



ASEAN Journal of Science and Engineering Education



Journal homepage: <http://ejournal.upi.edu/index.php/AJSEE/>

The Relationship of Vocational Education Skills in Agribusiness Processing Agricultural Products in Achieving Sustainable Development Goals (SDGs)

Kaka Widyastuti Gemil, Deki Sara Na'ila, Nanda Zahra Ardila, Zulfa Ulya Sarahah*

Sekolah Menengah Kejuruan Negeri Pertanian Pembangunan Lembang, Bandung, Indonesia

*Correspondence: E-mail: admin@smkppnlbg.com

ABSTRACT

Students' attitudes towards science learning based on the results of the questionnaire are still lacking, students' attitudes towards science are lacking because learning is not related to students' everyday problems, learning activities are less fun and students are afraid to express opinions, and students find science learning difficult. This study aims to improve students' attitudes toward science learning on the respiratory system material and wave material using the Problem-Based Learning (PBL) model. The subjects were 32 students (14 males and 18 females). The type of research used in this research is classroom action research (CAR) with 2 cycles. Data collection was carried out by filling out questionnaires and observing attitudes toward science. Attitude toward science indicators consists of 5 indicators, namely: Attitude, Unfavorable outlook, Control beliefs, Behavioral beliefs, and Intention. Based on the results, there was an increase in student attitudes starting from cycles 1 to 2. The student attitudes toward science learning were 69.69 to 71.73%. The average student attitude in one class rose by 2.06%. Attitude toward science in cycles 1 and 2 by applying the PBL model has increased learning outcomes.

ARTICLE INFO

Article History:

Submitted/Received 03 Sep 2023

First Revised 01 Oct 2023

Accepted 17 Dec 2023

First Available online 19 Dec 2023

Publication Date 01 Sep 2024

Keyword:

Agribusiness processing,

Agricultural product,

Learning achievements,

Sustainable development goals.

1. INTRODUCTION

Sustainable Development Goals (SDGs) are a development that balances the fulfillment of current needs without harming the environment and is beneficial for the lives of future generations (Primasti, 2021). The SDGs were created by the United Nations (UN) as a guide for all member countries to achieve sustainable development, including Indonesia (Yorisca, 2020). According to the Indonesian Ministry of National Development Planning/National Development Planning Agency (known as Kementerian Perencanaan Pembangunan Nasional/Badan Perencanaan Pembangunan Nasional) in 2023 about Sustainable Development Report 2023, Indonesia is currently ranked 75th in the world, up significantly from 102nd in 2019.

This is in line with Indonesia's SDGs index score, which continues to increase from 64.2 (2019) to 70.2 (2023). The current main theme of Water, Energy, and Agriculture towards Sustainable Food Security is expected to further encourage the private sector, philanthropy, universities, and other parties to jointly engage in realizing a better world through the achievement of SDGs" (Patiung, 2019).

United Nations through one of its fields, namely the United Nations of Education, Social, and Cultural Organization (UNESCO) which is engaged in education, makes special guidelines in the field of education called Education for Sustainable Development (ESD). Indonesia is part of UNESCO which has participated in implementing this ESD (Irhamisyah, 2019). One of them is in the field of vocational high school education, especially in the concentration of expertise in Agribusiness Processing of Agricultural Products (APHP).

The concentration of APHP expertise studies the processing of agricultural products in developing processed vegetables, animal, refreshing and plantation crops, and spices (Rachmawati et al., 2020). This subject is expected to equip students to be competent in doing work as an agricultural product processor independently or entrepreneurially, developing and doing work as an implementer or processing operator in the agricultural product processing industry to become a product that has high selling value (Hartanti, 2020).

APHP's concentration of expertise is a concentration of expertise that studies how to process farm products into products that have high selling value, including how to sell these products. (In the independent curriculum, the objectives of this concentration of expertise are written as learning outcomes (Potutu et al., 2023).

Based on the statements described above, we conducted literature study research to see the relationship between the APHP concentration and the SDGs through exposure to the APHP learning outcomes in the independent curriculum and the SDGs in realizing the SDGs in Indonesia. The uniqueness of this research is that it discusses the relationship between SDGs and vocational high school education with a concentration on Agribusiness Processing of Agricultural Products (APHP) expertise. This relationship is expected to be involved in realizing several SDGs in Indonesia.

