



Challenges and Directions of TVET in Facing IR 5.0 toward Sustainable Technical Education Environment

** Mohd Tafizam Mohd Taib*

SMK Nilai Impian, Nilai, Negeri Sembilan, Malaysia

**Corresponding author: mtafizam78@yahoo.com.my*

ABSTRACT

Challenges and directions of TVET in facing IR 5.0, new shifts in the learning environment through assessment of technical education programs were innovations towards universal education sustainability. The sustainable learning environment contains three pedagogical elements which are knowledge, skills, and technology. Sustainable knowledge is the core of sustainable technical education environment which interlinks the sustainable knowledge curricula and the mainstream knowledge curricula. Future sustainable knowledge should have a combined curriculum because the sustainable industry needs to produce sustainable apparel for future environmental societies. Hence, this study was conducted to evaluate Malaysian technical education. A CIPP model was used as a conceptual framework for the study. Research design used in this study was programs evaluation. Stratified random sampling was used to select 335 respondents from national secondary schools in Peninsular Malaysia consisted of 159 administrators and 176 teachers. Questionnaires, interview protocols and observation checklists were used as instruments in this study. Descriptive and inferential statistics were used to analyze the data. The empirical data of the study found that sustainable learning environment should take into account is the knowledge and skills of teachers, staff training and role of administrators. Sustainable technical education environment is the solution for the skill development of skilled workers to make them last longer, have awareness about their meeting life expectancy, and thus are adept at preventing garments from being thrown at the landfill faster than they should be. Therefore, proposing TVET education as the solution to human capital development will drive a sustainable industry in the future. Interview and observation data were also presented to support the quantitative findings. Implications and recommendations for teaching and learning as well as for future research are presented and discussed.

Keywords: Technical education, Sustainable learning environment, CIPP model, national schools, Malaysia

1.0 INTRODUCTION

In order to sustain the quality of TVET Teacher Education (TE) program, changes must be made along the time. The changes are important for the system to adapt with the changing economic and societal requirements and other socioeconomic trends. Due to the rapid changes that a system must undergo, it gives new challenges to the educational institutions to decide whether the system needs to be changed or sustained. The changes must be parallel to the current requirement to ensure the changes can be effectively implemented especially in TVET. The Industrial Revolution that started in Europe countries during the 18th Century gave a huge impact to the industrial worldwide. Now, the 4th Industrial Revolution that is happening must be considered in any TVET planning so that TVET products shall meet the requirement of the fast changing industries.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) have outlined various educational transformation initiatives through cooperation among member countries. The Millennium Development Goals (MDG) enacted in 2000 are directly related to the technical and vocational education system. Several MDG strategies have been implemented to improve all aspects of the quality of the educational environment including highlighting technical and vocational education through content improvement and educational methods, such as expanding student-centered learning methods, improving materials and learning technology through curriculum reform, teacher training, materials development, and monitoring and assessment of learning achievement (UNESCO, 2002; UN, 2010). However, MDG has less emphasis on improving knowledge, skills, values and attitudes. Thus, UNESCO has introduced the Sustainable Development Goals (SDG) 2015-2030, to ensure the development of quality and equitable education and to promote lifelong learning for all (UN, 2015; UNESCO, 2016). The SDG also emphasized that the main goal of technical and vocational education in the 2030 agenda, is to achieve sustainable development. The Bonn Declaration (2004) states that Sustainable Development for Technical and Vocational Education (TVE) must equip an employee with the knowledge, competence, skills, values and attitudes to produce a responsible and productive citizen who is always appreciative of the success of the work performed. Those initiatives would create a sustainable and innovative society.

