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Management Practice in Stimulating Safety Culture: A Study at Malaysian Education Sector



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Abstract Understanding safety culture in an organization can make a significant contribution to changing employee attitudes and behaviors in relation to workplace health and safety. Many studies have shown the importance of element that leads to broad behaviors, or culture actions, that are considered essential to the development of a positive safety culture in a workplace mostly in high-hazard industries, but less is done in the education sector. The aim of this research paper is to identify areas of improvement that can be addressed by managerial decisions and also policy activities in the Malaysian education sector, in creating academic organizations as a safe workplace for teachers and students. Therefore, this study was to analyze the relationship between factors that contribute to safety culture, analyzing through the Importance-Performance Matrix Analysis (IPMA) what the aspects to improve by the management to increase a safe working condition in the education sector, using PLS-SEM. Data were collected from 447 academic staff from Vocational Colleges using a cross-sectional survey by using a multi-stage sampling. Several components such as safety training, safety knowledge, PPE, safety communication, safety rule and the influence of peers significantly contribute to the positive safety culture in vocational training as the managerial need to keep up the great effort in bringing these element in this sector. Malaysian Ministry of Education should place OSH Education as a separate course in curriculums of vocational and technical schools at

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all levels. Furthermore, legal regulations must be included in OSH Education so that all staffs and students grasp the legal status and importance of OSH.

Keywords Education sector · Importance-Performance Matrix Analysis (IPMA) · Malaysia · Safety culture

1 Introduction

School as one of educational sector besides technical training schools, technical training center, and others is a workplace for teachers, students, academic staff and support staff, is an organization that is also exposed to various safety risks. Elements on occupational safety and health need to be exposed to teachers and learned by students as a preparation for the students for their future occupation and self-regulated towards any hazard and risk that occurred during their learning time at schools. According to the List of First Table in Occupational Safety and Health Act (OSHA) 1994, school is one of the educational organizations had been stated under the Public Sector and Statutory Bodies. Teachers have a huge responsibility to promote and maintaining the safety of students while imparting practical skills and knowledge in a specific area to students by the use of tools, machines, and materials in the workshop (Makhtar et al. 2019). The previous study has confirmed that there is a strong relationship between the educational level on dangerous substances and subjects, to the degree of education (Tureková and Bagalová 2018). For example, it is found that the level of education on the simple knowledge on first aid not just among primary and secondary school pupils but also among primary school teachers. Thus, it is very important to the teachers to themselves and the students from any possible risks and hazards, indirectly ensure their safety in school as a workplace where educational activities are performed (Hamzah et al. 2018; Ismail et al. 2017). Data showed the percentage of 0.96% number of accidents in 2015 that occurred in the Public Services and Statutory Bodies sector and increasing to 3% in 2016. The percentage then slowly decreased to 1.45% at the end of October 2017, in Malaysia according to the report by the National Institute of Occupational Safety and Health Malaysia (Makhtar et al. 2019). Furthermore, there were 47 cases of accidents involving injuries and even deaths that occurred in the school area from the year 2015 till 2017 based on the press reports (Makhtar et al. 2018).

Nowadays, the safety issue becoming particularly necessary as society supports technical education due to the increasing need for skillful employees in various fields of employment. Academic staff at vocational school plays an important role in practicing and delivering safety awareness and practices among students since this foundation may affect their working experiences for many years to come. Academic staff must play a good role in showing a good safety culture at a workplace. Since the students have lacked a systematic way to approach hazard control, it is found that vocational education pupils had limited knowledge of how to prevent safety and health risks at work (Hejduk and Tomczyk 2015; Shendell et al. 2018; Yurtçu 2019).

To ensure that a vocational college as one of technical based schools in Malaysia, is a safe institution for the academic staff to work at and for the students to gain knowledge and skills, a study must be conducted to identify how far the academic staff demonstrate safety culture during their teaching and learning process in the workshop. Furthermore, a study on what actions and elements need to be focused on upon managerial in the education sector to improve the safe environment at schools as a workplace.

2 Safety Culture and Its Contributing Factors

The culture of an organization is a reflection of the way in which the organization operates. To promote a positive health and safety culture, everyone in the organization needs to understand what is meant by safety and health culture. Safety culture can be defined as an organization encompasses individual and group values, the attitudes, perceptions, competencies of the entire workforce, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety management (Choudhry et al. 2007; Cooper 2000; Crutchfield and Roughton 2014; Yorio et al. 2019).

The culture of an organization contributes greatly to its health and safety performance. Evidence indicates that successful organizations have developed positive cultures that promote good health and safety practices. Having a good health and safety management system can go some way to set the scene for developing a good culture, but it goes much deeper than that. A positive health and safety culture embodies a combination of factors. Perceptions of safety culture are measured because it's will reflect the organizational activities and policies, predict safety-related behaviors, and also on the reporting of safety incidents (Tear et al. 2020).