2. METHODS

The method used in this study uses a library research approach. Based on this, the data collection in the study was carried out by reviewing and exploring several journals, documents, data sources, and other formations that are considered relevant to the research or study (Apriyani et al., 2022).

(i) First, we dealt directly with text (nash) or numerical data, not with direct knowledge from the field.

- (ii) Second, library data is "ready to use", meaning that researchers are not directly involved in the field because researchers are dealing directly with data sources in the library.
 - (iii) Third, library data is generally a secondary source, in the sense that researchers obtain material or data from second-hand and not original data from the first data in the field.
- Fourth, that the conditions of library data are not limited by time and space.

2.1. Sustainable Development Goals

SDGs are a sustainable global-scale development agenda for a prosperous and peaceful society while preserving the planet Earth. SDGs are global and national commitments to improve the welfare of society (Sarman *et al.*, 2023). Education for ESD is education to support sustainable development, namely education that provides awareness and abilities to all people, especially future generations, to contribute better to sustainable development in the present and future (Fitriandari & Winata, 2021). Merdeka Curriculum is a curriculum with diverse extracurricular learning where content will be optimized so that learners have enough time to explore concepts and strengthen concentration (Purnawanto, 2022).

Teachers have the flexibility to choose various teaching tools so that learning can be adjusted to the learning needs and interests of students. The independent curriculum gives educators the flexibility to create quality learning that suits the needs and learning environment of students (Priantini *et al.*, 2022).

The purpose of the independent curriculum is a breakthrough step to help teachers and principals transform the learning process to be much more relevant, immersive, and fun. Thus, students can more easily understand the learning that is carried out. At the vocational school level, there are two phases of the independent curriculum, namely phase E for class X and phase F for classes XI-XII. These phases are aligned with the theory of child and adolescent development and also with the structure of the education gap.

The use of the term "Phase" is done to distinguish it from classes because learners in the same class may learn in different phases of learning (Khaulani *et al.*, 2020). At the end of phase F, learners will have a concentration (hard skills and soft skills) in agricultural product processing which includes the production of processed vegetable products, animal products, refreshing crops and plantations, spice crops, food safety, and quality management systems, packaging, storage and warehousing, handling agricultural product processing waste, and analyzing agricultural product processing businesses (Hartiningtyas *et al.*, 2016).

2.2. Relationship between Learning Outcomes and Sustainable Development Goals

Based on the literature above, there are several SDGs related to the concentration of APHP expertise through analyzing the learning outcomes of the Merdeka curriculum. The following is a table of the relationship between learning outcomes and SDGs is shown in **Tables 1 and 2.**, APHP Subject Phase F Learning Outcomes with Goals (SDGs) shown in **Table 3.**

Table 1. Learning outcomes and SDGs.

Learning Outcomes	Target Objectives SDGs																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
At the end of phase E, learners can understand the business processes of the agricultural product processing industry, including industry classification, business scope, application of HSE, product planning, supply chain, logistics, production processes, equipment use and maintenance, and resource management with due regard to potential and local wisdom. and local wisdom.									√			√					
By the end of phase E, learners can understand the business processes of the agro-processing industry, including industry classification, business scope, application of HSE, product planning, supply chain, logistics, production process, use and learners can explain the development of agro-processing technology and quality testing, namely biotechnology, nanotechnology, automation, digitalization, Internet of Things (IoT); understanding of global warming, climate change, global, regional and local food security, sustainable agriculture, institutional systems in the production chain and markets.									√			√					
At the end of phase E, learners can explain the profile of agripreneurs who can read market and business opportunities to foster an entrepreneurial spirit, as well as the profile of professions or positions in the agricultural product processing industry that maintain food availability to foster an attitude of professionalism at work.									√			√					

Table 1 (Continue). Learning outcomes and SDGs.

