

RESEARCH ARTICLE | SEPTEMBER 29 2017

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AIP Conf. Proc. 1887, 020074 (2017)

<https://doi.org/10.1063/1.5003557>



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Identification of Green Skills Acquisition in Indonesian TVET Curricula

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Abstract. Recently, many countries have put the focus on green growth which specifically aims at achieving a resilient, low-carbon, and resource-efficient economy model that leads to higher quality of life. Environmental pollution and climate change are negatively affecting the sustainability of various economical activities across the world, with Indonesia being one of them. To mitigate the environmental problems, the existing economy should be shifted to a greener economy model which will create green jobs and greening the existing occupation in the industries. Green jobs require workers with green skills. Therefore, development of green skills in TVET institutions is urgently needed. By referencing the existing green skills frame work, green skills acquisition has not been clearly integrated into the existing Indonesian TVET curriculum. However, approach to integrate green skills into TVET curriculum can be carried out through the development of hard skills and soft skills in the domain of knowledge, abilities, and attitudes where green skills is an imparting of both hard skills and soft skills.

INTRODUCTION

Energy plays important role in human life. In the discussion of the grand design for 21 st century's civilized life, one of the most important issues to be solved was decided unanimously by the world community as the 3-E Trilemma. That is for the economic development (E: Economy), we need an increase of the energy expense (E: Energy) with the present infrastructure in modern countries. However, it induces an environmental issue (E: Environment) by more emissions of pollutant gases. On the contrary, if the political option chosen the suppression of pollutant gas emission it inactivates the economic development. This is known as the 3E-Trilemma [1]. Here the important is placed on the change in the circuit from the infrastructure of fossil fuels energy supply to that of renewable energy developments and supply.

In order to counteract the issues pertaining to sustainable development, the European Union has developed the "EU 2020 Strategies" which targets to increase 20% renewable energy consumption and at the same time cuts down 20% greenhouse gas emission in the EU member countries [2]. Although the contents might be different, similar policy has been formulated and endorsed in other countries including Indonesia. From an economical perspective, those environmental policies have a great impact on industrial sector where a large pool of employees with green skills are needed for developing a greener economy model and building up an environmental friendly society.

In the recent years, many countries have put the focus on green growth which specifically aims at achieving a resilient, low-carbon, and resource-efficient economy model that leads to higher quality of life and promotes the well-being of the people. In the past, most the economic activities do not contribute to the sustainable development of social, economic and environment due to low technical and technological levels [3]. Countries around the world have paid a very high cost on environmental pollution and climate change [4]. Environmental pollution and climate change are negatively affecting the sustainability of various economical activities across the world. The changes of climate and environment will bring about, for example, changing weather pattern, more extreme droughts or

monsoons, rising sea levels and so on [5]. These consequences will cause devastating impacts on social as well as economy if effective measures and pragmatic actions are not taken to mitigate the problems.

To mitigate the environmental problems, the existing economy should be shifted to a greener economy model which will create green jobs and greening the existing occupation in the industries. Green jobs require workers with green skills. The problem is that most of the TVET institutions only emphasize on hard and soft skills. The elements of green skills are almost absent in the TVET training framework. Therefore, these additional skill requirements call for a major effort to revise the existing training frameworks. The training institutions must go beyond equipping graduates with hard and soft skills because green skills are equally important and they must be embedded in all levels of education. In this aspect, TVET institutions have an essential role to play in producing green skills workers since TVET is closely and directly connected with the development of economy and society. Within South East Asia regional context, qualitative and quantitative information pertaining to green skills are fairly scarce in the literature due to the lack of empirical research. Therefore, it is still not clear if TVET providers are producing graduates that are required by the green industries. This question is worthwhile investigating in order to shed some light on the issue of green skills. This paper addresses conceptual framework and acquisition of green skills in TVET system in general and in the case of Indonesia.