The Reciprocal Safety Culture Model by Cooper (Cooper 2000) will be formulated with the purpose of this research based on previous studies. In this model, the safety culture factors in the context of organizational were measured in three important dimensions which were psychological, behavioural, and situational factors. Furthermore, the model itself promotes self-regulatory processes that are consistent with the definition of safety culture.

Psychological and behavioural measurement is generally collected from the individual perspective and then requires some amalgam of the measurement to gauge the collective culture (Flannery 2001). Elements in psychological aspect in this study were the safety attitude, the influence of peers, and safety knowledge. The behaviour aspect will be measured by the factors of management commitment, safety communication and, reward and recognition (Chenhall 2010; Frazier 2011; Vinodkumar and Bhasi 2010). Finally, the dimension of situational will be measured by safety training, accident and incident reporting, safety rules and personnel protective equipment (PPE) (Vinodkumar and Bhasi 2010; Idrus et al. 2004). All these elements

were found to have a positive effect in contributing positive safety culture in an organisation.

3 Importance-Performance Matrix Analysis (IPMA)

Martilla and James published this graphical tool (Martilla and James 1977) used to identify the most crucial attributes concerning their need for managerial action and define areas of improvements in developing a successful marketing programme to achieve an advantage over competitors (Ramayah et al. 2014). The analysis called as Importance-Performance Matrix Analysis (IPMA) is a method of evaluating the quality and the approach to help in managerial action (Rašovská et al. 2021). Furthermore, this simple graphical tool can identify the most crucial elements concerning their need for managerial action and define areas of improvement (Yeap et al. 2016). Hence, it is necessary to perform IPMA to avoid any ambiguity concerning managerial decisions and for managerial purposes (Wook et al. 2019).

The assessment provides in conventional IPA introduced by Martilla and James (1977) provides the average value of the importance and performance of different element attributes calculated in a defined coordinate system on a two-dimensional graph. The horizontal axis represents performance, and the vertical axis represents an importance in this approach. The attributes in the IPA quadrants are represented on a matrix where each attribute falls into one of four quadrants where every attribute shows up according to its mean rating on importance-performance scales. For example, the elements that fall into the “concentrate here” quadrant are of the utmost interest to the evaluators, as they represent areas of improvement that need to be considered more.

Abalo et al. (2007) come out with interesting alternative partitions of IPA which is different from Martilla-James partitions. The alternative partitions combine the quadrants and diagonal-based schemes, enlarging the top left quadrant of the original Martilla-James partition. Furthermore, these new quadrants will occupy the whole of the zone above the diagonal on which importance and performance are equal.

IPMA has been employed by researchers in many fields and has proven to be a valuable management tool (Shafaei and Razak 2015; Hassan et al. 2020a; Abulhakim and Adeleke 2018; Ong et al. 2019; Rahi et al. 2019), which allow directors and managers to improve their management strategies since it points out the main factors that require an immediate response. Thus, this research try to use this tool in the field study of safety culture to get a wide knowledge providing what aspects must be improved for a better safety culture in the education sector.

By assessing IPMA, the impact of exogenous latent variables (safety attitude, safety training, safety rule, safety communication, influence of peers, reward and recognition, safety knowledge, accident and incident reporting, management commitment, and PPE) with a relatively high importance and relatively low performance on an endogenous latent variable (i.e. safety culture) would be identified (Ringle et al. 2018). Furthermore, the IPMA results will help managerial actions to

focus on and improve the recognized areas within the quadrants of high importance but low performance (Hair et al. 2014) especially in the education sector.

4 Method

4.1 Population and Sampling Method

The population of this research comprised academic staff of Vocational College (VC) in 4 main parts of Malaysia which are North Malaysia, South Malaysia, West Malaysia, and also East Malaysia. The researcher used the multi-stage sampling method to obtain the samples. In this research, the researchers select the respondents that fit the criteria of teaching engineering courses at VC. The respondents consist of 497 academic staff in VC engineering courses which involved in teaching engineering courses.

GPower software is used to measure the sample size of the respondents by calculating the minimum sample size required for this study. The framework of the model in this study had 10 predictors. With the setting of the effect size was set as small, power needed as 0.95, finally the size of sample needed was 172. Finally for the sample size for this study, thus we decided to collect data that was slightly larger than the required sample size measured.

4.2 Measures

Measures for the study constructs were adapted and modified from previous studies with strong reliability coefficients. The items of safety attitude, safety rule, and PPE's construct were measured by Idrus et al. (2004), while the items for construct the influence of peers were measured based on (Frazier 2011) which contains ten items with Cronbach's alpha reported was 0.84. For the safety knowledge, safety training, and management commitment, the constructs were measured using items developed by Vinodkumar and Bhasi (2010) and lastly for safety communication and, accident and incident reporting, this study used the items developed by Abdullah (2010) with the reported Cronbach's alpha reported was 0.88 and 0.764 each. Likert scale with 5-point was utilized accordingly for all the measures with a rating scale of strongly disagree to strongly agree.