During the 10th Malaysian Plan period, (2011-2015), several efforts to modernize and expand access to quality TVETs to meet industry needs have been implemented in Malaysia: (i) improving TVET quality, (ii) strengthening TVET curriculum, (iii) enhancing relationships with industry and professional bodies, (iv) increasing student participation in vocational streams in technical secondary schools, as well as (v) broadening and restructuring of Malaysian Plan of Vocational (MPV). This effort has contributed to the increase in Malaysian Certificate of Education (SPM) graduates joining TVET, up 36% in 2013 compared to 25% in 2010 (EPU, 2015). The TVET transformation program was launched in 2012, emphasizing, among others, to increase student participation in the TVET field in Malaysia (10% to 25%), compared to student involvement in the TVET field in European countries such as France, Germany, Finland and Austria (50% to 80%) (KPM, 2013). In support of TVET's policies and transformation plans, the Technical and Vocational Education Division – Malaysian Ministry of Education (BPTV - KPM) has outlined three key roles: (i) ensuring the implementation and progress of technical and vocational education at the local school level, (ii) providing opportunities for students who are likely to to technical and vocational education and thus reduce student dropout problems, and (iii) provide equal opportunities for technical and vocational education to all students (Asnul et al., 2013).

The Malaysian Education Development Plan (PPPM) 2015-2025, was formulated to transform the national education system. To ensure the quality of international education, it is important that Malaysia compares its education system with international benchmarks to keep it in line with international education development. The sustainability of PPPM's is driven by the implementation of the Eleventh Malaysia Plan (2016) [2016-2020], the Economic Planning Unit (EPU), which has formulated nine strategic papers, transforming education and technical and vocational training to meet industry demand and contribute to economic growth, in line with globalization, the knowledge-based economy, the technological advances and mobility of the global workforce where the focus is on transforming the TVET delivery system to increase TVET's attractiveness as an educational path of choice because according to Ramlee (2013a), to advance Malaysia towards industrialized countries, human capital investment is critical. The knowledge-based economy (k-economy) requires a lot of creative and innovative workers.

In line with the rapid growth of technology and industry and the need to produce creative and innovative workforce as well as the changing direction of the country's education in an era of globalization, the Ministry of Education has introduced technical elective subjects such as Fundamental of Sustainability

(AK), Technical Communication Graph (GKT) and Invention (RC) at the Secondary School started in 1995. All three subjects share the same goal and purpose of providing students with technological, innovative and creative understanding. The curriculum delivery method covers aspects of theory and practice that emphasize creativity and innovation through project-based learning (PBL). The secondary school technical subjects aim to provide students with a basic exposure to basic technical subjects in preparation for furthering their studies in engineering related fields (KBSM, 1989). In the era of globalization and the rapid development of technology, in the light of economic change, massive labour market and skills workers needed. TVET transformation is becoming to be the agenda in most developing countries. Issues related to quality of education, lifelong education, entrepreneurial skills, as well as sustainable development are the main focus of the technical and vocational education transformation (UNESCO, 2015). In Malaysia in general, several previous studies on AK, GKT and RC subjects have identified several problems and weaknesses in their implementation in secondary schools.

Teacher's knowledge and skills are a challenge in teaching AK, GKT and RC (Radin, 2008; Kelly, 2009; Yusuff & Soyemi, 2012; UNESCO-UNIVOC, 2013). Furthermore, the study by Ruhizan et al. (2012) find that students often face difficulty in solving problems due to poor visualization due to inappropriate student selection mechanisms based on their academic achievement at Level Three Assessment. School administrators do not understand technical subjects, weaknesses of TVET leadership in designing, organizing and implementing effective strategies towards generating skilled and innovative human capital (Abu Bakar, 1991; Irdyanti, 2016). Previous studies have also found that AK, GKT and RC subject teachers are still less exposed to proper training and skills, teachers' readiness to teach subjects is low, teacher ICT skills are weak, as staff training is poorly implemented (Azizi & Roslan, 2000; Rashidah, 2001, Jamil; 2008, Nordin, 2011; Asnul et al., 2013).