GREEN INDUSTRY FOR GREEN ECONOMY

A green economy can be seen as an alternative model for the nation growth and development. It can generate growth and improvement in people's living in ways consistent with sustainable development. A Green Economy promotes sustainability and advancement in three aspects, namely, economic, environmental and social well-being. According to the definition established by United Nations Environment Program [6], green economy is defined as an economy model that is low carbon, efficient resource, and socially inclusive which leads to improvement in human well-being and social equity, and at the same time significantly reduce environment risks and ecological scarcity. In addition, in a green economy, growth in income and employment should be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. Green economy can be conceptualized as an economy model which puts the stress on nature conservation and environmental protection that leads to human well-being improvement and sustainable social development. Green economy aims at sustaining economy development without harming the environment. This goal will not be achieved without the cooperation and supports from industries that strive for a more sustainable pathway of growth, by undertaking environmental friendly investments.

Green industry can be any industry that is composed of a variety of activities or businesses involved in productions, distributions, and/or services which emphasize natural resources conservation and environmental protection [7]. The industry most often referred to as "green industry" include renewable energy, building, transportation, recycling, food and agriculture, forestry and tourism. For example, recycling companies and refuse collection companies can be regarded as green industry since the nature of those companies is promoting environmental friendly living condition.

Industry that invests in energy-related field can also be categorized as green industry. For example, solar panel production companies, power generation companies that utilize renewable sources. In addition, construction companies that apply eco-friendly concepts in design and construction can also be recognized green industry. Besides, manufacturing factories, fishery sector, forestry sector, hotels, etc. that play their role in natural resources conservation and environmental protection can also be a part of green industries. These sectors are usually the focal points of studies on green jobs not only because of the nature of the goods and services they are producing, but also because they tend to be labor intensive [8].

Green jobs can be identified by any jobs related to business or services that benefit the environment or conserve natural resources to prevent harms for the mother-earth. Apart from that, green jobs also can be regarded as jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources [9]. Green jobs benefit both the economy and the environment, and include everything from alternative fuels to tasty foods. In order to keep the business running, the green jobs require employees who are competent in green skills.

GREEN SKILLS FOR GREEN INDUSTRY

To compete in the workplace of today, students in TVET institutions must learn the high-level technical skills that are expected for positions in their field as well as the transferable skills that will allow them to keep these positions or advance to better ones [10]. In the past, the term skill solely referred to a specific manual operation. The term now means any practice, form of knowledge, or way of constituting productive labor [11]. Hard skills are the technical and administrative skills required in the workplace that are relatively easy to observe and measure [12]. In contrary, transferable skills are ingrained behavior patterns that are hard to quantify and to teach. Transferable skills are necessary for university-bound students as well as for those seeking a position in the working world directly out of TVET training institutions. Each country has definition and scope of transferable skills. However, transferable skills found in the majority of examined national policy documents cover communication skills, collaboration skills, problem solving skills, entrepreneurship skills and learning to learn skills [13]. Hard skills and soft skills are both important skills to have in the working world especially in TVET areas.

Green skills is generally composed of three dimensions, namely, knowledge (cognitive dimension), skills/abilities (psychomotor dimension), and attitudes/values (affective dimension) needed by workers to promote sustainable development in social, economy, and environment [14, 15]. From the cognitive dimension, the knowledge concerning environmental protection can be regarded as an element of green skills. From psychomotor perspective, green skills refer to the ability to, for instance, minimize energy consumption, or reduce greenhouse gases. Green skills also refer to affective aspect, for example, motivation of an individual to conserve natural resources.

There is dispute over the idea that green skills represent a completely new set of skills which remain largely absent within existing labor markets. A report published by the European Commission states that specific skills will be needed for the growth of the green economy such as knowledge of sustainable materials, carbon foot-printing skills and environmental impact assessment skills [16]. In this case, the challenge of filling the skills gap created by the transition to a greener economy goes beyond ensuring the existence of a qualified workforce in possession of traditional skills. These new skills will have to be incorporated into training and education programs.

