings

Overall, this study found that TVET students' participation in the construction industry is influenced by factors such as TVET promotion and exposure, family support, the implementation of Work-Based Learning (WBL), and perceptions of career opportunities in the construction sector. Internal student factors such as interest, motivation, and self-confidence also play an important role in determining their tendency to join the industry. The findings also indicate that students have a positive perception of the effectiveness of TVET training in providing construction technical skills. Relevant curriculum content, adequate training facilities and equipment, the use of current technology, and instructors' expertise were found to enhance students' readiness to enter the workforce. In addition, students supported the implementation of improvement strategies such as strengthening collaboration between TVET institutions and industry, increasing practical training and industrial training opportunities, and improving the image of the construction industry. These strategies have the potential to increase student interest and encourage more TVET graduates to pursue careers in the construction sector.

5.2 Research Implications

The results of this study have important implications for TVET students, educational institutions, the construction industry, and the government. The findings help students better understand opportunities and factors influencing participation in the construction industry, thereby reducing negative perceptions of the sector. For TVET institutions, this study serves as a reference for improving curriculum design, training approaches, and industry collaboration to enhance graduate employability. From the construction industry's perspective, the findings help stakeholders understand the needs and expectations of TVET students in planning more effective local workforce recruitment strategies. Furthermore, this study supports the government and policymakers in developing more

focused TVET policies aimed at skilled human capital development and reducing dependence on foreign labor in the construction industry.

5.3 Recommendations for Improvement

Based on the findings of this study, several strategic recommendations are proposed to enhance TVET students' participation in the Malaysian construction industry. These recommendations are categorised into initiatives for TVET institutions, industry stakeholders, and long-term strategic collaboration to ensure sustainable workforce development.

(a) Recommendations for TVET Institutions

TVET institutions should continuously strengthen and update their curriculum to ensure alignment with current construction industry requirements and emerging technologies such as Building Information Modelling (BIM), Industrialised Building System (IBS), and digital construction management. Curriculum enhancement is essential to ensure that graduates possess relevant technical competencies and remain competitive in the evolving labour market.

In addition, the implementation of Work-Based Learning (WBL), industrial attachment programmes, and practical training activities should be expanded to provide students with greater exposure to real working environments. Continuous career exposure initiatives such as construction site visits, industry seminars, and engagement sessions with construction professionals should also be organised to improve students' understanding of career opportunities within the construction sector.

(b) Recommendations for Industry Partners

Construction industry stakeholders are encouraged to strengthen collaboration with TVET institutions through active involvement in curriculum development, industrial training, and apprenticeship programmes. Structured mentoring programmes between contractors and students can help improve students' understanding of actual workplace expectations while increasing their confidence and employability skills.

Furthermore, industry partners should provide additional incentives such as professional certifications, training allowances, and career development opportunities to attract more TVET students to the construction sector. Such initiatives can contribute to improving the image of the construction industry and encouraging local workforce participation.

(c) Proposed Strategic Plan

To ensure sustainable implementation, a phased strategic plan is proposed. In the short term, efforts should focus on increasing TVET promotion campaigns, industry seminars, career exposure programmes, and construction site visits to improve students' perceptions and interest in the industry. Medium-term strategies should emphasise strengthening dual-training systems, structured industrial internships, and curriculum enhancement initiatives that integrate current industry technologies and practices.

In the long term, continuous collaboration between TVET institutions, industry stakeholders, and government agencies is essential to develop a sustainable and competitive local workforce. This collaboration can contribute to reducing dependency on foreign labour while supporting the development of highly skilled construction professionals capable of meeting future industry demands.

5.4 Limitations of the Study

This study is limited to TVET students; therefore, the findings cannot be generalized to all TVET sectors. In addition, the use of questionnaires depends on respondents' perceptions and honesty, while time and scope constraints resulted in the study focusing only on selected aspects related to student participation and the effectiveness of TVET training in the construction industry.

5.5 Suggestions for Future Research

Future studies are recommended to use qualitative approaches, such as interviews with industry representatives, involve TVET institutions at the national level or in other states, and conduct comparative studies with TVET systems in other countries to identify best practices.

6. Conclusion

In conclusion, this study shows that increasing TVET students' participation in the construction industry requires an integrated approach involving students, TVET institutions, industry, and the government, with an emphasis on continuous collaboration to produce a skilled workforce that sustainably meets industry needs.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The authors are responsible for the study conception, research design, data collection, data analysis, result interpretation and manuscript drafting.

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