2.0 STATEMENT OF THE PROBLEM

In the era of globalization and rapid technological developments, based on economic changes. Sustainable TVET environment has become an agenda in most developing countries. Issues related to quality of education, lifelong learning, entrepreneurial skills, infrastructure as well as sustainable development (SD) are the main focus of the transformation and innovation in technical education (UNESCO, 2015; UNESCO, 2016). In Malaysia generally, the achievement of technical stream students less encourage and the decline in student enrolment has been a factor in the success of the transformation. Malaysian Examination Board (LPM) data for AK, GKT and RC subjects indicate that students' achievement was weak. Based on previous empirical studies on implementation of technical education in Malaysian secondary schools, the key issues are limited teacher knowledge and skills, poor administrative role and lack of staff training (Azizi & Roslan 2000; Rashidah, 2001; Ahmad Zairi. 2002; Jamil, 2008; Nordin, 2011; Ruhizan et al., 2012; Azaman et al., 2012; Asnul, 2013; Sadrina & Ramlee, 2019; Irdyanti et al., 2015; Mohd Tafizam et al., 2020; Mohd Tafizam, 2022). Therefore, it's important for Malaysia to improve their TVET system in line with the development of technical education 4.0.

3.0 METHODOLOGY

Research design used in this study was programme evaluation study using part of the Context, Input, Process and Product (CIPP) model by Stufflebeam et. al (1971). The sample size of the study was based on Krejcie & Morgan's sample size table, in which 335 survey respondents were randomly selected based on zones. A total of 12 respondents at the Secondary School were interviewed. Stratified random sampling was used to select 335 respondents from national secondary schools in Peninsular Malaysia consisted of 159 administrators and 176 teachers. Because the respondents in this study are numerous but require minimal interaction with the respondents, the questionnaire is suitable for use. Although the data obtained through the survey in this study were numerical data and were analysed according to descriptive statistical procedures and inferences, some of these numerical data require more in-depth explanations through interviews from a small number of respondents. Further observations using the checklists were also conducted to see the general teaching and learning process through school visits.

Questionnaires, interview protocols and observation checklists were used as instruments in this study. Cronbach Alpha reliability index for the three sets of questionnaires were between 0.77 to 0.93. Descriptive

and inferential statistics were used to analyse the data. Figure 1 shows the conceptual framework of the study based on several models selected to construct the appropriate input dimension construct including Stake (1967), Hammond (1973), Bushnel (1990) and Husted (2003). The dimensions of the process are Hammond (1973), Bushnel (1990) and Kirkpatrick (1996). Furthermore, product dimensions are shaped by the models of Tyler (1949), Stake (1967), Hammond (1973), Bushnel (1990), Kirkpatrick (1996), Husted (2003).

