

THE DEVELOPMENT OF JOB COMPETENCY FOR SKILLED TECHNICAL WORKER TOWARDS GREEN TECHNOLOGY

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ABSTRACT: Promoting green technology to protect the environment is a major challenge in the current world. Human activity that affects the environment must be designed with a proper manner to ensure that the effort to maintain good practices is achieved. Referring to the above matter, an individual that entering the industry must be equipped with adequate skill and knowledge related to green skills. However, the scenario shows those individuals that enter the labor market without a relevant qualification is common in Malaysia. In the labor market, these individuals are considered to be low-skilled workers because they had no training prior to employment. Therefore, specific training needs to be prepared for them to increase their skills. Therefore, this research is conducted to develop a job competency for these groups of workers pertinent to its aim towards sustainable development. This research provided an opportunity to examine an enterprise-based approach to skill formation for workers with basic academic qualifications. Curriculum Development Based on Ability Structure (CUDBAS) methodology is used for this research where a structured curriculum development of human resources learning needs will be designed according to the job profile of the typical individual and group work. It will provide a clearer perspective on knowledge, competence and skill levels of employee behavior in performing tasks. The biggest impact on this study is to produce high skill employees concerning customer satisfaction and increased organizational productivity towards high-income nations.

Keywords: Job Competency; Skilled Technical Workers; Green Skill.

1. INTRODUCTION

In line with the demands of progress in the 21st century, the various sectors, particularly in education and industry need to improve the quality of individual competence [1]. Malaysia is a developing country, has encouraged employees to have a competent skill [2] especially green skills to be able to compete in this era of globalization. Green skills aimed to promote individual awareness in preserving nature. Promoting green technology to protect the environment is a major challenge in the current world. Human activity that affects the environment must be designed with a proper manner to ensure that the effort to maintain good practices is achieved [3]. Green skills are the skills associated with the design, management, monitoring and production of technology [4]. Therefore, the need for green skills development among workers is increasing as the industry's demand for employee competence.

Sustainable development is a complex issue and includes a combination of skills in the field of economic, social and environmental [5]. The balance between economy, environment, and social can create a sustainable development [6]. These three aspects need to be balanced to achieve sustainable development in line with the demands of technological and industrial

advancement. However, there are no specific guidelines that show how to balance implemented to create a sustainable development [6]. Pierantoni [7] explains that the meaning of the concept of sustainable development depends on the relevant field.

Economic development and population growth in Malaysia are increasingly significant, this affects the increasing needs of vehicles as a transport infrastructure whether private vehicles or public transport. The transport sector is one area that has an important role in improving the economy of a country [8]. The total estimated number of vehicles in Malaysia in 2020 was 48 million [9, 10]. The growing need for vehicles causing the transport industry is growing. Transportation industry focuses on many aspects such as planning, procurement control, materials movement, operation, maintenance and field implementation.

The need for workers with high skills and competencies are increasingly crucial to meet the industry's demand, especially the transportation industry. To improve profitability and to penetrate international markets, transportation equipment industry labor needs to improve their skills and work efficiency [11]. However, based on the findings of Dlimbetova *et al.* [12], it shows that employers are lack of knowledge and are unaware of the importance of

green skills. This is due to the inadequate training and proper qualifications before entering the labor market. Specific training needs to be designed and prepared for them to increase their skills. Therefore, this research is conducted to develop a job competency for these groups of workers pertinent to its aim towards sustainable development.

2. OBJECTIVES

This study is aimed to develop a job competency for technician group of workers towards sustainable development in Malaysia transportation industry.

3. LITERATURE REVIEW

3.1 Green skill

Green skills refer to the value, knowledge, technical skills and attitudes required for service in supporting, building and creating innovations related to economic, social and environmental sustainability [13]. Green skills are a list of skills that help individuals or workers in creating green technology in their practice as an effort to preserve nature. In addition, green skills are related to cognitive, psychomotor and affective aspects [14]. The findings of Vona *et al.* [4] found that environmental regulations are causing changes and technological advances so that the demand for technical skills to be increasing. Therefore, green skills are important skills to compete and improve their quality.