In most cases however, the new jobs created by the green industries will require a mix of both traditional and new green skills. For example, construction companies that carry out building and housing projects will require workers with traditional construction skills and up-to-date training in energy efficiency [17]. In general, it can be said that for low to middle-skilled jobs, there will be a need for traditional skills complemented by green skills, most of which can be offered by on-the-job training programs. Higher skilled occupations, such as those found in eco-consulting, will require a broader and more specific set of new green skills. Such new skills are best delivered by educational and in-depth training programs.

The green industry has caused a change in occupations' employment demand and worker skills requirements. In other words, significant skills gaps will be created in labor market due to the needs of the green industry. Neglecting to fill these skills gaps could impede economic and employment growth, and would also represent an obstacle to broader efforts to fight climate change.

A large number of workers with green skills are needed in order to succeed the transition to a green economy. In order to avoid the shortage of green skilled workers from happening, immediate action needs to be taken by training institutions in order to provide the adequate workforce training. Several surveys concerning this issue have been conducted in different countries. The outcomes have revealed difficulties in finding well-trained employees for green industries, and the workforce is still lacking green skills [6, 17]. Although the detail might be different, similar trend and problems are expected to occur in Indonesia in very near future. Therefore, it is imperative to train future workers who are able to contribute to green industries and to get rid of shortage of green skilled workers.

TVET TRAINING FRAMEWORK FOR GREEN SKILLS

The meaning of skills refers to the abilities and capacities to perform tasks that are in demanded in the workforce. These skills can be generic or specific regarding functions at work such as managing people, computing,

collaborating or dealing with risk and uncertainty or developing a new product or service [18]. TVET training framework is composed of several skill components including basic skills hard skills and soft skills. The basic skills are the general skills that must be mastered by students across the world. These skills include effective use of linguistic skill, arithmetical skills, and basic IT skills. Hard skills are regarded as technical skills which are domain specific and it requires consistent training and practice in order to be acquired. Hard skills are various and it depends on the field of training. For example, in the field of welding, the hard skills are related to the welding techniques, welding inspection, and skill to handle welding machines. In addition to the basic and hard skills, soft skills are also a part of the training components. In brief, soft skills are non-academic skills such as communication skills, critical thinking and problem solving skills, team work, lifelong learning and information skills, entrepreneurship, ethic and professional moral skill, and leadership skill [19].

From the existing training framework, it is obvious that the elements of green skills are not explicitly mentioned in the training components. The graduates who have gone through the training programs under such training framework might not be able to meet the needs of the green industry. This problem will be even more pronounced in near future where green economy model is taking it place across the world. Therefore, the existing framework must be revised in order to produce high quality graduates who are able to contribute to growth of green economy. Thus, the conceptual framework as illustrated in Figure 1 purported as a conceptual to explore the green skills competencies for both hard skills and soft skills