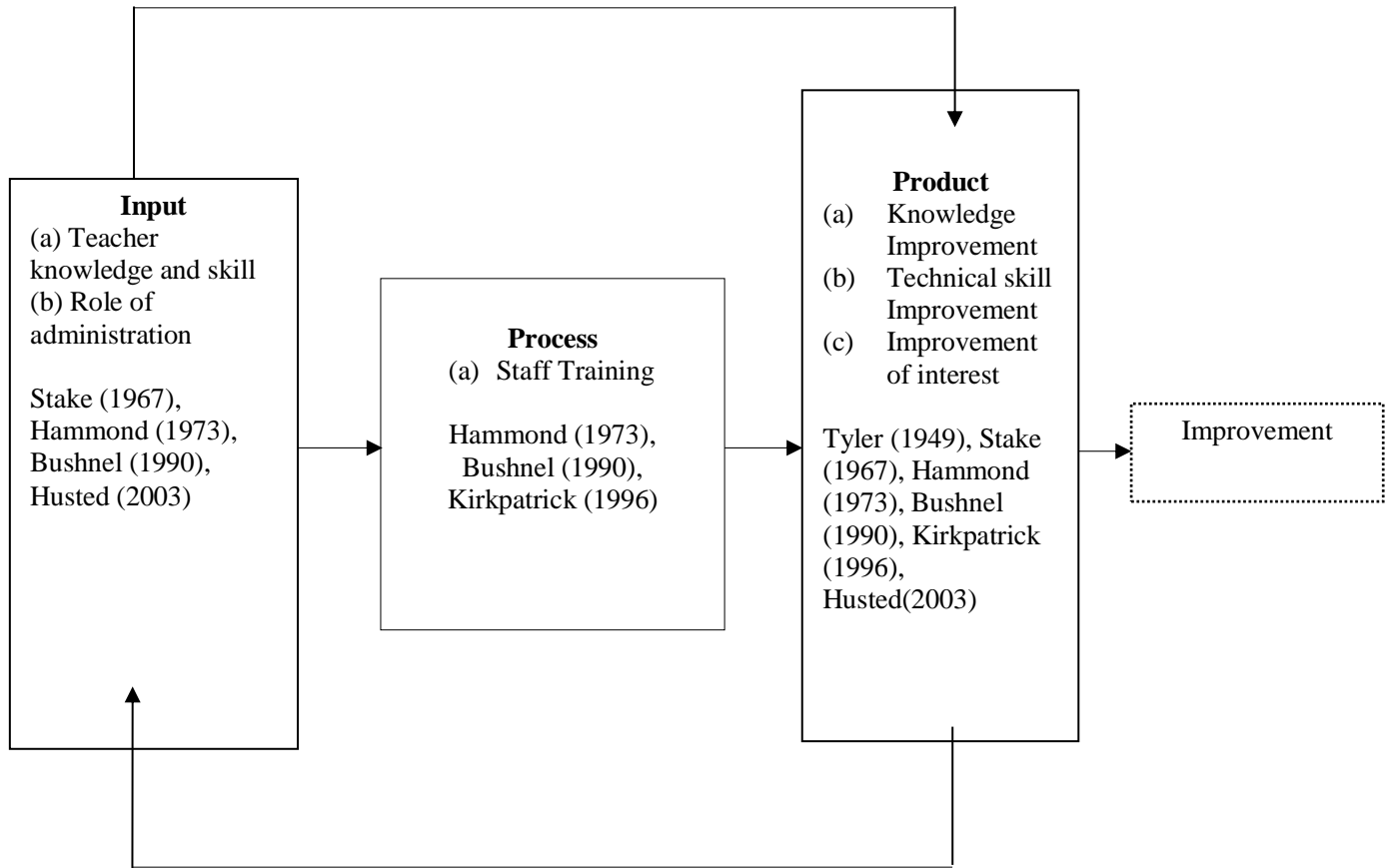


Figure 1: The conceptual framework of the study

Justification using the CIPP Model Stufflebeam et al., (1971) in this study is to obtain information through a comprehensive approach to providing information to decision makers. Improvements in the quality of the education system must be made to meet the challenges of the changing world with the application of Science, Technology, Engineering and Mathematics (STEM). In order to realize GTP and ETP, the needs of skilled workers and k-workers by 2020 need to be increased (Posavac, 2015; JPM, 2015). Based on the special features of the CIPP Model such as overall improvement orientation, quantitative and qualitative data collection methods and their flexible nature, it is well suited to the evaluation studies of AK, GKT and RC subjects. Based on these justifications, the researchers chose to use the CIPP Model Stufflebeam et al. (1971), focusing only on input dimensions (teachers' knowledge and skills and role of administrators), process dimensions (staff training process implementation) and product dimensions (subject products). The contextual dimension was dropped because the study did not focus on needs analysis, assuming that needs analysis was conducted before the subject was launched in 1995.

4.0 DISCUSSION

Sustainable Knowledge, Skill & Technology

Needless to say, the hard skills of TVET teachers are based on the current situation in the industries. New industries will require new skills meaning that TVET teachers have to work closely with the industries in

order to sustain their skills. They have to be able to communicate and negotiate with the industries to create the partnership between them. Yet, lack of self confidence in speech, poor English communication, not presentable to the industries, lack of trust and simply uninterested due to age factors has been noted by the experts as the attitude of TVET teachers towards partnership with the industries

Teacher skills are critical factors in determining the quality of educational experience provided to students (Kelly 2009). Knowledge readiness plays an important role in the teaching and learning process, but there are still teachers who lack the ability to apply knowledge and experience in implementing teaching and learning process (Saharudin, 1996 in Corcoran, 1981). The findings of this research show that administrators and teachers believe that teachers' knowledge and skills are good. This finding is in line with the study of Nordin (2011), who found that technical teachers have the knowledge and skills to implement the teaching and learning process. Good teacher knowledge and skills are important in implementing AK subjects as they emerged from the interviews with AK teachers in this study.

