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 identifying for ballast type                | 0.177              | 0.819           |
| knowledge in identifying for watt bulb lighting          | 0.125              | 0.874           |
| able to rewiring lighting                               | 0.169              | 0.857           |
| able to replace 1 set 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, mcb, 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 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 abu system                    | 0.159              | 0.883           |
| able to refill gas for acsu                              | 0.158              | 0.793           |
| able to charge capacitor indoor/outdoor acsu             | 0.079              | 0.864           |
| able to charge blower acsu                               | 0.062              | 0.895           |
| able to charge 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 abu 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 cell 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.
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.

| Ability                              | Threshold Value, \( d \) | Fuzzy Score \( (A) \) |
|--------------------------------------|---------------------------|-----------------------|
| able to replace the piping system    | 0.062                     | 0.895                 |
| able to clear blockage drainage toilet | 0.113                     | 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 9 show that ability 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.

| 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, upei, 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 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.

| 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 ability to building services has a consensus of more than 75%. Therefore, all experts agree that 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 environments.

**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 | 0.113                     | 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                 |

**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, upei, 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                 |

**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                 |

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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