JTET

http://penerbit.uthm.edu.my/ojs/index.php/jtet
ISSN 2229-8932 e-ISSN 2600-7932

Journal of Technical Education and Training

Dimension of Green Skills: Perspectives from the Industry Experts

Muhammad Zulfadly Mohd Zubir[1], Chee Sern Lai[1*], Adib Farhan Zaime[1], Ming Foong Lee[1], Badaruddin Ibrahim[1], Affero Ismail[1]

[1]Faculty of Technical and Vocational Education,
Universiti Tun Hussein Onn Malaysia, Parit Raja, 8600, Johor, MALAYSIA

*Corresponding Author

DOI: https://doi.org/10.30880/jtet. 2021.13.01.017
Received 11th January 2021; Accepted 23rd February 2021; Available online 31st march 2021

Abstract: The environmental issue was a debating topic over the past decades, but the knowledge, skill, and attitude among the people are still never changed. Several studies found that a huge contributor to waste is the industrial sector. Due to that, the green industry policies were created for environmental justice in order to minimise the greenhouse gases, and the creation of the green industries was started. The green industries were opening jobs opportunity for green jobs, and fulfilling the jobs that required someone competent with green skills. To be competent, they needed in mastering the three dimensions of green skills: knowledge, skill, and attitude. However, the skill shortage among the workers arose. Therefore, this paper aimed to explore green skills elements from the industrial perspective in skill dimension. In this study a Delphi technique were applied which started with interview session among experts. The semi-structured interview was conducted, and the protocol interview was validated through peer review and member checking. Six experts were selected from the green industries and the selection according to the characteristics such as the background qualification, job position, working experience, and knowledge in the green industry. The data was transcribed by using paper and pen, and the thematic analysis was used. From the interview session, a total of eight elements has been identified in green skills namely; waste skills, design skills, planning, procurement, and material skills, energy and water skills, communication skills, management skills, leadership and teamwork skills, problem-solving and critical thinking skills. This exploration was useful in order to conduct the next round of Delphi technique in terms of checklist items among the experts.

Keywords: Environment, skill shortage, green skills

1. Introduction

The issues of the environment look will never-ending due to lack of knowledge and awareness among people. According to the previous study have been revealed that the knowledge and attitude related to the environment issue are low among people (Oyero et al., 2015). That finding was consistent with the National Environmental Education and Training Foundation (NEETF, 2001); the Asia Foundation (2012); and Yang et al. (2018), which are they found the majority of respondents never know about the causes of climate change and never to know to deal with it. Moreover, it never stopped there, through the Vynne and Doppelt (2009); Edsand and Broich (2019), most of the respondents lack knowledge and attitude on the environment. Through the empirical study, many people never have sensitivity and concern on the impact of climate change and pollution.

Corresponding author: lcsern@uthm.edu.my

Furthermore, four sectors contribute to climate change and pollution, such as industrial, transportation, logging, and urbanisation (Omar, 2010). Zia and Devadas (2007), reported that industrial waste is the most significant contributor to climate change and pollution, and the amounts of waste were increasing every year. For example, Sungai Kim Kim's tragedy caused illegal dumping into the river by the immoral and unethical the industry. Due to that, the people around there were poisoned, and most of them were warded at the hospital (Shah & Devi, 2019). To minimise the environmental issue, the industry needs to adapt and apply the eco-friendly process that more to the natural process and not dangerous to the community and environment (A. Ragheb, El-Shimy & Ragheb, 2016). The development of new industrial policy which is taking care of environmental and industrial performances have been creating and known as the green industry (M. o. I. Thailand, Green Industry, 2013). The creation of green industry was creating the new jobs which called as the green jobs (Hatfield-Dodds et al., 2008; Othman et al., 2019).

