Industry Perceptions on the Need of Green Skills in Agribusiness Vocational Graduates

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Abstract: One of the global issue trends in vocational education is greening to support the achievement of sustainable development. Industry as one of the main stakeholders of vocational schools needs to know their views regarding the skills of prospective workers they need. This study aims to identify industry perceptions on the necessity of green skills in agribusiness vocational graduates. Five elements of green skills studied here are environmental awareness, innovation skills, communication skills, adaptability, and management of waste. A descriptive research design with quantitative approach was used in this research. Data was be gathered through a questionnaire involving fifty practitioners from various types of food industries. The result showed that the industry practitioners agreed that green skills is required by agribusiness vocational graduates. This finding can be used as a guide in integrating green skills into the agribusiness vocational curriculum by considering the skills most needed based on industry perceptions.

Keywords: Agribusiness vocational graduates, green skills, industry perceptions

1.   Introduction

Generally, vocational education in many countries consists of secondary and higher education (Brunello & Rocco, 2015). In Indonesia, there is an upper secondary vocational education institution called SMK (Sekolah Menengah Kejuruan) as a vocational school. It has a mission to equip workers who can work professionally in the industry. Therefore, it plays a role in generating graduates who have the skills correspondingly to the requirements of the job market to increase the growth and development of the nation's economy (Murniati, Usman & Azizah, 2016). The industry is a stakeholder who has an imperative and specific role in accomplishing the mission of vocational education (Ngure, 2013). Vocational school and industry may develop mutually beneficial partnerships to improve students' skills to meet industry demands (Hadromi, 2018).

Work field targeted by graduates is specific. Thus, the vocational school is special education that equips graduates to be competent to work professionally, develop careers in particular areas of expertise (Asnawi & Djatmiko, 2015). In this regard, the Indonesian government has divided SMK into nine fields of expertise which are technology and engineering, energy and mining, information communication technology, health-social work, agribusiness-agrotechnology maritime affairs, business and management, tourism, arts and creative industries. Each of which consists of several expertise programs and expertise competencies (Regulation Director-General of elementary and secondary education, Education and Culture Ministry, No 6/2018 on the skills spectrum of vocational high school). Agribusiness and agrotechnology is one of the expertise areas of SMK in Indonesia consisting of 6 skills programs, namely plant agribusiness, livestock agribusiness, animal health, agribusiness processing of agricultural products, agricultural engineering and forestry. Vocational school of agribusiness processing in agricultural products called SMK APHP (Agribisnis Pengolahan Hasil Pertanian) prepare students to work in the business world, as well as the food industry. Thus, it plays as one of the main stakeholders for agribusiness vocational school.

Food industries contribute negatively to the environment since it causes rising of gas emissions due to energy usage throughout the manufacturing process up to distribution as well as production waste. The global threat like climate change, reduced water availability, pushing to adopt sustainable food processing that is more environmentally friendly (Tiwari, Norton & Holden, 2014). This has become one of the drivers of shifting the recent economy design to the green economy (Loiseau, etc., 2016) which increases the rate of adjustment in employment and the skills required by green industries (Vona, Marin, Consoli & Popp, 2018). A green economy calls for green skills improvement that are needed almost any employment considering green jobs are relevant in all main field such as transportation, manufacturing, tourism, construction, agriculture, and renewable energy (Maclean, Jagannathan & Panth, 2018). Those skills are needed to do profitable work without damaging the environment, to ensure sustainable development (Sern, Zaime & Foong, 2018). Green skills can improve workforce understanding and skills for more environmentally friendly performance in order to support green growth (Pavlova & Chen, 2019). Green skills are defined as soft skills that focus on environmental preservation and energy efficiency (Thirupathy & Mustapha, 2020).

The issue of greening in vocational education is a global issue (Pavlova, 2017). Integration of green skills into vocational education curriculum is a necessity that will encourage the development of green technology as an effort to sustainability toward green economy (Kamis, Alwi & Yunus, 2017). The term sustainability is increasingly appearing in many industries, including food industries. The concept of sustainability in food processing shows that the process must: i) be based on raw materials that can be produced sustainably without damaging the environment, social or economy; ii) in the long run, do not depend on non-renewable energy sources; and iii) produce products that are safe for human health (Tiwari, Norton & Holden, 2014). Today, food producers around the world are very concerned about sustainable food processing chains and implementing sustainability practices in their industrial activities. Thus, in this study, green skills are considered as skills needed food industry to implement sustainable food processing. Students of SMK APHP as prospective employees should have skills proper to industries necessity. Practitioners' view, as well as industry involvement, are needed to enhance the quality of vocational education preparing competent graduates who are ready to work. This study aims to identify industry perceptions of the need for green skills in agribusiness vocational students.