Learning Outcomes	Target Objectives SDGs																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
At the end of phase E, learners can understand concepts, principles, and procedures through the limited practice of basic processes of processing agricultural products (plant, animal, and fish including size reduction (cutting, shredding, grating, chopping, crushing, and grinding), thermal processes (cooling, freezing, pasteurization, sterilization, drying, roasting, roasting, and frying), chemical and biochemical processes (salting, salting, acidification/fermentation), and separation processes (sieving, screening, distillation, extraction, precipitation, and frying). (sieving, filtering, distillation, extraction, precipitation, agglomeration evaporation, and the process of mixing ingredients.									√			√						
At the end of phase E, learners can understand about identify the characteristics and handling (sorting, grading, preservation, packaging, packing, and cold storage) of post-harvest agricultural products for storage, consumption, or further processing into semi-finished processed products, or finished products by applying K3LH principles and procedures.									√			√						

Table 1 (Continue). Learning outcomes and SDGs.

Learning Outcomes	Target Objectives SDGs																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
At the end of phase E, learners can understand the principles, and procedures for the use and maintenance of glassware (volume measuring cups, container cups, distillation apparatus, extraction apparatus, filtration apparatus, titration apparatus, wa- dah cups, reactor/mixer cups, and supporting glassware), non-glassware (analytical balance, oven, water bath, furnace, incubator, autoclave, fume hood or fume-scrubber, hot plate, bunsen or burner, Laminary Air Flow/LAF), use of chemical reagents and standards (making solutions and standardizing solutions), aseptic work techniques, sterilization of equipment and sterilization of media, and handling of laboratory waste. laboratory waste handling.									√			√					

Table 2. Phase e-learning outcomes of APHP subjects with goals (SDGs).

Learning Outcomes	Target Objectives SDGs																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
By the end of phase F, learners can select and handle raw materials and additives for the vegetable processing production process, prepare and operate equipment, control the process, and assess the quality of results using conventional methods and/or modern tools. results using conventional methods and/or modern tools									√			√					
By the end of phase F, learners can produce processed meat/fish/eggs and/or milk by selecting and handling raw materials and additives for the animal product processing production process, preparing and operating equipment, controlling the process, and assessing the quality of results using conventional methods and/or modern tools.									√			√					

Table 2 (Continue). Phase e-learning outcomes of APHP subjects with goals (SDGs).

Learning Outcomes	Target Objectives SDGs																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
By the end of phase F, learners can carry out the production of processed tea/coffee/chocolate/coconut/tobacco and/or other commodities by selecting and handling raw materials and additives for the production process of processing refreshing and plantation products, preparing and operating equipment, controlling the process and assessing the quality of results using conventional methods and/or modern tools quality using conventional methods and/or modern tools									√			√						
By the end of phase F, learners can produce processed ginger/turmeric/Curcuma/clove/cinnamon/nutmeg and/or other commodities by selecting and handling raw materials and additives for the production process of processing spice crops, preparing and operating equipment, controlling processes and assessing the quality of results using conventional methods and/or modern tools.																		
By the end of phase F, learners can understand and develop product specifications, application of sanitation/SSOP (Sanitation Standard Operating Procedures), GMP (Good Manufacturing Practice), and HACCP (Hazard Analysis Critical Control Point).										√			√					
By the end of phase F, learners can determine packaging materials, packaging techniques, storage of processed agricultural products, warehousing processes, and warehousing management systems in their application in the field of agricultural product processing using conventional methods and/or modern tools. vensional methods and/or modern tools.										√			√					
By the end of phase F, learners can handle and utilize agricultural by-products using conventional methods and/or modern tools. by-products utilization using conventional methods and/or modern tools.										√			√					

Table 2 (Continue). Phase e-learning outcomes of APHP subjects with goals (SDGs).

Learning Outcomes	Target Objectives SDGs																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
By the end of phase F, learners can analyze aspects of business feasibility, namely legal aspects, environmental aspects, market and marketing aspects, technical/technological aspects, human resource aspects, financial aspects (calculation of investment needs, operational costs, calculation of product cost of goods, B/C ratio, IRR, NPV, PI, BEP), as well as simple administration and bookkeeping.								√	√								

Table 3. APHP subject phase F learning outcomes with goals (SDGs).

