



The Knowledge and Skill Readiness of TVET Trainee in Construction Program for Green Construction Project Management

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Abstract: Project management with the concept of green building construction requires competence efficiency compared to conventional building project management. The readiness of prospective workers in the construction field also needs to be identified as it is a requirement. This study was conducted to identify the readiness of TVET trainees from two different TVET institutions in managing green concept construction projects. Readiness identified based on critical knowledge and soft critical skills. The study's objective was to identify the level of critical knowledge and soft critical skills readiness as well as to identify the differences in the readiness of TVET trainees from two different institutions. The study was conducted in a survey using a quantitative approach. The research instrument used was a questionnaire, and the study was conducted in two TVET institutions from different ministries (please stated name of the institutions and ministries). A total of 153 trainees as respondents and a simple random sampling method was used to determine the study sample. The findings show that the level of critical knowledge and soft critical skills are at a high level (both institutions?), and there are differences between these two TVET institutions in terms of critical knowledge, while there is no difference in terms of soft critical skills. Overall, the study shows that the TVET trainees are prepared in knowledge and skills in green concept construction project management. This study can be a part of reference for TVET programs, trainee, and trainers especially in Construction to ensure the aspects of critical knowledge and skills can be improved align with industry need.

Keywords: Soft critical skill, critical knowledge, readiness, green construction project management

1. Introduction

Technical and Vocational Education and Training (TVET) enhances practical skills, habits, comprehension, and knowledge associated with work in various economic and social life fields. To develop a generation equipped for the twenty-first century in tandem with a green technology policy, trainees must master various skill sets, or more precisely, green skills. Green skills are defined by CEDEFOT (2017) as the knowledge, abilities, values,

and attitudes necessary to live in, create, and support sustainable communities. One of the diverse skills that TVET trainees must acquire is applying green skills at a current level and applying green technology in a variety of sectors. Green technology and generic green skills are inextricably linked and compatible. Most green technology subjects are concerned with energy, environmentally friendly purchasing, green chemistry, green nanotechnology, and green building. From a green building standpoint, each construction should incorporate sustainable or green management practices to ensure that the green building constructed meets all applicable standards. As a result, TVET trainees must be exposed to technologies and prepared to address any issues that arise when implementing green management using the critical knowledge and soft critical skills acquired at technical institutions. Although TVET trainees have emphasized aspects of knowledge and skill in project management, each technical institution's learning environment is unique and has a distinct study scope. McCoy, Patrick, O'Brien, Novak, and Cavell (2012) stated that the green skills issue should be explained in terms of the training and learning programs that occur. Hamza et.al (2020) indicate the three main factors that could be included in the integration of green skills into the curriculum of building construction trade include environmental, economic, and social factors. Hence, it relates to the students or trainees must possess the critical knowledge and soft critical skills in green construction project management for the building construction industry to quickly implement Malaysia's sustainable development plan.

1.1 Research Background

TVET programs in the construction industry should aim to equip trainees with the knowledge and skills needed for sustainable and green construction project management. The following are some key knowledge and skill areas based on UNESCO-UNEVOC (2017) that TVET trainee should possess:

- a) Project Management: Knowledge of project management principles, methodologies, and tools is critical for successful green construction project management. Trainees should learn how to plan, execute, monitor, and control green construction projects.
- b) Communication and Interpersonal Skills: TVET trainees should develop strong communication and interpersonal skills. The ability to work effectively with team members, stakeholders, and clients is critical in ensuring the success of green construction projects.
- c) Sustainability Analysis: Trainees should learn how to conduct sustainability analysis and environmental impact assessments for construction projects. This knowledge helps in identifying areas for improvement and implementing sustainable practices throughout the project lifecycle.
- d) Problem Solving: TVET trainees should learn how to identify, analyze, and solve problems related to green construction projects. This skill is essential in ensuring project success and overcoming potential obstacles.