2. Methodology

2.1. Population and Sampling

This study employed a survey research design with a quantitative approach as a method of data collection. In general, survey research was conducted on the sample, so it is necessary to determine the subject of data source (population and sample), as well as how the sample was taken (Ali, 2019). Population in survey research may take in the local or national scope where the population of this study was food industries around West Java province. Later on, the sample subject was chosen to represent the population by considering the size and representation of the sample. The sampling technique used in this study was purposive based on consideration of research objectives, identify industry perceptions on the needs of green skills in vocational graduates. This study involved fifty (50) food industries as a sample which are stakeholders of the vocational school of agribusiness processing in agricultural products (SMK APHP) around West Java.

2.2. Instrument

Data was collected through questionnaires distributed to industry practitioners as stakeholders of agribusiness vocational high school. A set of a questionnaire consisting of 97 items using 5 points Likert scale from '1' as strongly disagree to '5' as strongly agree (Leung, 2011). It was through a process of developing research instruments, namely development of questionnaire items based on theoretical studies (Pavlova, 2018; Kokkinen, 2013; Van Dam, 2013; Umar, Sehab, Yagnik, 2018), legibility testing content validation by expert judgment, and was tested on respondents to determine their validation and reliability. The questionnaire distributed to industry practitioners as respondents have been revised according to expert advice, also declared valid and reliable after being tested. All respondents' answers in the questionnaire were grouped according to five elements and indicators of green skills (Table 1) namely as follows: 1) Environmental awareness; 2) Innovation skills; 3) Communication Skills; 4) Adaptability; 5) Management of waste.

Table 1 - Indicators in Green Skills Elements

Environmental awareness	Understand environmental problems
	Understand solutions to environmental problems
	Being concerned about environmental issues
	Actively participating in organisations that campaign for environmentally-sustainable development
	Have a habit of protecting the environment
Innovation skills	Identify opportunities to support green growth
	Develop creative strategies to support green growth
	Initiating innovative solutions to overcome environmental problems
Communication skills	Deliver ideas and information in writing
	Understanding written material
	Communicate ideas and information verbally
	Active listening
Adaptability	Be aware of changes in the work environment that are shifting towards green jobs
	Have an open mind to the shifting needs of green jobs
	Show positive emotions to response the adjustment of work environment towards green jobs
	Resilient in facing the challenges of changing work environment that is shifting towards green jobs
	Behave proactively towards changes in the work environment
Management of waste	Understand liquid waste management in food industry
	Understand solid waste management in food industry
	Understand gas waste management in food industry
	Understand management of hazardous and toxic waste

2.3. Data Analysis

Statistical Packages for Social Science (SPSS) version 23.0 was used to analyse the whole data. Data analysis begins with reliability analysis for checking whether the items of the questionnaire are reliable for components in green skills in this study. Reliability becomes the basis for assessing the feasibility of the instrument. The degree of reliability was known based on the results of tests conducted empirically. This test was carried out by trial and error, and the data obtained from the trial results are used to perform the reliability test (Ali, 2019). This study used Cronbach's alpha to determine the average correlation in items. The calculation was done by preparing data that would be tested for reliability in the tabulation of the answers of each respondent with the fifty respondents, while questionnaire statement items are grouped into five elements.

Table 2 - Reliability Analysis

Element	Cronbach's Alpha
Environmental awareness	0.795
Innovation skills	0.759
Communication skills	0.788
Adaptability	0.801
Management of waste	0.812

The examination showed that Cronbach's alpha of environmental awareness, innovation skills, communication skills, adaptability, management of waste was 0.795, 0.759, 0.788, 0.801 and 0.812, respectively (Table 2). Cronbach's alpha is applied to measure the reliability in a research instrument, whether suitable or not with research objectives (Taber, 2018). Alpha value is described as reliable (0.70 – 0.79) and highly reliable (0.80 – 0.90). Accordingly, this finding demonstrates that the reliability of the set of distributed questionnaire was relevant and could be applied in this study.

3. Results and Discussion

In this study, fifty industry practitioners had given response to the questionnaires. Educational background of respondents are shown in Table 3.