Technical teachers also need to be qualified by having the technical education, professional education, and work experience needed to succeed as a technical and career education teacher (Husted et al., 2003; Billet, 2011b, Asnul et al., 2013) . However, descriptive analysis found that 34.6 percent of non-optional teachers teach AK, GKT and RC subjects in daily secondary school. As a result of the interviews, the problems encountered were inexperienced teachers, teachers occupying only one field, teachers lacking technical skills (not optional) and teachers lacking pedagogical skills. In terms of the lack of knowledge, this finding is in line with the study of Abdul Kadir in Lilia (2009) who found that there is a significant difference in the pedagogical content knowledge aspect between new teachers and those who have had teaching experience. Teachers who have teaching experience are able to explain the concept in more detail. They are also able to encourage students to participate in class. The importance of optional teachers for technical subjects was also explained by Rashidah (2001), in his study which found that optional teachers monopolized RC teaching, of which 20 were optional teachers, while only three were non-optional teachers. The choice is appropriate given that RC subjects require certain qualifications especially to build student creativity in the latest technology.

Problem to mastery in three main areas of civil, mechanical and electrical engineering is a major challenge for AK subject teacher. The Inference analysis of this study showed that respondents were more confident in the knowledge and skills of GKT teachers than AK. The quantitative findings of this study support the findings of a study conducted by Jamil (2008), who found that teachers' readiness to teach AK was low. Empirical data also found that the skills of GKT and RC teachers using AutoCAD affected the performance of GKT and RC coursework. Furthermore, this study also found that AK, GKT and RC teachers are still lacking in ICT competency. This is in line with the findings of Azizi and Roslan (2000) who found that teachers' ICT skills were poor. According to Shulman (1987) and Fullan (2014) although a teacher has mastered his or her knowledge, ICT competency related to educational disciplines such as educational psychology and educational sociology are also important. Therefore, the provision of knowledgeable, skilled and motivated option teachers with sufficient numbers is critical. Rosehan (1994) in his study found that teachers of choice need to be proficient in teaching aspects including time management features, student discipline and behaviour, lesson delivery and teaching feedback.

Sustainable Administrators

Keller (2005) explains that when making a program decision, an administrator should be attentive to each member to maintain support for a program. Administrative Creativity and innovation is the key to the success and effectiveness of the planning and implementation of a program (Namara, 1998; Asnul et al., 2013; Irdayanti et al., 2015). The empirical data of this study show the role of administrators as responsible individuals at the school level to ensure that decisions and planning are implemented. Meanwhile, the administration's commitment to the subject also needs to be improved. Some of the themes that arise from interviews with administrators and teachers, such as the weaknesses of the relationship between administrators and teachers, the relationship between administrators and students, the administration's commitment to the subject and the management of money allocation of subjects among administrators need to be improved in order to realize the challenges of the Malaysian Education Development Plan (KPM, 2013) to provide quality governance to achieve the objective of ensuring strong school leadership and management is realized.

Nevertheless, non TVET personnel leading TVET institution also make things worse. This is because TVET requires specific knowledge in administration than the academic route. If it is administered as other academic route, it will lead to many underestimate in the requirement of TVET. This includes the low

payment for TVET graduates in the industries. The low payment of TVET graduates in the industries only contribute to the 2nd class perception from the community. Even though the expert noted it as getting better, it is still happening where the perception of 2nd class or drop out students are still lingers among TVET institutions.

Some of the weaknesses in the administration's role were also expressed by respondents in open questions such as poor financial management, lack of administrative support for AK, GKT and RC students and teachers. Administrators' low understanding of AK, GKT and RC subjects and the role of administrators at the Ministry of Education, the State Education Department and the District Education Office in monitoring the implementation still need to be improved. This finding is contrary to the opinion of Owen (1991), Keller (2005) and Irdyanti et al. (2015), who stated that administrators have the supportive role of providing the right environment for implementation to occur, the role of administrators as a prerequisite for successful implementation of a program. This explains that the role of administrators from the school level to the ministry level needs to be improved, in order for closer relationships and cooperation to improve the quality of the subjects. As Hashim (1991) points out, administrators need to have close and special relationships with their subordinates to collectively improve organizational performance.