Learning Outcomes	Target from SDGs																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<ul style="list-style-type: none"> At the end of phase F, learners can develop a production plan including determining the type and number of products, determining product design/design, developing a work process for making prototypes/samples of products, and calculating production costs. Learners can make products starting by preparing work plans and schedules, determining product strategies, determining standard criteria/product specifications, carrying out production activities, and product quality control (quality assurance). Learners can make packaging designs, carry out product packaging, and make labeling. Learners can determine distribution strategies and provide services to customer complaints. 									√			√					

Table 3 (Continue). APHP subject phase F learning outcomes with goals (SDGs).

Learning Outcomes	Target from SDGs																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
<ul style="list-style-type: none"> At the end of phase F, learners can read business opportunities by identifying the potential that exists in the internal and external environment of the vocational school and determining the type of business. Learners can prepare a business proposal (business plan) which includes business planning, production costs, break-even point (BEP), and return on investment (ROI). Learners can market products by determining market segments, determining product prices, and determining the media used to market products. Learners can apply intellectual property rights (IPR), explain the concept of IPR, and comply with IPR regulations. At the end of phase F, learners can prepare financial statements in the form of balance sheets, income statements, statements of changes in capital, and cash flow statements. 	√	√						√	√			√						

3. RESULTS AND DISCUSSION

3.1. SDGs Point One (No Poverty), Point Two (No Hunger), and Point Eight (Decent Work and Economic Growth)

SDGs Goal Point one (No Poverty), point two (No Hunger), and point eight (Decent Work and Economic Growth). Point one, No Poverty is to end poverty in all forms and places. Point two Zero Hunger is one of the most interesting SDGs because when the targets are achieved, it means that no one will be undernourished or malnourished. The main goal of point number two is to end hunger, achieve food security, and promote sustainable agriculture. Point eight is to promote inclusive and sustainable economic growth, and create decent and productive work for all (Wicaksono, 2023). These three goals can be realized by equipping students with the concentration of being an agri-preneur profile studied in phase E. In the Agribusiness Concentration of Agricultural Product Processing, students are also equipped with entrepreneurial learning so that they can open decent job opportunities. After graduation, students can create their businesses and open up jobs. In addition, entrepreneurship can indirectly help increase national economic growth.

Students can awaken the entrepreneurial spirit of various entrepreneurial profiles to foster an attitude of professionalism. then able to start a business so that he has income and gets a decent livelihood studied in Phase F. In the Agribusiness Concentration of Agricultural Product Processing, students are also equipped with entrepreneurial learning so that they can open decent job opportunities. After graduation, students can create their businesses and open up jobs. In addition, entrepreneurship can indirectly help increase national economic growth. Point nine, Sustainable development of industry, innovation, and infrastructure is an effort made by the government of a country to help people fulfill their daily needs. By building durable infrastructure, supporting inclusive and sustainable industrialization, and fostering innovation (Pasaribu & Nainggolan, 2022).

In point 12, Responsible consumption and production is to Promote inclusive and sustainable economic growth and create decent and productive jobs for all. Reduce global per capita food waste at the retail and consumer levels by half and reduce food losses along production and supply chains including post-harvest losses. In addition, achieve sustainable management and efficient utilization of natural resources (Pristiandani, 2023). Both points relate to the learning outcomes in the APHP expertise concentration, one of which is understanding the business processes of the agricultural product processing industry in Phase E. Then learners can process vegetable, animal, spice, plantation, and refreshing agricultural products to achieve food security, and advance sustainable agriculture in Phase F.

Both points are also learning outcomes in implementing sanitation or sanitation standard operating procedures (SSOP), Good Manufacturing Practice (GMP), and Hazard Analysis Critical Control Point (HACCP). GMP and HACCP are food safety and product quality management systems. To produce safe food products, the food processing process requires quality assurance and food safety with the HACCP system approach. GMP is a procedure to control the quality of food production produced by a company. In addition, learning outcomes on packaging systems, storage, and use are also related and learning outcomes on processing by-products and waste. The learning outcomes in production activities studied in the Creative Products and Entrepreneurship (PKK) subject study how the stages of home industry scale production can be applied. In addition, the learning outcomes challenge students to innovate in determining the type of business.