Table 3 - Industry Practitioners by Educational Background

Education background	Industry Practitioners
Agriculture technology	4,0%
Agroindustry Technology Education	12,0%
Chemistry - Chemical engineering	8,0%
Food Technology	50,0%
Industrial engineering	8,0%
Management	14,0%
Others	4,0%

Industry practitioners involved in this study have different educational backgrounds, where 50% of them have expertise in food technology, while the rest come from agro-industrial technology education, management, industrial engineering, chemical engineering, agriculture technology and other expertise. In general, workers in the food industry have an educational background in the field of food technology. This is in line with the statement Mayor et al., (2015) that the competitive food industry sector requires food science and technology professionals of the highest quality. Employee skills can influence directly or indirectly on the quality of products produced by the food industry so that they can compete in the food sector market. According to Antic and Bogetic (2015), the success of an organisation including the industry depends on comprehension, creativity and encouragement of its employees, so that company management needs to improve employee competency through education and training.

Table 4 - Industry Practitioners by Industry Type

Industry Type	Practitioners
Food & snack industry	22,0%
Palm oil industry - downstream	12,0%
Beverage industry	10,0%
Food & beverage industry	10,0%
Plantation industry (tea, coffee, palm oil)	10,0%
Flour mill industry	8,0%
Fast-moving Consumer Goods	6,0%
Others	6,0%
Agricultural product certification	4,0%
Agricultural product supplier	4,0%
Cocoa industry	4,0%
Meat & fish processing industry	4,0%

Furthermore, the respondents of this study come from various types of food industries, as shown in Table 4. The food industry is known worldwide as one of the important industries, considering that all humans need food every day. Its term encompasses a batch of all activities in the industry such as supply, processing, food preservation up to packaging. Food industries generally use raw materials from vegetable or animal materials which are harvested from agriculture, animal husbandry and fisheries. Therefore, there are some types of food industries like meat processing and preservation, processing of fish products, processing of fruit and vegetable, milling of grains, biscuit, beverages, oils and fats products, and others. The manufacturing is very diverse, ranging from small activities, run by highly labour-intensive families, to large industrial processes that are capital intensive and very mechanical. This is in line with Sadiku, Musa & Ashaolu (2019) which states that food industry is not just one industry but is a collection of several types of industries that produce a variety of food products. This includes agriculture, food production, food processing, preservation, packaging, distribution, retailing and catering. The food industry consists of the following components: agriculture, processing of food, distribution, financial services, research development and technology.

All industry practitioners gave almost the same response to each indicator in green skills that need to be possessed by agribusiness vocational students. They stated their agreement on the need for green skills as seen in Table 5, which shows the mean score in the range 4.14 - 4.74 of the highest mean score of 5 (strongly agree). The indicator of active listening is the lowest score, while the indicator of resilient in facing the challenges of changing work environment and being concerned about environmental issues are the highest score. However, they are categorised 'agree' responses and

the standard deviation shows a low score, meaning that the data points tend to be very close to the mean. This finding is in line with the statement Maclean, Jagannathan & Panth (2018) that in recent years, there are regulatory and incentives to encourage industry to switch to greener production systems. Thus, the workforce needs to be prepared, for example through training on new skills in order to compete in green economy. In addition, the green growth transition ('greening') has a big structural effect on the global labor market. Greening issues will alter the career path of work, change of skills needed to complete tasks and green jobs in the field (Bowen, Kuralbayeva & Tipoe, 2018). Pavlova (2019) confirmed that green growth at the global level and climate change mitigation have led to the need for a workforce with new skills needed to build and sustain new industries and environmental practices.

Table 5 - Mean for Indicators in Green Skills Element

Element	Indicator	N	Mean	Std. Deviation
Environmental awareness	Understand environmental problems	50	4.67	0.46
	Understand solutions to environmental problems	50	4.68	0.48
	Being concerned about environmental issues	50	4.74	0.26
	Actively participating in organizations that campaign for environmentally-sustainable development	50	4.35	0.45
	Have a habit of protecting the environment	50	4.55	0.42
Innovation skills	Identify opportunities to support green growth	50	4.57	0.45
	Develop creative strategies to support green growth	50	4.71	0.34
	Initiating innovative solutions to overcome environmental problems	50	4.36	0.44
Communication Skills	Deliver ideas and information in writing	50	4.52	0.51
	Understanding written material	50	4.47	0.56
	Communicate ideas and information verbally	50	4.53	0.51
	Active listening	50	4.14	0.64
Adaptability	Be aware of changes in the work environment that are shifting towards green jobs	50	4.53	0.43
	Have an open mind to the shifting needs of green jobs	50	4.66	0.47
	Show positive emotions to response the adjustment of work environment towards green jobs			
	Resilient in facing the challenges of changing work environment that is shifting towards green jobs	50	4.72	0.44
	Behave proactively towards changes in the work environment	50	4.74	0.35
	Be aware of changes in the work environment that are shifting towards green jobs	50	4.65	0.41
Management of waste	Understand liquid waste management in food industry	50	4.70	0.44
	Understand solid waste management in food industry	50	4.71	0.46
	Understand gas waste management in food industry	50	4.68	0.46
	Understand management of hazardous and toxic waste	50	4.73	0.47