Among the suggestion from respondents from this study through open-ended questions is school administrators needed to understand technical subjects, and administrators need to be creative and innovative in solving problems. Creativity and innovation are important practices in TVET leadership when planning, organizing and executing effective strategies towards generating skilled and innovative human capital (Abu Bakar, 1991; Irdyanti et al., 2015). Therefore, improvement should be made to the role of administrators in implementing AK, GKT and RC subjects as the study by Husin (2005) found that administrative support was a critical aspect that needed to be taken seriously in order to enhance program effectiveness. Azizi Yahya (1999) pointed out that principals need to work well together to ensure that the KHB program can be implemented more effectively. Similarly, a study by Yahya, Rashid, Kandar and Jailani (2003), found that most Life Skills teachers stated that principals need to be attentive and always support and encourage teachers to increase the effectiveness of the implementation of a subject at school.

Sustainable Training

In Malaysia and international education, the efficiency of interdisciplinary training methods is a contentious issue (Nagalaxmy Markandan et al., 2023). Like any other teacher education programme, TVET teacher education programme in Malaysia is abide by the same policy under the Malaysian Government. To be specific, there are only certain Public Universities that provide TVET Teacher Education Program nationally. Even though Faculty of Education is widely available in most of the major Public Universities, specific program that produce TVET teachers is scarce. The available Teacher Education Institution do not provide a full study level for TVET teachers with only up to Bachelor Degree level while the Public Universities only provide TVET Teacher Education program at the higher study level beginning from Bachelor Degree.

As administrators conclude that staff training is acceptable, teachers are not sure if staff training is adequate. Furthermore, GKT administrators and teachers agreed on staff training, whereas AK and RC teachers and teachers were not sure if staff training was adequate, one-way ANOVA analysis revealed no significant differences between GKT, AK and RC teachers and staff training. In the open-ended questions some themes emerged such as staff training that had not been carried out for the last five years and lack of training in the use of tools and technical skills. The results also show that administrators and teachers have reiterated that in the last five years the number of staff training organized by the Ministry of Education, the Education Department and the Education Office has decreased. In addition, several themes emerged in the areas of staff training such as training of teachers and administrators, training of equipment and machinery and workshop management. In addition, innovative training on the development of interpersonal skills also needs to be conducted. Observations also found that documents related to curriculum implementation, only 66.7% of schools were able to submit documents related to school coaches, course schedules and course materials.

Empirical data showed that aspects of staff training need to be improved, especially staff training organized by the Ministry of Education and the Department of Education on the knowledge and skills of teachers for all three subjects. Internal training on aspects of pedagogy also needs to be organized by the school. Further training to improve teachers' skills also needs to be evaluated, as well as motivational training also needs to be improved over time. Campbell et al. (2004) recommended that a professional development of a teacher can be carried out by attending short-term and long-term courses. Innovation is needed in schools because teachers need to be trained or retrained because the skills they possess are no longer suitable for

effective work in the teaching profession (Cascio, 1995; Luck & Peng, 2010). It is also found that knowledge sharing and skills among teachers are limited because in general, only one subject teacher is placed in a school, while the knowledge of teachers in their field or field is seen as important and motivating to their students (Ann Lewis, 2007; Asnul et al., 2013; Mohd Tafizam & Ramlee, 2018).

Some themes also emerged based on respondents' answers in open-ended questions such as subject teachers not attending any related courses for this subject, no courses to enhance teacher professionalism, no courses for AK teachers since 2010 and the majority of AK and RC teachers have no equipment and machine maintenance skills. The interview also made it clear that there are still administrators who agree that staff training is poorly organized at the school and district levels. While staff training is one of the factors that needs to be given the main focus on vocational education and training towards the Industrial Revolution 4.0 (Klaus, 2017).