3.2 Sustainable development

There are various opinions about the definition of sustainable development. Although there is a definition that refers to sustainable development, it's still not acceptable and gets an agreement by which there are many fields in society generally. This is because the concept is considered less accurate based on the perspective of various fields. According to Pierantoni [7], economic, social and environmental concepts are an important variable in sustainable development. Ciegis and Zeleniute [15] proposed a definition related to sustainable development such as (i) in social, sustainable development covers the various social relationships available in a community which is closely related to the emotional-social, (ii) in the environmental field related to the development process which maintains, manage and preserving ecosystem life, environmental and biological diversity, (iii) in economic, sustainable development focus on development process with an emphasis on income per capita of the

population to get better and the welfare of the population is assured.

3.3 Competency development

The workers who have the ability in academics, skilled and competent in their field is the main motivator of an organization. The employer is responsible for ensuring that employees can improve their quality to increase productivity in line with the demands of the industry in the era of globalization. According to Jackson, Farndale, and Kakabadse [16], a capability is the ability of an individual to use the skills and competencies to add value or enhance the quality of activity. Personal efficiency evaluation usually begins when an employee makes an assessment of the work efficiency. This assessment process is calculated from time to time.

3.4 CUDBAS

In 1990, Prof. Dr. Kazuo Mori from Japan founded the Curriculum Development Based on Ability Structure (CUDBAS). CUDBAS is closely related to the attitude, knowledge, and skills of an employee in the performance of a particular job assigned to him. The maintenance management system is a process of maintaining and preserving the equipment, machine or operating system in order to achieve excellence in asset maintenance [17]. CUDBAS aims to identify in detail and systematically manage matters related to human resource quality, work processes implemented and manage financially and effectively to assist an organization to improve its productivity.

4. METHODOLOGY

Focus Group Discussion (FGD) is a qualitative study that allows a researcher to interview some respondents simultaneously and systematically at a certain time [18]. Thus, respondents are grouped in a certain room and researchers interviewed respondents simultaneously. It can be concluded that the FGD is a group interview method. Krueger [19] says that the FGD has a high level of validity and with this method; researchers can also obtain results quickly. Curriculum Development Based on Ability Structure (CUDBAS) methodology is used for this research where a structured curriculum development of human resources learning needs will be designed according to the job profile of the typical individual and group work. It will provide a clearer perspective on knowledge, competence and skill levels of employee behavior in performing tasks. Therefore, in this study, the

researchers have used the FGD to obtain the study data. After the interview was conducted with 8 experts, the researcher constructed the questionnaire based on the interview result. The questionnaire was distributed to 14 experts to identify the opinions and views of experts regarding job competency to aim towards sustainable development. Furthermore, the researcher used the Fuzzy Delphi Method (FDM) analysis to identify the expert's consensus to job competency for the group of the technician. Light Rail Transit (LRT) transportation service was selected for this study since this transport is now becoming the essential transport for those who are living in the city.

5. FINDINGS AND DISCUSSION

5.1 Technician's job competency

Technician competency checklist contains questionnaires related to maintaining roller shutter, maintain escalator, maintain lift, maintain lighting appliances, maintain fire alarm system, maintenance air conditioning, maintain door, maintain toilet, maintain fan system, pump maintenance and building services. There are 118 questionnaires on technician competency, where this question uses Likert 7 point scale. To analyze the data, the researcher changed the scale of Likert point 7 into Fuzzy scale and then analyzed data using the Fuzzy Delphi Method (FDM) formula.

Table 1 Expert consensus for *maintaining roller shutter*

Ability	Threshold Value, d	Fuzzy Score (A)
able to repair roller shutter when stuck	0.167	0.812
knowledge in control panel for roller shutter	0.051	0.945
able to adjust limit switch for roller shutter	0.062	0.843
able to respond for an emergency when roller shutter malfunction	0.177	0.819
able to greasing roller shutter chain	0.089	0.871
able to replace push button switch	0.160	0.890

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 1 show that ability to maintain roller shutter has a threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that the ability to maintain roller shutter is an element technician's job competency.

Table 2 Expert consensus for *maintaining escalator*

Ability	Threshold Value, d	Fuzzy Score (A)
able to identify alert indicator when escalator stop	0.132	0.881
able to replace escalator comb	0.167	0.812
able to replace escalator demarcation comb	0.162	0.850
able to reset supervisory panel during fire alarm activated	0.113	0.893
able to identify escalator sensor failure	0.096	0.845
able to identify escalator step chain faulty	0.136	0.888
able to identify escalator handrail crack	0.167	0.788
able to communicate with the vendor when failure happens	0.132	0.881

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 2 show that the ability to maintain escalator has a threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that the ability to maintain escalator is an element technician's job competency.