Table 6 displays the mean score (4.41- 4.70) on the whole elements of green skills. Industry practitioners convinced that students should possess all of the green skills element. Moreover, the standard deviation for each component of green skills shows a relatively slight mutability in the distribution. The following are the elements, sorted from the most significant score to the smallest: management of waste, adaptability, environmental awareness, innovation skills, and communication skills. Those are all skills needed in realising a green industry to attain sustainable development. Future vocational education not only prepares individuals for work but must also develop students into responsible citizens who are able to protect the environment and improve the welfare of society (Chinedu, Wan-Mohamed & Ogbonnia, 2018).

Table 6 - Mean for Green Skills Element

Element	Mean	Std. Deviation
Environmental awareness	4.60	0.29
Innovation skills	4.55	0.34
Communication Skills	4.41	0.45
Adaptability	4.66	0.29
Management of waste	4.70	0.35

Table 7 is the illustration for each element of green skills mean score of every industry. Every industry practitioners rated the management of waste as the highest rating compared to other green skills element that needed by agribusiness vocational students. However, this comparison is not significant, since all industry practitioners give a rating in the range of 4-5 (agree to strongly agree) for all green skills elements that students need to have. Meanwhile, cocoa industry have the highest rating for the needs of green skills of students, followed by FMCG (fast moving consumer goods), the plantation industry, the food & snack industry (table 7). This results show that waste is a crucial problem in the food industry so workers are needed who have the skills to manage waste. Food industries generate a large number of pollution which can be an environmental issues so the development of systems for food waste treatment is needed (Al-Rumaihi, McKay, Mackey & Al-Ansari, 2020).

In addition, the industry perceives that students need to have adaptability. Technological changes and automation that alter job characteristics, mergers or corporate restructuring, require employees to learn new ways to do their work and learn new skills so they can compete for different jobs (Cascio & Montealegre, 2016). Adaptability has a significant effect on work involvement to employee welfare (Yang, Feng, Meng & Qiu, 2019). The rating for adaptability is at the second highest after management of waste.

Table 7 - Green Skills Mean Score by Industry Type

Industry Type	Environmental awareness	Innovation skills	Communication Skills	Adaptability	Waste management
Food & snack industry	4,55	4,51	4,40	4,72	4,82
Palm oil industry	4,55	4,40	4,36	4,58	4,72
Beverage industry	4,43	4,51	4,35	4,54	4,50
Food & beverage industry	4,54	4,56	4,23	4,76	4,62
Plantation industry (tea, coffee, palm oil)	4,81	4,61	4,55	4,80	4,82
Flour mill industry	4,54	4,42	4,36	4,60	4,67
Fast-moving Consumer Goods	4,87	4,80	4,79	4,62	5,00
Others	4,33	4,44	4,23	4,48	4,45
Agricultural product certification	4,65	4,59	4,63	4,53	4,66
Agricultural product supplier	4,80	4,75	4,10	4,65	4,47
Cocoa industry	4,84	4,86	4,97	4,88	5,00
Meat & fish processing industry	4,74	4,62	4,29	4,63	4,41

Environmental awareness is the concern of all food industry practitioners, where it needs to be owned by prospective student workers. Managing and increasing environmental awareness has become one of the main goals of social development in all aspects (Ham, Mrčela & Horvat, 2016). It affects several areas of individual life, both personal and work. Environmental awareness includes environmental knowledge, where emotional involvement shapes environmental awareness and attitudes (Smederevac-Lalic et al., 2020). It is also referred to as caring for environmental problems and live involvement in environmental association (Altin et al., 2014). Moreover, the higher one's knowledge of environmental problems, the higher the environmentally friendly behaviour (Mei, Wai & Ahamad, 2016).

Regarding environmental issues, food industry faces several challenges such as temperature change, waste exile, pollution, deforestation, environmental degradation, and shortage of natural resources (Sadiku, Musa & Ashaolu, 2019). Moreover, food processing as the main activity in the food industry is considered a leading sector due to the great growth potential and socio-economic effect (Rais, Acharya & Sharma, 2013). These are encouraging each country to adopt a more sustainable food system. Generally, food processing activities spend a large number of water and energy since water is the main processing media in all stages of the food process, both as material and process support. Moreover, several major operations such as food preservation, storage and sanitation, require a lot of energy. In a sustainable food processing

system, the industry is trying to make more efficient use of water and energy, and minimise or even not produce waste. This will be of great benefit to the environment and the economy (Lee & Okos, 2011).