According to Zahir et al. (2014), the ever-growing urban population necessitates rapid infrastructure development, which results in areas becoming saturated, reducing available green space. This concrete forest has resulted in various environmental problems, including urban heat islands and flash floods, which have disproportionately impacted citizens. For example, Kuala Lumpur's green areas have shrunk to 59.4 percent (14,386 hectares) of their original 24,222 hectares in 2012. (Yusof & Johari, 2012). The municipal process has also exacerbated Kuala Lumpur's environmental problems, resulting in high demand for green spaces. This awareness has compelled the government to establish re-planting areas to address the issues. Thus, the government phased in the concept of green building (GB). Simultaneously, by incorporating green concepts and measures into the planning of the building construction industries, we can mitigate the harms imposed on the environment. Nevertheless, Malaysia's lack of knowledgeable and skilled parties in green technology, mainly green project management, makes implementation difficult and development slow. Due to the shift from conventional to green practices in homebuilding, firms are expected to acquire new skills and knowledge to meet market needs (McCoy et al., 2012). As a result, new critical knowledge and soft critical skills in green construction project manager must be implanted throughout the workforce. Thus, the government's primary focus in developing technical skills, including knowledge and green skills, through TVET institutions in Malaysia is on TVET trainees.

Nowadays, construction project management requires critical knowledge to resolve issues in the construction industry. Numerous studies have established that green technologies create such barriers for developers, clients, and contractors. Darco et al. (2017) identified two possible explanations: insufficient knowledge or technical expertise and a lack of knowledge with the products, materials, system, or design. From the perspective of TVET trainees, particularly those enrolled in construction technical institutions, critical knowledge is necessary for implementing green construction practices. Thus, A set of non-technical skills, such as social and emotional, cognitive, and metacognitive, basic digital skills and basic skills for green jobs, transferable across occupations and professions, as well as between low- and high-level jobs. Both core skills and technical skills are required by individuals, if they are to become employable, manage their careers in a fast-changing world of work, use digital

technology at work and in everyday life, achieve life goals and contribute to their own well-being and that of their community (ILO, 2021).

Positively, new emerging occupations will emerge in Malaysia's green building sector shortly. Ismail & Hassan (2013) report that the primary issue raised by industries is trainees' lack of product quality and skills. Although the system is designed to meet observed or projected labor market demands, Malaysia's current TVET programs are predominantly supply-driven. They do, however, place insufficient emphasis on matching training to available jobs. Additionally, training institutions rarely track their graduates' employment destinations. Technical instructors are critical members of TVET institutions because they must be adaptable to changes in the industry to produce highly skilled graduates who meet the country's current and future needs (Mohd & Hisham, 2011). Not to mention, the TVET institution should work to improve the quality of the TVET curriculum. It should also be refined to produce a balanced individual on all levels, and the curriculum should be developed per industry needs and changes. As Yapin et al. (2017) stated, the implementation of green skills is evaluated in terms of their importance in education and training through co-curricular activities as a proactive step toward a green industrial system that benefits the economy as it raises awareness about the social and green environment.

1.2 Problem Statement

According to the background research presented, there is a need to examine the readiness of TVET graduates in construction technology courses, as they are expected to be prepared in a variety of ways, most notably in terms of implementing knowledge and skills, as construction projects today are centered on the concept of incorporating green technology toward a sustainable country. The lack of critical knowledge and soft critical skills has led the TVET trainees to be rejected to work in the company. A few research has stated that neither do TVET graduates have adequate knowledge on their areas of study nor conversant with current affairs in their fields. Not to mention, TVET trainees have also been said to have a lack of soft critical skills such as innovativeness, communication skills, including the ability to express themselves orally and in writing that could affect them in leading any project management in the future, especially regarding green construction. Additionally, this research focuses on the knowledge and soft critical skills required for green construction management, specifically green building. Not to mention, to achieve a green future in multiple sectors in mind, the process entails more than a green environment. In other words, the transition from conventional to low-carbon technology will necessitate comprehensive and new regulations, investment, and an institutional framework that have been started by the new policy on green knowledge and skills among TVET trainees as recently issued by the ILO. As a result, the researcher must understand the various knowledge and soft skills associated with green construction management available. It may result in a more structured approach to enhancing trainees' readiness for green implementation. Therefore, it is clear that there is a need to research the readiness of TVET trainees to apply green construction management acquired in technical institutions.

1.3 Objectives

The objectives of this study were to

- a) To identify trainees' critical knowledge in green construction project management
- b) To identify critical soft critical skills provided during training program related to green construction project management
- c) To differentiate the critical knowledge and soft critical skills in green construction project management among TVET trainees in the institutions

2. Methodology

The implementation of this study is focused on the scope, namely the readiness of TVET trainees to apply green construction project management in the future industry. This methodological approach is intended to accomplish the study's stated objectives. The research was conducted using specific methods for obtaining information from respondents who took part in the study. As a result, the appropriate methodological approaches can help ensure the authenticity and accuracy of the findings.