Table 3 Expert consensus for *maintaining lift*

Ability	Threshold Value, d	Fuzzy Score (A)
able to identify alert indicator when lift stop	0.156	0.876
knowledge in lift function system	0.131	0.821
able to replace lighting inside lift car	0.117	0.867
able to replace floor mat inside lift car	0.099	0.879
able to test intercom function	0.169	0.857
able to test sentinel phone	0.141	0.810
able to identify battery e-box faulty	0.113	0.893
able to operate ups lift system (uninterruptible power supply)	0.109	0.860
able to identify water level inside lift pit	0.130	0.848
being fast respond for attend breakdown (mantrap)	0.137	0.855
able to communicate with the vendor when failure happens	0.137	0.855

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 3 show that the ability to maintain lift has a threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that the ability to maintain lift is an element technician's job competency.

Table 4 Expert consensus for *maintaining lighting appliances*

Ability	Threshold Value, d	Fuzzy Score (A)
able to troubleshoot an electrical problem	0.147	0.836
able to repair lighting system	0.109	0.860
knowledge in identify for ballast type	0.177	0.819
knowledge in identify for watt bulb lighting	0.125	0.874
able to rewiring lighting	0.169	0.857
able to replace 1set lighting	0.076	0.917
able to replace the socket outlet	0.116	0.807
able to replace switch part	0.147	0.836
able to use multi-meter	0.107	0.886
able to use clamp meter	0.132	0.881
able to use insulation tester	0.115	0.907
able to replace timer inside panel	0.137	0.855
able to replace contactor inside panel	0.117	0.755
able to replace DB set part (mcb, elcb, mccb, fuse)	0.167	0.812
able to maintain gen-set system	0.099	0.879

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 4 show that ability to maintain lighting appliances has a threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that the ability to maintain lighting appliances is an element technician's job competency.

Table 5 Expert consensus for *maintaining a fire alarm system*

Ability	Threshold Value, d	Fuzzy Score (A)
able to troubleshooting fire alarm system	0.084	0.890
able to replace the smoke detector and heat detector	0.168	0.831
able to disable and enable fire alarm panel	0.167	0.812
able to reset fire alarm panel	0.090	0.898
knowledge on for troubleshooting CO2 panel	0.132	0.881
able to troubleshooting hose reel pump panel	0.116	0.833
able to check the tunnel fire alarm system	0.136	0.888
knowledge in fire alarm part	0.141	0.810
able to test hose reel system	0.117	0.867
able to test sprinkler system	0.132	0.881
able to test wet riser system	0.159	0.824
able to identify equipment for panel fire alarm	0.130	0.848
knowledge in cms system (central alarm monitoring station)	0.092	0.919

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 5 show that ability to maintain fire alarm system has a

threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that the ability to maintain fire alarm system is an element technician's job competency.

Table 6 Expert consensus for *maintaining air conditioning*

Ability	Threshold Value, d	Fuzzy Score (A)
able to troubleshoot air-cond defect	0.167	0.812
knowledge in reading error code air-cond system	0.151	0.869
able to reset alarm chiller	0.158	0.793
able to change belting for ahu system	0.159	0.883
able to refill gas for acsu	0.158	0.793
able to change capacitor indoor/outdoor acsu	0.079	0.864
able to change blower acsu	0.062	0.895
able to change compressor acsu	0.113	0.893
able to fast respond for air-cond failure	0.115	0.907
able to use a manifold gauge	0.169	0.800
able to change a condenser fan	0.037	0.881
able to change acsu sensor	0.146	0.798
able to service acsu using chemical	0.092	0.919
able to vacuum acsu system	0.162	0.850
able to service ahu system (air handling unit)	0.156	0.876
knowledge in acsu system installation	0.177	0.819

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 6 show that ability to maintain air conditioning has a threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that the ability to maintain air conditioning is an element technician's job competency.