The teachers provided feedback that was consistent with the findings of the questionnaire but surprisingly, there was a response from the teacher's respondents stating that the staff training program for this subject had not been implemented in the past 5 to 14 years. The findings of staff training in this study, in line with Zahba's (1999) study of in-service training towards effective school success, found that weaknesses in the implementation of staff training in schools needed to be improved in terms of training planning, training objectives, training curriculum, training environment and training evaluation. Rashidah (2001) found that teachers are still less exposed to proper training and skills to enable them to improve teaching procedure. Therefore, innovation in staff training should be conducted more effectively as suggested by Ramlee (1999) and Jamil (2002). The findings of this study are also in line with the findings of Nordin's (2011) study which found that the series of courses organized by the Ministry of Education Malaysia was inadequate as teachers were expected to benefit greatly after completing the course.

As such, those involved in staff training at the Ministry of Education Malaysia need to change their staff training strategies to a more systematic staff training system starting at the university level and the Teacher Education Institute which trains prospective teachers, and its continuation through the on-the-job training system. Innovation of on the job training is based on regular skills needed. The training should be based on skills using the latest technology and should be carried out periodically. Further training of administrators and teacher professionalism also needs to be conducted by the MOE so that teachers can improve the quality of teaching. Innovation internal training at the zone level or District Committee by the Teacher Activities Centre (PKG) needs to be enhanced as it is a platform for sharing knowledge and experience between AK, GKT and RC teachers.

According to Ornstein and Hunkins (2017), the field of teaching is a professional field that requires a person to practice for a certain period of time. Staff training is a continuous process organized by the school with specific goals and objectives to enhance teachers' skills and abilities as teachers' skills and abilities have a significant impact on student achievement and learning. However, the survey conducted using the observational checklist of this study found that 33.3% of the schools visited did not have documents relating to school coaches, course schedules and course materials. Therefore, the implementation of staff training in this subject at school should be implemented periodically and further enhanced by taking into account the facilities of the faculty, the knowledge and skills of the teachers and the readiness of the students. Administrators need to increase the number of staff training to increase teachers' knowledge and skills in the subject matter. In general, it can be concluded that the staff training in the implementation of technical subjects in daily high school is poorly conducted. According to Pratt (1980; 1994) wherever the curriculum is formulated, it is the teacher who determines whether or not the curriculum works. Providing innovative training or retraining, is a solution that needs to be addressed to overcome the problem of teacher inefficiencies in their teaching.

It is undeniable that a teacher's experience in implementing the teaching and learning process as informal training. Kang (2010) and Fullan (2014) point out that staff training is a self-learning activity and a reflection on shaping individual skills, knowledge and expertise. Staff training is a continuous process organized by the school with specific goals and objectives to enhance teachers' skills and abilities as teachers' skills and abilities have a significant impact on student achievement and learning. However, in the context of the implementation of these subjects, the limited facilities available in most schools make the teaching process only done theoretically (Mohd Tafizam & Ramlee, 2017). The knowledge and skills of the teachers can be said to be at a minimum because most of these subjects are from various fields of engineering and technology that are derived from the Graduate Teaching Course (KPLI) program, which is given a pedagogical exposure of only 12 months. This finding is supported by a study conducted by Ruhizan et al. (2012) found that teachers and schools failed to help students acquire the knowledge, skills and exposure they needed outside of school

and at work. This will eventually lead to academic and vocational integration that emphasizes curriculum integration between the theoretical and practical constraints (Ramlee et al., 2003; Lauglo & Maclean, 2005; UNESCO-UNIVOC, 2013).

5.0 IMPLICATION AND RECOMMANDATION

Theoretical implication in this study, the CIPP (1971) evaluation model was selected as a guide in conducting the study. The CIPP model is structured systematically by categorizing each aspect of the assessment according to the context-input-process-product dimension. However, the CIPP model does not list in detail what are the relevant criteria for each dimension by priority. The empirical findings of this study have suggested that staff training systems and the appointment of optional teachers are two main criteria for evaluating technical subject programs based on assessment of input, process and product dimensions. The setting of these criteria is important in the evaluation process as it can influence the results. Indirectly, the findings of this study support the three main dimensions of the CIPP model: input, process and product. This finding also supports the opinion from Worthen et al. (2004), which cites evaluation studies need to involve the evaluation of various criteria in each dimension and to associate them with decision-making activities.