2.1 Research Design and Procedure

The survey research design was applied in and quantitative approach with survey research instrument was applied in this research. Survey research is a popular method of collecting data from many people to learn about their beliefs, opinions, attitudes, behaviors, and experiences. The questionnaire was developed based on literature review focus on two variables; critical knowledge and critical soft skills to measure the readiness of green project management for construction trainees. This study examined two categories of TVET institutions in which are Vocational College (Institution A) and Kolej Kemahiran Tinggi MARA (Institution B). TVET institution A consists of one technical institution in the construction engineering technology program, while TVET institution

B consists of four technical institutions in the construction technology program. Research procedure illustrates in Figure 1.

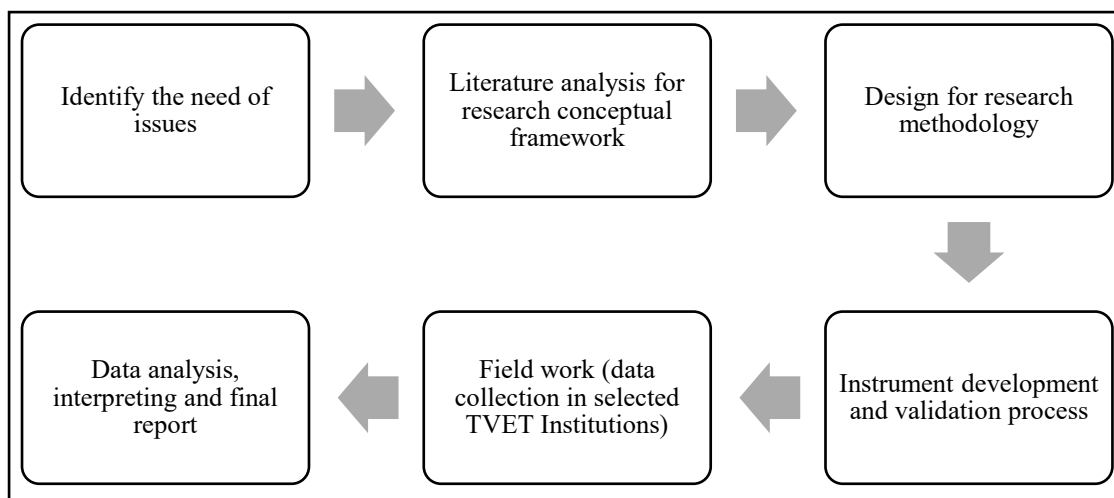


Fig. 1 - Research procedure

2.3 Research Instrument

The research instrument development based on literature review and based on research conceptual framework. Figure 2 shows the variables measure in this research. Knowledge is subdivided into three sub-variables: project management planning, quality management, and professional practices. Previous researchers proposed the sub-variables of analytical, communication, creative thinking, and leadership in terms of required skills. The suitability of these descriptions serves as the foundation for this research's investigation of the readiness of knowledge and soft critical skills in Green Construction Project Management