Green jobs contribute to preserve or recover the environment (The Research Base Australia, 2014). Most of the green jobs are not new jobs (The Research Base Australia, 2014). It can be industry (production) and lifestyles (consumption) such as manufacturing, construction, research and development, waste management, energy and utilities, transportation, and many more (The Research Base Australia, 2014). In Germany, more than two million green jobs have been created (The Deutsche Gesellschaft für Internationale Zusammenarbeit, 2013), and meanwhile, 400 000 new green jobs will be created by the year 2015 (European Centre for the Development of Vocational Training, CEDEFOP, 2010). In the context of the labour market, there are have millions of green jobs have been created and the number that will be increased due to the investments, policy support, and appropriate skills development (Olga et al., 2011). According to Dodds et al., (2008); Othman et al., (2019), the environmental policy creates new jobs rather than killing the jobs. However, green jobs required someone with green skills (Essex & Hirst, 2011; Ismail et al., 2020).

Although green jobs have been created, some other problems have arisen in terms of skill shortage. The previous study has been identified that the skill shortage exists in several occupation and sector. Dodds et al., (2008) found that green skills among the employees were very poor. In South Africa, the skill shortage has existed across the industries. Apollo Alliance (2008), reported that in the U.S., the green industries faced with the skill shortage in the many sectors such as manufacturing, construction, and installation. Besides, Germany's renewable industry also suffered from a lack of qualified manpower in green skills (United Nations Environment Programme, UNEP, 2008). A lack of green skills in technicians, managers, and operators were identified at the biofuels industry in Brazil and the construction sector in Australia, China, Europe and South Africa (Strietska-Ilina et al., 2011). Therefore, this study was conducted to explore green skills elements from the industrial perspective in skill dimension. This present study only consists of one objective which to explore the elements of green skills from the industrial perspective. There are three mains of the dimension in green skills; 1) knowledge, 2) skill, and 3) attitude (Sern, Zaime, & Foong, 2018). Despite, this study only covered the dimension of skill.

2. Green Skills

There are two terms often used in green skills that some researchers use green skills as low carbon skills (Essex & Hirst, 2011), whereas the other researchers use generic green skills (Buntat & Othman, 2012). Even though the terms are different, this skill's main goal is to protect the environment from climate change and pollution (Aitchison, 2015). Generally, green skills are defined as the technical skills, knowledge, value and attitude needed on green jobs support a sustainable economy, social, and environmental through activities such as industry, business, and community (Strietska-Ilina et al., 2011).

Previously, the green skills were practising among the gardener (Sern, Zaime & Foong, 2018). However, the situation has been changed, which the green skills have been practising in all sectors (Essex & Hirst, 2011). The green practice is not a new thing at the industrial, which is it was practising a long time ago, but it was going important after the Local Agenda 21 (LA21) have been adopted. The LA21 refers to the global plan promising countries to design and practise strategies to minimise greenhouse gas emissions (Owen & Videras, 2007).

Besides, many policies support green practice such as ISO 14000, EMAS and P5 standard by GPM. The aim is to focus on improving environmental performance. Thus, many industries are moving to be green industries which offered green jobs (Othman, 2019). The green jobs required the competent worker in knowledge, technical, and attitude related to green practice, called green skills (Essex & Hirst, 2011). There are many green skills elements we can find, but there is still a lack and new thing among the community in the context of Malaysia. Table 1 shows the framework of green skills demanded by the industries, according to Essex & Hirst (2011).

Table 1 shows that there are 13 elements important in green skills, and it starts with design skills, second is energy skills, followed by client skills, and ending with transport infrastructure skills. However, these elements might be changed according to the government's culture, education, policies, and system. Otherwise, this framework is useful to revise or guide others to explore the elements or compare the outcome of the study.