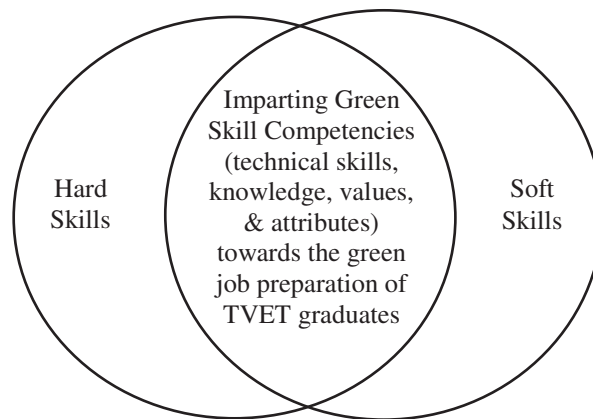


FIGURE 1. Conceptual framework

A common framework for green skills namely three tiers, need to be established. (1) Tier 1: Transforming TVET Institutions for the Green Society and Economy, (2) Tier 2: Formulating National Strategy to achieve green growth; and (3) Tier 3: International Cooperation framework in Greening TVET [20]. Transforming TVET institutions will form a coherent network that can set the agenda for green policy formulation that can support the mainstreaming and sustaining of green-oriented institutions as a national movement. To support the above framework of transforming TVET institution in a new way of development, a national policy need to be developed to have a comprehensive green growth policy covering all aspect of greening society transformation including green growth strategic plan, energy, food and water security & policy, carbon emission targets, research and development policy in green and clean technology, and all related policy development including green TVET framework. Capacity development to formulate the entire above policy requirement is an urgent task. The international framework builds upon all key areas of TVET for sustainable development strategies. Specifically, capacity development, will serve as a pivot of the initiative consistent with ongoing efforts in this direction. International organization must act now to address growing challenges related to ESD. This requires substantial political commitment. The international community should send strong signals to support for green TVET and also set the strategic framework in which programs and initiatives can work to introduce green TVET.

A holistic framework is needed to transform TVET institution in a comprehensive manner to support green society and green economy. It cannot be achieve by piecemeal or ad hoc approach. Majumdar [20] has proposed five dimensions of greening TVET frame work at institutional level. Greening TVET is considered as one of the holistic

frameworks for smooth transition to sustainable and low-carbon world in the TVET sector. A suggested framework is such that is built upon five dimensions to anchor sustainable development principles in TVET institutions as shown in Table 1.

TABLE 1. Green Criteria and Indicators

No.	Criteria	Purpose	Indicator
1	Green Campus	To reduce the carbon footprint of students, teachers and staff within the TVET institutions.	Green policy and objectives Resource management Management systems for M&E
2	Green Curriculum	To meet upcoming skills for clean and green jobs.	Green programs and courses Green practices in classroom and lab Industry-Institute interaction
3	Green Community	To extend sustainable development practice at the community level so that the movement of TVET institutions is extended to the society at large.	Green practices at community level Community participation Innovative programs and projects
4	Green Research	To foster the development of a research culture in relevant areas of sustainable development	Research programs in SD Impact and outcome Management and monitoring
5	Green Culture	To focus on strengthening values education, ethical standards, attitudes and behavior that respects ecological resources and values the future requirements of the future generation.	Values and practices Participation and involvement Innovative programs

GREEN SKILLS ACQUISITION IN INDONESIAN TVET CURRICULA

Based on the developed green skill framework, we have identified the acquisition of green skill in the TVET curriculum. This preliminary study was conducted through literature study from curriculum documents followed by limited focus group discussions. It is found that the development of green skill has not been specifically mentioned in the current Indonesian TVET curriculum. However, it is possible to integrate the development of green skill into the curriculum. This is because in general, the curriculum is oriented to the development of hard skills and soft skills in the domain of knowledge, abilities, and attitudes where green skill is an imparting of both. The development of green skill can be done through intra-curricular and extracurricular activities.

Several initiatives to develop green skills have been conducted, including: (1) insertion of energy literacy content into relevant subjects such as physics, chemistry and energy conversion, (2) increasing energy literacy through extracurricular activities in student activity units, (3) involvement some TVET institution in green metrics university ranking (<http://greenmetric.ui.ac.id/>). These initiatives need to be systematic and planned with clear frameworks and targets.

SUMMARY

In the framework of sustainable economic development, development of green skills, green jobs and green industry are very much needed. The development of green skills for TVET graduate can be included in the TVET curriculum and teaching and learning process. At present, green skills development has not been clearly integrated into the existing Indonesian TVET curriculum. However, approach to integrate green skills into TVET curriculum can be carried out through the development of hard skills and soft skills in the domain of knowledge, abilities, and attitudes where green skills is an imparting of both hard skills and soft skills.

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