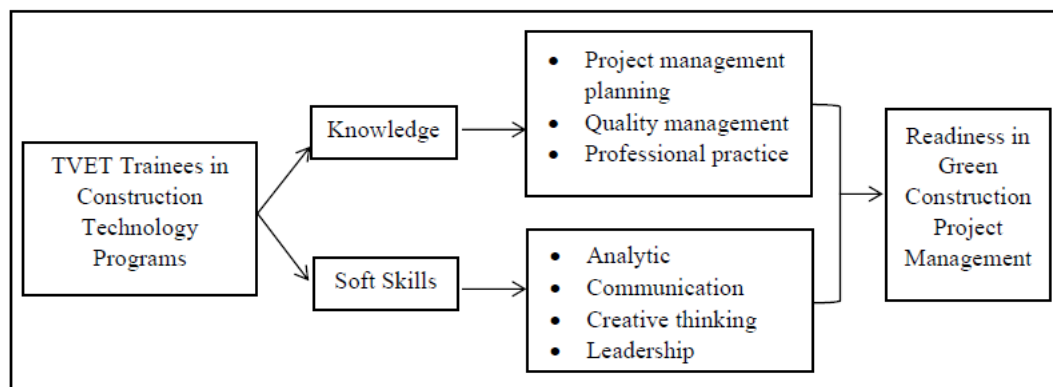


Fig. 2 - Research conceptual framework

For quantitative studies, the researcher may employ various methods, including questionnaires, evaluation forms, and achievement tests. Additionally, before conducting research, the researcher must determine research instruments. The questionnaire method is used in this study, and the instrument is derived from respondents' responses to a face-to-face questionnaire and an online survey. The primary objective of this method is to ascertain the response and level of preparedness of TVET trainees regarding the application of green building project management to accomplish the study's first and second objectives. Each institution received a total of 153 questionnaires. However, the distribution of questionnaires is more significant for the population of construction majors at TVET institution A when compared to TVET institution B, owing to the more significant number of trainees. This form was distributed to TVET trainees in each institution via email surveys and by filling out a "google form." This questionnaire contains several questions that the researcher developed in response to the stated objectives. This questionnaire utilises Likert Scales to assess trainees' readiness. The questionnaire comprises three (3) sections: A, B, and C. Table 1 summarises the information contained in this questionnaire. The Likert scale is used in this questionnaire form because it is a typical selection of answers often used in questionnaire forms.

Table 1 - Items information

Section	Description	Number of items
A	Respondent's demography	4
B	Critical Knowledge	18
C	Critical Soft-Skills	16

3. Results and Discussion

This chapter describes the data analysis and research results obtained through the feedback process submitted by respondents through the questionnaire that has been prepared. The data obtained were analyzed to obtain the values of frequency, percentage, and mean and deviation scores standard and T-test. The main purpose of this data analysis is for TVET trainee's feedback on the critical knowledge and soft critical skill readiness in green construction project management as well as the difference of readiness among the institutions.

3.1 Demographics of Respondents

Respondents involved in this study were randomly selected from two institutions were majoring in Construction Technology Program and Construction Engineering Technology Program. The institutions involved are located in the area of Johor. Demographic information is required to determine gender, age, institution, and the trainee took the program. Based on the descriptive analysis results, the number of male respondents was 78 people (51%) while for female respondents is a total of 75 people (49%). Next, based on the descriptive analysis results, most trainees are aged between 17-20 years, 64 people (41.8%)—next, followed by respondents aged between 21-24 years, which is a total of 83 people (54.2%). The least respondents are 25-28 years old, which is six people (3.9%). Not to mention, most of the trainees are from TVET institution A, which is 89 respondents (58.2%) while TVET institution B have 63 respondents (41.8%). In addition, most of the trainees are from TVET institution A, which is 89 respondents (58.2%) while TVET institution B have 63 respondents (41.8%). Lastly, the analysis of trainees' critical knowledge in green construction project management is divided into two parts: Construction Technology, 63 respondents (41.2%) for TVET institution B. Also, TVET institute A, with the Construction Engineering Technology program, 90 respondents (58.8%).

3.2 Trainees' Readiness in Critical Knowledge in Green Construction Project Management

A total of 18 items have been developed to assess the readiness of trainees on green construction project management critical knowledge. Based on the results of the analysis as shown in Table 3.4, respectively overall has shown a high perception of critical knowledge among respondents. The highest mean value is for item B2 i.e. related to safety measures when performing work on construction sites with a mean value of 4.25 and a standard deviation of 0.746. While item B14 has the second highest mean value is 4.13, and the standard deviation is 0.749. It is related critical knowledge in explaining the importance of efficient water use in implementing green construction. Furthermore, from Table 2, there are trainees who aren't very good at using BIM software simulation from the aspect of designing electrical and mechanical systems for item B15, with the lowest mean value with a mean value of 3.73, the standard deviation is 0.851. However, it is still at a high level. Table 3.1 presents the data obtained for this part.

Table 2 - Trainees' readiness in critical knowledge in green construction project management

No	Statement	Mean Score	Standard Deviation	Level
B1	I can explain the processes involved in green construction management.	4.10	0.897	High
B2	I can differentiate between conventional construction methods and green conceptual construction.	4.25	0.746	High
B3	I can detail the effects of pollution on the environment due to unsystematic management of green building construction with specifics.	4.10	0.709	High
B4	I can clarify that the irregular management of construction waste can contribute to the generation of greenhouse gases (Green House Gases, GHG)	4.03	0.806	High
B5	I can categorize the criteria of materials or products used in green construction management.	4.04	0.873	High
B6	I can review that controlling the use of resources can help reduce energy consumption from green conceptual management.	3.99	0.795	High