Table 1 - The framework of green skills which have been demanded by the industries

Element	Ranking
Design skills	1
Energy skills	2
Client skills	3
Leadership and management skills	4
Community skills	5
Construction skills	6
Town and country planning skills	7
Waste skills	8
Procurement skills	9
Landscape and environmental skills	10
Building management skills	11
Financial skill	12
Transport infrastructure skills	13

3. Methodology

At the initial phase of this research, the Delphi technique was used to identify green skills needed by industrial sectors. The Delphi technique comprised three rounds of data collection by involving experts from the industrial and academic sectors. In the first round, semi structured interview was conducted. The data has been analysed using thematic analysis to find out the green skills elements. In second round, the checklist items among the experts. The data will be analysed using mean and standard deviations to verify level of agreement. In the third round, fuzzy Delphi method and deffuzification analysis which to determine the rank of green skills identified in the second round of data collection. However, this study only covered the first round of Delphi technique and the data from the industrial were used as the main points which align with the present study.

3.1 Population

In this study, the green industries were chosen as the population. The three sectors of the green industries were chosen: 1) environmental, 2) manufacturing, and 3) construction. Presently, most of the industries are applying and practising green practice in their activities, but in this study specifically was chosen the green industries because of the overall process from starting and ending the process they are applying and practising the green practice (International Organization for Standardization, ISO, 2009). There are many standardise in green practices applied in green industries such as ISO 14000, EMAS and P5 standard by GPM. The aim is to focus on improving environmental performance.

3.2 Sampling

The purposive sampling technique was used in order to choose the suitable participants in this study. Each participant was selected according to the characteristics such as the background qualification, job position, working experience, and knowledge in the green industry sector (Ladd, 2012). The expert should have at least a bachelor degree major in engineering or environmental and more than five years of working experience. In terms of position, the expert should be at least holding the position of executive. Last but not least, the expert must be well versed in green practice in the green industry. Tuckett (2004), stated there is no formal criterion to determine sample size, but the essence of the richness of data collected is more important than the number of participants. Thus, a total of six participants was selected in this study. All the participants are knowledgeable and presently involving and practising green practice in the industry. Additionally, the participants' selection was based on the abilities and willingness to provide the information needed.

3.3 Research Instrument

The protocol interview was used as the research instrument in this study, and the semi-structured interview was conducted to explore unknown content in the study. The protocol interview was adapted from Aitchison (2015) regarding adapting green skills to vocational education and training. The validation process of protocol interview was conducted through peer review and member checking. The process was done through which the interviewer communicated with the participants to check the validity of data interpretation of interview process whether they agree or disagree. According to DeCuir-Gunby & Schutz (2016), the validation process using member checking will be increased accuracy, creditability, and more trustworthiness.

3.4 Data Collection

The data was collected through the interview session to explore the elements of green skills from the industrial perspective. Data collection started with making an appointment by phone after the participants had been agreed to be interviewed. The interview session was recorded using the voice recorder.

3.5 Data Analysis

To analyse the interview data, firstly, the data obtained from interview session were transcribed by using pen and paper. From these transcriptions, certain codes were constructed. Next, the codes were grouped and arranged according to the appropriate categories. Lastly, the coding process was done which each category was coded based on the appropriate themes. This process was reduced the number of codes from the initial stage.

4. Findings and Discussion

Green skills are important to support sustainable social, economic, and environmental outcomes in business, industry, and the community (Strietska-Ilina et al., 2011). Apart from that, green skills elements are still unclear in the education system and management (Sern, Zaime & Foong, (2018), but the industries needed the worker with green skills (Essex & Hirst, 2011; Othman et., 2019). According to Sern, Zaime & Foong (2018), there are three main dimensions in green skills such as; 1) knowledge, 2) skills, and 3) attitude and value. However, this study will be covered the dimension of skills. The total of eight elements have been identified among green industries which are explained as followed:

4.1 Waste Skills

Generally, the waste is described as unwanted, discarded, rejected, or abandoned material that is not valuable or afford to recycle, reprocess, and recover through the technical separation process (National Solid Waste Management Department, JPSPN, 2016). Zia and Devadas (2007) stated that the domestic, industrial, and commercial were generating huge wastes, and the amounts were increasing every year. To minimise the waste, some countries took precautions to implement and practise such as the zero-waste, 4R's practice (reuse, reduce, recycle, recovery). The findings of this study found that waste skills are important, which most of them were highlighted the point of recycling, reducing, and waste management. This finding is consistent with the research outcome discovered by Essex & Hirst (2011). Essex & Hirst (2011), asserted that workers involved in the industry must be competent in waste skills. Previously, Essex & Hirst (2011) reported that the waste skills ranked number eight based on voting by the industries.