Green technology is required to actualise a sustainable food processing system like reducing efficient in energy use, reducing waste, recovering products, and disposing of waste that is safe for the environment (Boye & Arcand, 2013). Therefore, environmental sustainability in food processing becomes an important issue where most companies will increase sustainability in the quality and safety of their food products (Xian et al., 2017). Food waste harms the environment due to pollution and increased greenhouse gas emissions so that it becomes a crucial problem both locally and globally. Papargyropoulou et al., (2014) proposed a systematic and holistic framework in food waste management that shows the priority scale of action choices, considering three dimensions of sustainable development namely environmental, social and economic aspects. The priority scale forms a hierarchy of food waste where the priority is prevention and reduction of waste, then reuse of waste. Recycling of waste and the last priority is recovery and safe disposal.

Considering all these facts, it is not surprising that the food industry needs employees who have skills related to environmental awareness and management of waste. Those skills include understanding the environmental problems caused by the food industry and its solutions, caring to the environment, be active in environmentally friendly communities and have a habit of protecting the environment. Besides, employees should understand the waste management of liquid, solid and gas in the food industry, also managing them according to the waste management hierarchy.

Innovation skills and adaptability are three elements of green skills that, according to food industry practitioners, must also be owned by prospective student workers, especially in agribusiness vocational school. They are the main soft skills that form the educational policy framework of various countries, where the other soft skills are critical thinking, creativity, collaboration skills, self-direction, contextual learning skills (Cobo, 2013). Increasing innovation skill is important as a major element in advancing renewal in the economy, where many jobs require innovation (Toner, 2011). These findings suggest that skills are necessary for agribusiness vocational students who are prepared to be professional workers. In addition, 21st-century learning skills needed for success in the workplace are also in demand by employers, namely verbal and written communication, teamwork, and skills how to solve the problems (Rios et al., 2020). Many education stakeholders have recognised 21st Century skills as a stable and internationally recognised policy framework. Learning to support these skills must be student-centred and include three domains, namely interpersonal, cognitive aspects and the domain of intrapersonal competencies, each of which contains general competencies. Communication and collaboration are included in the interpersonal domain (Nehring, Charner-Laird, & Szczesiul, 2019).

In 2015, economic observers had estimated that five years later (2020) more than a third of the skills (35%) deemed important in the workforce would change. One of the skills that workers must be possessed besides critical thinking and problem solving is creativity. Changes in the world of work cause workers to be more creative and they are required to have high adaptability. The interesting thing is that active listening skills, which are considered to be core skills at the time, are estimated to be missing from the top 10 required skills. On the other hand, emotional intelligence, which was not in the top 10 at the time, would be one of the skills needed by all. The following are the top 10 required skills in the industrial revolution era (2020): how to solve the complex problems, critical thinking, skills of creativity, how to manage people, teamwork, emotional intelligence, how to make judgement and decision, service orientation, how to negotiate with other people, and cognitive flexibility (Gray, 2016). These skills intersect with the finding of this study namely innovation skills (creativity), communication skills (coordinating with others, how to negotiate with other people) and adaptability. In green skills context as the skills needed to present sustainable food processing systems that apply green technology, the three skills (innovation, communication and adaptability) that workers must possess are directed towards efforts to bring renewable raw materials, renewable energy, and implementing zero waste.

Unfortunately, the necessity for skills in new jobs that are environmentally friendly or green jobs have not been responded effectively by educational and training institutions. TVET (Technological Vocational and Education Training) in some developing countries has not answered to skills challenges related to environmental issues and temperature change (ILO Global Report, 2011). Therefore, education and training in green skills need to be developed in sectors which are the main drivers of growth and occupation. Simsekli (2015) stated that student awareness to the environment could be increased through practical learning that involves environmental problems they face or other problems. Industry and business practitioners have commenced steps to train employees to have environmentally friendly work competencies. However, this has not been well-coordinated between the government, industry and educational institutions.

4.   Conclusions

In this study, it is found that green skills are required by agribusiness vocational graduates based on the food industries perceptions as the main stakeholders of vocational high school of agribusiness processing in agricultural products. The five elements of green skills, namely environmental awareness, innovation skills, communication skills, adaptability and management of waste, students need to have as prospective workers in food industries. Those skills are needed to present sustainable food processing systems that apply green technologies in food industries. Therefore, this finding can be used as a guide in integrating green skills into the agribusiness vocational school curriculum to improve student skills so that they are in line with industry needs.

Acknowledgment

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