B7	I can manage finances through sustainable planning based on the learning and teaching found in green construction management.	3.79	0.901	High
B8	I can use and do specialized training through training and activities in the teaching and learning of green building management.	3.90	0.844	High
B9	I can explain the objective of studying capital cost control from the aspect of energy efficiency in building design.	4.02	0.854	High
B10	I can list the green assessment tools used to encourage construction companies to implement green construction.	4.01	0.835	High
B11	I can point out the importance of learning the key components of green building.	4.02	0.773	High
B12	I can evaluate the application of green construction principles from the aspect of the internal environment.	4.03	0.782	High
B13	I can explain the objective of learning green building from the aspect of green-based management and construction.	4.05	0.817	High
B14	I can explain the importance of efficient water use in the implementation of green construction	4.13	0.749	High
B15	I can make simulations using BIM software from the aspect of electrical and mechanical system design.	3.73	0.851	High
B16	I can list the impact of green building construction on construction sites, the environment, and landfills.	4.12	0.746	High
B17	I can classify safe designs based on the green management teaching, and learning gained	4.07	0.740	High
B18	I can apply green construction design learning in green technology training and testing.	4.07	0.723	High
Mean Score		4.03	0.802	High

The results show that TVET trainees are well prepared for the critical knowledge of green construction project management. The highest mean score shows that the trainees can differentiate between conventional construction methods and green conceptual construction. The critical knowledge stated has been explained by Shi et al. (2014) in their study. He explained that people must acknowledge that the building has a significant impact on the building environment, including implementing sustainability in various aspects. The analysis shows that the trainees can at least distinguish the pros and cons of each method of conventional construction and green conceptual construction to get in more detail with the green construction project management. Then, the moderate mean score gain from the analysis is the trainees are ready enough to clarify regarding the irregular management of construction waste that can contribute to the greenhouse gases effect (GHG). Musa, S. M. S., et al. (2019) explained that conventional methods in carrying out construction works are not environmentally friendly due to low-quality control at the construction site. It produces solid construction waste, which is uncontrollable. He added that this situation has contributed to the problem of environmental pollution such as air pollution, water pollution, and construction solid waste. Hence, the trainees are encouraged to understand the importance of implementing green construction project management. Lastly, the lowest mean score value for the critical knowledge is to identify the trainees' readiness for simulation using BIM software from electrical and mechanical system design. However, the mean score is still in a good and favourable position. This may be due to the implementation of BIM not being fully implemented compared to the use of CAD software introduced at the school level in the subject of engineering drawings. Trainees' readiness can be affected, as Thurairajah & Goucher (2013) said, apart from implementation issues, there is a lack of awareness of BIM and how it may be integrated into various professional specialties within the building sector could slow down the process of implying BIM.

3.3 Trainees' Readiness in Soft Critical Skills in Green Construction Project Management

A total of 16 items have been developed to assess the readiness of soft critical skills among trainees in green construction project management. Based on the summary of the results, the analysis of the level of readiness among TVET trainees in soft critical skills on the management of building construction projects done as shown in Table 3, there is high skill readiness feedback among respondents. The highest mean value is item C16, a mean value of 4.52, and its standard deviation value is 0.876. While for the lowest mean value is item C13 which is 4.18, and a standard deviation is 0.663. By referring to Table 3, the second-lowest mean value is item C13 which

is 4.22. It is related to the skills in priority to the views and feedback of my teammates. The deviation value's standard is 0.690.

Table 3 - Trainees' readiness in soft critical skills in green construction project management

No	Statement	Mean Score	Standard Deviation	Level
C1	I can form groups and perform tasks together according to a set time.	4.30	0.619	High
C2	I can take responsibility for problems that arise and resolve issues promptly without any excuses	4.26	0.750	High
C3	I can convey information with confidence, along with a strong example.	4.32	0.603	High
C4	I tend to act in decision-making according to a set time.	4.40	0.642	High
C5	I will think in detail about the implications that arise as a result of the decision made.	4.35	0.567	High
C6	I can solve problems quickly that could improve the performance of the building project environment.	4.36	0.635	High
C7	I can convey information on green construction management with confidence, along with a strong example.	4.29	0.708	High
C8	I am always trying to learn and add new ideas regarding green management and construction.	4.31	0.621	High
C9	I can see general project-related functions such as logistics management, information flow, and interrelationships within the organization.	4.24	0.696	High
C10	I can make presentations related to the topic of green construction smoothly and confidently.	4.37	0.604	High
C11	I can predict and describe a step forward in managing a green construction project.	4.25	0.654	High
C12	I give priority to the views and feedback of my teammates.	4.22	0.690	High
C13	I use the 3R concept (Reduce, reuse, recycle) in my daily activities.	4.18	0.663	High
C14	I can evaluate the construction of green building projects according to all circumstances.	4.35	0.672	High
C15	I tend to lead discussions and make decisions together in groups.	4.27	0.599	High
C16	I can take responsibility for problems that arise and resolve problems promptly without any excuses.	4.52	0.876	High
Mean Score		4.31	0.703	High