> […We talk about green skills, so that, on the skill dimension in an industrial perspective, the employers needed the waste management skills among the employees to manage the waste industry. So, the waste that can be recycled we put in one place. Thus, it will give a good effect on environment…]
>
> […so, for the liquid waste disposal in our company will be managed by an appointed contractor to ensure the liquid waste disposal is safe and not affected to environment. Even though the liquid waste disposal has been appointed to the contractor but as worker we need to monitor for ensuring the contractor follow the specification and standardisation stated by industry…]
>
> […it is common sense where each of worker need to manage the waste by the category. Waste that can be recycled and disposed will be placed separately. This is to ensure that no pollution will be released from us…]

4.2 Design Skills

Next, the element of green skills needed in the industry is the design skills. The design skills are skills to design and adopt the technologies, products, and processes for minimising carbon emissions (Department for Business, Innovation and Skills United Kingdom, (2011). Most of the employees seek to employers with the design skills (Essex & Hirst, (2011). The previous study found the design skills are ranked number one according to vote by the industries. In this study, the researcher found a sub-element of design skills to increase the machine's efficiency.

> […if we look at the machinery, how to increase the machine's efficiency to maximum level for ensuring the machine's able to work on optimum and minimise the electrical usage. Thus, technical graduates should have this skill for surviving in the industry...]
>
> […as a worker, they are able to use relevant protective protection equipment which considers the environmental aspect…]

4.3 Planning, Procurement, and Material Skills

Another element in green skills is planning, procurement, and material skills. The previous study showed that the planning, procurement, and material skills were separate items, and not most researchers found the element. In this study, researchers have been found three sub-elements: 1) the project planning, 2) the material that uses, and 3) the procurement from resources. In the industry, these elements are very important in order to produce green output.

> […when the Department of Environment is doing the site visit, the don't intend to find our fault, but they are looking for our soil work which we needed to have sentiment control plan. Thus, in my opinion the project plan is important to worker…]

> […sometimes the material that we use can give some reaction to the environment if we are not storing the material safely. Thus, as worker we need to know the content of a material and storing it at the right place…]

> […in terms of procurement we needed to make sure that we choose an eco-friendly or eco-material which will not contribute to the environmental pollution. Thus, the decision to choose the right materials are needed…]

4.4 Energy and Water Skills

The present study's findings reveal that the next elements of green skills are energy and water skills. In this study, the energy regarding electrical energy. The previous study showed that these elements were in two separate elements (Pro-Enviro, 2009). However, in this study that elements are combined into one element. According to Essex and Hirst (2011), the energy skills were ranked number two from the 13 skills demanded by the industries, but the water skills were not in the 13 elements they found. In this study found the industries were highlight about to reduce and save energy and water. The increasing of the energy and water consumption will be affected by global warming and greywater. Due to that, the industries susceptible to that and needed the worker will use the energy and water efficiently.

> […the energy skills are so important and a must in the industry. This is because once the machines finish the task where aaa… we should switch off to avoid the electrical waste…]

> […the equipment must be rated with energy-efficient power consumption which can reduce the use of electricity other than that reduce of amount…]

> […here, the employees just need to make sure the water consumption is efficient…]

4.5 Communication Skills

The present study's findings reveal that the next elements have been found the communication skills demanded among the industries. This skill is not popular and not much highlighted through the previous studies; however, this present study was consistent with the outcome discovered by Loubser and Freeman (2011). The study found that the industry is preferred ICT (Information and Communication Technology) as a medium of communication among them, and they are concern about paper consumption.