4.3 Data Collection

This cross-sectional research by distributing the questionnaire survey face-to-face and also mailed, were used to collect data from the respondents. The survey was conducted at 62 vocational colleges in Malaysia by using the multi-stage sampling technique 447 questionnaires were distributed and 397 were returned and accounted for a response rate of 89%. With 6 of the questionnaires were not fully answered and some were taken out due to outliers, 380 were accepted for further analysis.

4.4 Data Analysis

Statistical Package for the Social Sciences version 24 is used to analyze the descriptive information of respondents based on demographic profile. The validity, reliability, hypothesis testing and, importance-performance map analysis (IPMA) of the study was assessed by using Partial least squares-structural equation modeling (PLS-SEM).

4.5 Respondents' Profile

SPSS 24 software was used to obtain the frequencies of the respondents' demographic profile. Majorities of the respondents are more than 46 years old (33.7%), are male (68.7%), are equipped with undergraduate degrees (69.5%), and with working experience of more than 15 years in VC (45.0%).

4.6 Importance-Performance Matrix Analysis (IPMA)

Through IPMA analysis, the target construct with low performance but high importance can be determined to increase the organization's performance (Xhafaj et al. 2021). The IPMA results help decision-makers and also the organization's management prioritize areas for managerial actions (Hee and Lin 2021), as in this research, it shows an important evaluation for studies with a focus on safety culture. Due to Tan et al. (2019), the total effects of the estimated relationships in the structural model for explaining the target construct can be used to determine the importance scores in this analysis. While the performance can be computed by readjustment the scores to range from 0 to 100 as for the lowest performance to the highest performance each (Hair et al. 2014). IPMA results can be seen in Table 1 below.

Finally, from the data in Table 1, a priority map was plotted from the scores values of the index and total effects as shown in Fig. 1. Figure 1 demonstrated

Table 1 Total effect and index value

Latent variable	Total effect of the latent variable safety culture (Importance)	Index values (Performance)
Safety attitude	0.06	79
Influence of peers	0.15	79
Management commitment	-0.06	74
Safety communication	0.08	72
Reward and recognition	0.03	70
Safety rule	0.15	73
PPE	0.09	77
Safety training	0.12	61
Accident and incident reporting	-0.07	28
Safety knowledge	0.20	72

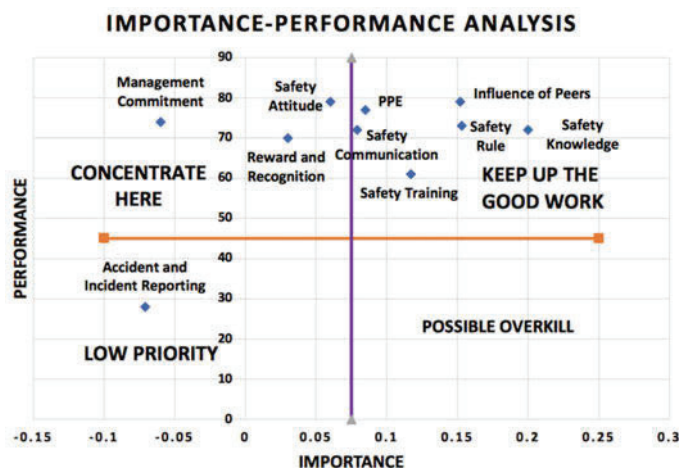


Fig. 1 IPMA (Priority Map) for safety culture in education sector

6 very important factors for the managerial actions in determining a safety culture among the staff regarding the higher values of importance compared to the rest of the variables. The constructs were safety knowledge, safety communication, PPE, safety rule, the influence of peers, and safety training that also within high performance construct among all. Hence the organization’s management needs to maintain all these elements in the management of OSH in the education sector to ensure a safe work environment.

Though variables such as management commitment, safety attitude, and, reward and recognition relatively scored high in performance, it is low in affecting safety culture among the staff since the value of the importance is quite low. However,

management in the technical education sector needs to pay more attention to all these constructs as it will improve the safe environment in schools. The continued commitment from the management to safety and health will enhance the attitude towards safety among employees. To value the involvement of employees to work safely, management is recommended to emphasize the element of respect for all employees. This is an important area that needs to be focused on and concentrated by the organizations' management, thus will bring a great impact in improving safe environment in the education sector.

Through the priority map in Fig. 1, we could say that the construct of accident and incident reporting has a low performance and lower importance variable in the prediction of safety culture. Hence, this element requires less priority and the organization's management should not focus much on this variable in the case of the education sector. This variable is mostly categorized as an important element in a high-risk industrial sector as many previous studies have found that, the construct of reporting accidents and incidents plays an important factor in shaping a positive safety culture in the workplace.