After conducting the analysis, the researchers found that TVET trainees have high soft critical skills in green construction project management. The highest mean value is TVET trainees' willingness to take responsibility for problems that arise and solve problems promptly without reason. Therefore, the analysis proves that TVET trainees have the leadership skills to manage specific projects regarding green construction. At the intermediate level, the mean value for trainee skills is continuous learning skills by striving to learn and add new ideas about green management and construction. Senaratne and Hewamanage (2015) explain continuous learning is vital because developing Green Buildings presents many new ideas. Continuous learning is essential because it can help trainees explore something new in implementing a more in-depth and creative green construction management in line with the current circulation. Thus, this study proves that trainees need to have a responsibility to continually learn new information and update their views on an ongoing basis. Additionally, the lowest mean score proves that the trainees are less skilled in using the 3R concept (Reduce, reuse, recycle). This may be due to difficulties in carrying out work involving recycling among trainees. Therefore, this may be one of the factors that cause trainees to be less prepared in applying innovative skills such as the implementation of recycled materials in real life.

3.5 The Readiness of Critical Knowledge and Soft Critical Skills in Green Construction Project Management Among TVET Trainees Between the Institutions

Based on Table 4, it was found that there was no significant difference in the soft skill readiness of TVET trainees ($t = 0.506$; $p > 0.05$). In contrast, there was a significant difference between the two institutions on the readiness of critical knowledge in TVET trainees ($t = 4.440$; $p < 0.05$). This indicates that TVET trainees from both institutions are different in readiness for critical knowledge compared to readiness for soft critical skills. The analysis showed that the critical knowledge of TVET trainees between the institutions is different. A high t-value and a significance level of less than 0.005 indicate significant differences between the institutions. The results may be due to the various methods of learning implementation of the respective institutions. TVET trainees from

skills institution B are more focused on producing skilled workers in implementing a field that has been offered. Nevertheless, the soft critical skills among TVET trainees in both institutions had recorded that the t-value is low, and the significant level is higher than 0.005.

Table 4 - The differentiation of critical knowledge and soft critical skills among TVET trainees in the institutions

No.	Statement	Institutions	Mean Score	Standard Deviation	t-value	Sig (2-tailed)
1.	Critical knowledge readiness in green construction project management	TVET Institution A	4.18	0.465	4.440	0.000
		TVET Institution B	3.81	0.574		
2.	Soft critical skills readiness in green construction project management	TVET Institution A	4.30	0.484	0.506	0.614
		TVET Institution B	4.26	0.277		

The results show a significant difference in the soft critical skills in green construction project management of TVET Trainees between TVET institution A and TVET institution B, Mohammed, I., Mohamed, and Wan. A, (2017) in their study states that the impact of soft critical skills on Malaysian Technical institutions is generally moderate. This may be because the emphasis exercised by both ministries on TVET institutions is balanced as the importance of TVET institutions is to focus on technical skills and hard skills. However, the mean analysis from the results of the institutions is high and eligible. Therefore, it is inevitable that the TVET trainee in both ministries is equal in soft critical skills in green construction project management. To summarise, the researchers found that the critical knowledge in TVET institutions from the two ministries was different due to the implementation of other delivery and learning methods. Not only that, but the learning period of the program is also one of the factors influencing the analysis related to green construction project management critical knowledge. However, the researchers found that the trainees in the TVET institution A had higher soft critical skills from the study conducted. To some extent, this has proved that TVET institution A have successfully applied soft critical skills from the aspect of green project management. Finally, the researchers also found that TVET trainees are prepared in implementing green construction project management in terms of critical knowledge and soft critical skills.