> […use email as interpersonal messaging can reduce of paper which can be contributed in the green practice…]

> […presently, Malaysia is heading towards IR4.0. I think the communication such as green ICT is a must, even though we are there 100% yet]

4.6 Management Skills

Next, the element of the green skills which demanded among the industry is the management skills. The management skills we can found through the generic skills, soft skills and employability skills, but in this context, it is different from the other management skills. That is because, in this context, management skills are focus on environmental and green practice. Through the Essex & Hirst (2011), this element was ranked number four demanded by the industries. In this present study, there are two sub-elements have been found such as able to reduce the greenhouse gas emissions and able to follow the procedure, guideline, and standard which have been stated by the management in order to handle the waste.

> […how to manage the process so that it will not contribute to greenhouse gas emissions and pollution…]

> […performing the job according to standard, guidelines, rule or operating procedures set by the organization and able to produce a quality output and observed the risk and environment …]

4.7 Leadership and Teamwork Skills

The present research findings revealed that the next element of green skills is leadership and teamwork skills. Through the previous study showed there were not the teamwork skills in the elements except the leadership skills. According to Essex & Hirst (2011), they found the leadership skills are a shared element with management skills ranked number four important. Leadership skill is the strengths and abilities for each individual to demonstrate that help the oversee processes, guide initiatives and steer their employees toward the achievement of goals (Mclaughlin, 2014). In this study found that as a leader, they must ensure their team follow the SOP related to green practice in order to achieve the goal of green practice.

> […as a leader we need to supervise our staff in order to follow the procedure or SOP which have been stated by the company, I think each of graduate should master in this skill...]

> […the team need to remind each other in order to achieve green practice among us...]

4.8 Problem-solving and Critical Thinking Skills

The present research findings also reveal that problem-solving and critical thinking skills should be included in the green skills elements. These skills are similar the communication skills and teamwork skills which are not popular among the researchers. However, this study found that these skills are very important and demanded among the industries. Two sub-elements have been found, such as how to solve the problem and use critical thinking to make the decision or solution.

> […critical thinking is an essential skill. This is because as a worker, in my position as an example, it is crucial to think on how to make a solution which includes the environment aspect…]

> […thus, the decision making to choose the materials must be accurate…]

5. Conclusion

Everyone deserves to have a good quality of life. However, climate change and pollution were effecting the community, economy, and environment (Chinowsky et al., 2011). For example, the Doocy et al., (2013), reported that the highest consequence for humans on the natural disaster was death. According to the report, the natural disaster event was killed more than five thousand people from 1980 until 2009. Many developed countries were starting to take the precautions that shifted to the green economy model to reduce greenhouse gases (CEDEFOP, 2010). The green economy model offered the green job (Hatfield-Dodds et al., 2008), and the green jobs required green skills among the employees (CEDEFOP, 2010). Although there were many green skills model and framework through the previous study, the competent manpower still not produced much and still has the skill shortage among the employees (Dodds, 2008).

In order to reduce the gaps, a new framework related to green practice is needed. The perfect platform for implementing, applying, and practising the framework is through higher education (Sern, Zaime & Foong, 2008). Through the present study, the total of eight elements of green skills have been found and identified through the group discussion among the experts from the green industries, and there are; 1) waste skills, 2) design skills, 3) planning, procurement, and material skills, 4) energy and water skills, 5) communication skills, 6) management skills, 7) leadership and teamwork skills, and 8) problem solving and critical thinking skills. According to that skills, four new skills have been identified compared to the previous study such as; 1) water, 2) teamwork, 3) problem solving and critical thinking, and 4) protection.

In conclusion, the purpose of green skills should be implemented in higher education for reducing greenhouse gases and preventing climate change and pollution. Additionally, the perspective from the experts is important and useful in order to revise the present training curricular due to green skills demand, to develop the new framework which integrated with green skills, to know the present demand of labour market on green skills, to minimise skill-shortage among graduates, and to protect our environment.

Acknowledgement

The authors would like to thank Universiti Tun Hussein Onn Malaysia to provide financial funding through Contract Grant (Vot No U940).

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