In addition to providing theoretical contributions, this study also provides practical implications for improving the implementation of technical education. Hammond's (1973) evaluation theory also proposes a three-dimensional model consisting of a domain of instruction that evaluates program features or activities. Institutional domains evaluate individual or group characteristics, while behavioural domains assess the program's objective features. However evaluation of staff training performance is not considered in the instructional domain. The empirical findings of this study suggest a new domain in Hammond's theory of systematic evaluation of staff training. Systematic staff training is a critical requirement according to Human Capital's theory of human resource provision. In the era of the industrial revolution 4.0 involving automation technology, staff training systems should not missed these digital transformations such as the Internet of Things (IoT), system integrations, robotic and cloud to stay competitive. While achieving national development initiatives through the National Transformation 2050 (TN50), creative and innovative human resource development will be a key focus of driving economic development and people's well-being by 2050. This finding also supports the fact that staff training is one of the factors it is necessary to focus on technical education towards the Industrial Revolution 4.0 (Klaus Schwab, 2017). Meanwhile, staff training is required in schools because teachers need to be trained or retrained because the skills they possess are no longer suitable to perform well in their work to bridge the technological gap (Cascio, 1995; Luck & Peng, 2010).

Empirical data shows that aspects of staff training need to be improved especially sustainable staff training organized by the Ministry of Education and the Education Department from the knowledge base of teachers for all three subjects which is not satisfactory, internal training on aspects of school-based teaching enhanced. These studies recommend, further training to improve teachers' skills needs to be conducted, as well as motivational training in the future. As such, those involved in staff training at the Ministry of Education Malaysia need to change their staff training strategies to a more systematic staff training system beginning at the University and the Teacher Education Institute that trains prospective teachers, and their continuity through the on-the-job training system. Job Training based on continuous skills training for teachers. The training should be based on the latest technology and be continuous and on schedule. Further training of administrators and teachers needs to be conducted so that administrators and teachers can better teach the process. Internal training at the zone level or District Committee by the Teacher Activities Centre (PKG) should be supplemented as it is a platform for sharing knowledge and experiences and issues between subject teachers, as internal training is minimal and difficult to implement as there is only one subject teacher in each school.

6.0 CONCLUSION

The findings from this study illuminate key challenges that have to be faced in sustaining TVET Teacher Education programme. TVET environment which makes up by the institutions, industries and communities as well as the leadership have to collaborate to create one supportive and balance ecosystem. The chain of involvement among the stakeholders will influence the sustainability direction of TVET holistically in facing IR5.0.

The deterioration in the quality of the subject, affecting the transformation of technical education in Malaysia. The creative and innovative growth of STEM graduates as outlined by PPPM, to meet the shortage of k-workers for the industry, may be difficult to realize without the efforts of improvement, new solutions, and paradigm shifts especially in the technical curriculum. The weakness of the process dimension is in the aspect of non-creative and innovative staff training by ministries and schools especially in the technical skills of teachers. The survey respondents suggested the appointment of teachers based on appropriate options and teacher technical improvement programs such as the use of the latest equipment and digital technology.

Based on the open-ended questions, the role of administrators as the top management in schools is critical. Teacher skills in terms of knowledge and technical skills need to be improved and refined in line with industry revolution 4.0 and TN50 aspirations. The quantitative and qualitative findings of the study also provide clear theoretical implications for the theory of accountability, domain of accountability and the role of creative and innovative administrators in making decisions that are not emphasized in previous theories. Meanwhile, the findings, interviews and observations of this study also provide theoretical implications for the CIPP evaluation model whereby administrators need to be creative and innovative. Theoretical implications have also suggested several new domains to the CIPP model in terms of staff training and teacher appointments according to options. The practical implications defined new improvements for teacher knowledge and skills, the role of administrators and staff training has been suggested by the respondents.

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