4. Conclusion

In conclusion, the researcher obtained the result of cooperation provided by the parties involved, especially the institutional management, instructors, and trainees; the study results concluded that trainees from all institutions are prepared to implement green project management in terms of critical knowledge and soft critical skills. These skills and readiness need to be taught in the trainees to produce TVET trainees who are successful in making an impact in development in the country to be more developed. Insufficient critical knowledge and skills will contribute to negligence, errors, and waste in implementing this green-based project management. Therefore, everyone must play a role in ensuring the effectiveness of developing green control in all aspects of Malaysia's sustainability.

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References

- CEDEFOP (2017). European public opinion survey in vocational education and training. Luxembourg: Publications Office. Cedefop research paper; No. 62. <http://dx.doi.org/10.2801/264585>
- Darko, A., Chan, A. P. C., Ameyaw, E. E., He, B. J., & Olanipekun, A. O. (2017). Examining issues influencing green building technologies adoption: The United States green building experts' perspectives. *Energy and Buildings*, 144, 320-332.
- Hamza, S., Jamal@Musta'amal, A.H., & Kamin,Y., (2020). Integration Factors of Green Skills into Building Construction Trade Programme in Nigeria. *Journal of Technical Education and Training*. Vo.12 (1), 1-10

- International Labour Organization (ILO). 2021. Global framework on core skills for life and work in the 21st century (Geneva). Available at: <https://www.ilo.org/wcmsp5/groups/public/>
- Ismail, A., & Hassan, R. (2013). Issues and Challenges of Technical and Vocational Education & Training in Malaysia for Knowledge Worker Driven. National Conference on Engineering Technology 2013 (NCET 2013), DOI: 10.13140/2.1.4555.2961
- McCoy, A. P., Patrick, O'Brien, P., Novak, V. and Cavell, M. (2012). Toward understanding roles for education and training in improving green jobs skills development, *International Journal of Construction Education and Research*, 8(3), 2012, 186-203.
- Mohd Noor, N., & Hashim, M. N. (2011). Penglibatan pensyarah dalam program sangkutan industri pensyarah (SIP): Satu kajian kes di Politeknik Kota Bharu (PKB). *Persidangan Kebangsaan Penyelidikan Dan Inovasi Dalam Pendidikan dan Latihan Teknik Dan Vokasional*.
- Mohammed, I., Mohamed and Wan. A. (2017), An Analysis of the Impact of Soft Skills on Malaysian Technical Institutions, *Advanced Science Letters*, Volume 23, Number 9, September 2017, pp. 8984-8987(4)
- Musa, S. M. S., Md Yassin, A., Zainal, R., Shafii, H., & Yoe, P Y. (2019). Perbandingan Penghasilan Sisa Pepejal Binaan antara Sistem Bangunan Berindustri (IBS) dengan Sistem Konvensional. *Journal of Information System and Technology Management*, 4(14), 72-83. doi: 10.35631/jistm.414007
- Senaratne, S. and Hewamanage, P.R (2015) The role of team leadership in achieving LEED certification in a green building project. *Built Environment Project and Asses Management*: 5(2): 170-183
- Shi, Q., et al.(2014). *Renewable and Sustainable Energy Reviews* 36 (2014) 203–211
- Thurairajah, N. and Goucher, D. (2013), "Advantages and Challenges of Using BIM: a Cost Consultant's Perspective", Available:<http://ascpro0.ascweb.org/archives/cd/2013/paper/CPRT114002013.pdf>
- UNESCO-UNEVOC (2017). *Greening Technical and Vocational Education and Training. A Practical Guide for Training Institutions*. Germany:UNESCO-UNEVOC International Centre for TVET.
- Yapin, H., Suhadi, N., and Esa. A., (2017). "Implementation of Green Skills through the co-curriculum activities among students Technical and Vocational Education Training (TVET) towards development of Green Industry." *Elixir Social Sciences* 107 (2017): 47295-47297.
- Yusof. M., & Johari. M. (2012). Identifying green spaces in Kuala Lumpur using higher resolution satellite imagery. *International Journal of Sustainable Tropical Design Research & Practice* 5(2): 93-106.
- Zahir, M.M.H., Raman, S.N., Mohamed, M.F., Jamil, M. & Nopiah, Z.M. (2014). The perception of Malaysian architects towards the implementation of green roofs: a review of practices, methodologies, and future research. *E3S Web of Conferences* 3: 1-8.