Table 7 Expert consensus for *maintain door*

Ability	Threshold Value, d	Fuzzy Score (A)
able to maintain cdl system (central door lock)	0.070	0.902
able to respond for an emergency when door malfunction	0.192	0.814
able to repair mechanical lockset	0.066	0.940
able to adjust door closer	0.084	0.890
able to adjust hinges door	0.033	0.855

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 7 show that the ability to maintain door has a threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that the ability to maintain door is an element technician's job competency.

Table 8 Expert consensus for *maintaining toilet*

Ability	Threshold Value, d	Fuzzy Score (A)
able to replace the piping system	0.062	0.895
able to clear blockage drainage toilet	0.136	0.790
able to repair toilet part	0.102	0.852
able to replace toilet part	0.144	0.862
able to troubleshooting a pump control panel	0.177	0.838
able to set the pressure switch	0.185	0.845
knowledge in toilet part specification	0.062	0.895

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 8 show that the ability to maintain toilet has a threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that the ability to maintain toilet is an element technician's job competency.

Table 9 Expert consensus for *maintaining fan system*

Ability	Threshold Value, d	Fuzzy Score (A)
able to troubleshooting control panel fan	0.137	0.855
able to identify motor fan problem (exhaust fan, wall fan, supply fan)	0.084	0.890
able to identify motor fan problem (tvf, upef, raf, spf, sef)	0.169	0.800
able to operate tvf system	0.187	0.826
able to repair motor fan	0.156	0.876
knowledge in identify relay for control panel fan	0.168	0.831
able to check air compressor system	0.155	0.843
able to work under pressure	0.160	0.890

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 9 show that ability to apply to maintain fan system has a threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that ability to maintain fan system is an element technician's job competency.

Table 10 Expert consensus for *maintaining pump*

Ability	Threshold Value, d	Fuzzy Score (A)
able to troubleshoot pump panel	0.090	0.898
able to test motor pump shooting	0.037	0.862
able to rewiring motor pump control	0.090	0.898
knowledge in part pump unit	0.155	0.843
able to identify sound for motor pump noise	0.128	0.767
knowledge in the pump operation system	0.169	0.857
able to set up portable pump	0.147	0.836
able to planning work before working start	0.096	0.845

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 10 show that the ability to pump maintenance has a threshold value ($d \leq 0.2$) and the percentage of expert consensus is more than 75%. Therefore, all experts agree that the ability to pump maintenance is an element technician's job competency.

Table 11 Expert consensus for *building services*

Ability	Threshold Value, d	Fuzzy Score (A)
able to supervise contractor based on the requirement to work	0.079	0.864
able to read schematic diagram	0.147	0.836
able to read building layout	0.089	0.871
able to changes tile	0.136	0.902
able to do re-painting work	0.074	0.883
able to install scaffolding	0.169	0.857
able to repair automatic boom gate	0.074	0.883
able to mix cement	0.144	0.862
able to clear object at track area	0.117	0.867
able to operate ECS (environmental control system)	0.113	0.893
able to operate BMS (building management system)	0.137	0.895
able to operate sky lift	0.136	0.902

The results of the analysis using the formula Fuzzy Delphi Method (FDM) in Table 11 show that the ability to building services has a consensus of more than 75%. Therefore, all experts agree that the ability to building services is an element technician's job competency. All elements in this study consist of skill knowledge and attitude needed to ensure the sustainability environment, economic and social. Greening is a continuous effort to ensure the greenness. There is 4 perspectives to implement green skills which understand the process, planning, implementing and monitoring. Therefore, implementing and monitoring these 11 competencies are very important to ensure that the staff are provided with adequate knowledge and skills and thus enhance the operation of the

6. CONCLUSIONS

Promoting green skill to protect the environment is a major challenge in the current world. Human activity that affects the environment must be designed with a proper manner to ensure that the effort to maintain good practices is achieved. Therefore, an individual that entering the industry must be equipped with adequate skill [21] and knowledge related to green skills. This research finally examined the enterprise-based approach to skill formation for workers with basic academic

qualifications. This study found that experts in this study have reached an agreement that eleven ability which has been identified is the skills needed by a technician to improve job competency towards sustainable development. These skills are either skills owned by the technician in connection with the design, management, monitoring and production of technology. The biggest impact from this study is to assist in produce high skill employees concerning customer satisfaction and increased organizational productivity towards high-income nations.

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