5 Discussion

According to the findings of IPMA, high performance and high importance factors as safety training, safety rule, safety communication, safety knowledge, PPE and the influence of peers appears in "keep up the good work" quadrant, towards the safety culture concern. Managerial actions should emphasize safety culture concerns in these aspect. The educational ministry of Malaysia should prioritize in these elements in order to keep vocational organizations as a safe workplace for the academic staff and also students. Managerial needs to ensure that ongoing safety training is provided to teachers in order to ensure that all staff have an adequate understanding on safety knowledge. This situation has been illustrated in previous studies that have found that accidents that occur in laboratories and workshops among teachers and students in vocational and technical high schools, are due to a low of knowledge related to occupational safety (Yurtçu 2019). All academic staff needs to have a sufficient knowledge about the types of risks and hazards occurred in laboratories and workshops while doing teaching and learning process. Furthermore they need to know how to control the specific risks associated with the activities there, so that the risks will be as low as possible and does not pose a danger to the staff and students (Laberge et al. 2017).

Despite the importance of education to increase the knowledge, managerial also need to focus on the training of the use of PPE and do monitoring for the optimal use of PPE among teachers and students during the instructional process. An understanding of appropriate use of PPE to reduce the risk of occupational injuries and accidents of Barratt et al. (2020), even they are still at risk for injury even when they used the right type of PPE (Barratt et al. 2020; Rubenstein et al. 2014). Next, extended knowledge on PPE selection, fit, and how the use of PPE, need to be administered both while in training at vocational training schools on or can be extended during

off school to get very well structured learning experiences on the PPE (Rubenstein et al. 2014; Feszterová 2015; Hakim and Okda 2016). Teachers face some pressure due to the limited time along the instructional process, thus providing little adequate time of safety instruction to allow all students to feel really comfortable while using PPE over the instructional time (Langley et al. 2018). Based on these, training must be provided to teachers for them to continue with the educational practices of using PPE along their teaching and learning process at vocational training.

Besides, the managerial in vocational training could use the findings of this research to strategize their management plan regarding to the accident reporting and investigation. Based on the low value in performance and the importance of the element of accident and incident reporting, shows the need for a quick action by the management to come out with a proper accident and incident reporting. As stated from the IPMA analysis, even this element need minimal focus by the management, however by having a good system of accident and incident reporting, will reflect the need on the training of injury prevention and the interventions provided can decrease the number of injuries reported, thus help decrease in medical expenditure and finally gain academic performance among students (Shendell et al. 2018). Teachers need to report every single accident and incident caused by injury from machine or equipment, which are the most common types in terms of the type of the accident in vocational and technical high schools (Yurtçu 2019).

Furthermore, more concentration on the commitment from the management to create safe workplace environment among all staff in vocational training institution. Safety must be a key-value in an organization and it is the responsibility of management to always strive to improve it in the workplace (Makhtar et al. 2019; Hassan et al. 2020b). Providing continuous professionalism development courses on safety training, the used of PPE, enhancing safety related programmed and enhanced the commitment towards safety rule are some further action need to be focused on by the managerial board (Langley et al. 2018; Shafarin et al. 2021). Besides, the management needs to re-evaluate their governance practices related to safety so that the commitment from the management can be felt by the teaching staff which in turn enhances the safety culture of the teaching staff (Makhtar et al. 2019; Hamzah et al. 2018). The management of the educational organization needs to focus on the developing and implementing safety policy in every schools to provide guidelines that can be implemented by all staff in order to reduce workplace hazards, protect and promote safety and health to all staffs. This action will deeply shows the commitment from the management on the safety and health issues at education sectors.

Based on findings revealed in the study, there are some recommendations for all stakeholders in Ministry of Education in Malaysia and also OSH field organization. There is still a huge gap that needs to be filled in OSH education in vocational and technical high schools. Teacher training conducted by the Ministry of Education should place OSH Education as one of the courses to be learned and trained by future teachers to provide knowledge related to safety risks that may occur in schools and how the teachers can manage those safety risks (Tureková and Bagalová 2018). Malaysian Ministry of Education should place OSH Education as a separate course in curriculums of vocational and technical schools at all levels. Furthermore, legal

regulations must be included in OSH Education so that all teachers and students grasp the legal status and importance of OSH.

6 Limitations

There are some limitations to this study. First, our results are based on a Vocational College so it is not necessarily generalizable to other types of schools under the education sector in Malaysia with different study contexts. Next, we were only concerned with the academic staff to involve in teaching engineering courses' perceptions on safety culture. It will be more holistic with the involvement of different groups of employees at education sectors such as administrative staff, all of the academic staff, and also students may result in different improvement priorities which can be uncovered using IPMA.

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