3.2. Relationship between Industrial Learning Strategy and SDGs

Point 4 of Quality Education in the SDGs is to organize education that is inclusive, quality, and equal to be accessible to all people and supports lifelong learning opportunities for all people. According to the Ministry of Education and Culture, 2022 Teaching factory learning is a model of learning in production/service-based vocational schools that refers to the standards and procedures that apply in the industry and is carried out in an atmosphere like that in the industry. This learning strategy allows learners to experience and apply various learning outcomes in everyday life. Learners can hone their skills in carrying out industrial activities and all matters related to the industry. Therefore, industrial learning is one of the school programs that support the achievement of SDGs.

3.3. Relationship between Industrial Relations Management and SDGs

The relationship between industrial relations management in schools is related to point 17 of the SDGs. Partnerships are a means of implementing and revitalizing global partnerships to realize all SDGs (Alfa, 2019). In this point, namely, partnerships related to the learning outcomes of the APHP concentration, namely school policies in the form of industrial relations that function to be formed by the vocational school environment to approach vocational

school with industry and the wider community in providing industrial practice services. Based on this, the industrial relations management program is related to the Link and Match program. Link and match are a policy of the Ministry of Education, Culture, Research and Technology developed to improve the relevance of education to the needs of work, business, and industry (Cahyanti *et al.*, 2018). This program connects schools, especially students with industry needs such as curriculum alignment, cooperation in fieldwork practice (PKL), and the recruitment process. This industrial relations management effort is to meet the needs of the world of work so that business and industry are very important so that education graduate institutions can be well absorbed in the world of work (Gea *et al.*, 2022).

4. CONCLUSION

The Agribusiness of Agricultural Product Processing learning outcomes in phases E and F are closely related to the SDGs, including Zero Poverty, Zero Hunger, Decent Work, Industrial Sustainable Development, and Responsible Consumption and Production. The Agribusiness of Agricultural Product Processing industry learning strategy supports Quality Education, following point four of the SDGs. Industry relationship management programs such as link and match in this skill contribute to the SDGs, especially Partnership for Purpose (point 17). The integration of these concepts in Agribusiness Agro-processing vocational education creates a concrete effort towards achieving the SDGs. The overall implementation of this vocational education supports the SDGs by positively contributing to poverty reduction, and hunger and improving the quality of education as per the vision of the SDGs.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

6. REFERENCES

- Alfa, A. (2019). Analisis keselarasan tujuan pembangunan berkelanjutan/sustainable development goals (TPB/SDGS) dengan rencana pembangunan jangka menengah kabupaten rokan hulu tahun 2016-2021. *Selodang Mayang: Jurnal Ilmiah Badan Perencanaan Pembangunan Daerah Kabupaten Indragiri Hilir*, 5(1), 23-32.
- Apiyani, A., Supriani, Y., Kuswandi, S., and Arifudin, O. (2022). Implementasi pengembangan keprofesian berkelanjutan (PKB) guru madrasah dalam meningkatkan keprofesian. *JlIP- Jurnal Ilmiah Ilmu Pendidikan*, 5(2), 499-504.
- Cahyanti, S. D., and Indriayu, M. (2018). Implementasi program link and match dengan dunia usaha dan dunia industri pada lulusan pemasaran SMK Negeri 1 Surakarta. *Jurnal Pendidikan Bisnis dan Ekonomi*, 4(2), 1-22.
- Fitriandari, M., and Winata, H. (2021). Manajemen pendidikan untuk pembangunan berkelanjutan di Indonesia. *Competence: Journal of Management Studies*, 15(1), 1-13
- Gea, Z. S., Zulyadi, T., & Nurfahmi, N. (2022). The effectiveness of the role of the special job fair smk smti banda aceh in enhancing graduate's employability to the business/industry world. *Jurnal Peurawi: Media Kajian Komunikasi Islam*, 5(1), 51-62.

- Hartanti, N. B. (2020). Pelatihan kewirausahaan dalam mengolah rumput laut menjadi manisan dan dodol pada kelompok belajar sipatuo di LKP BBEC Bontang. *Learning Society: Jurnal CSR, Pendidikan Dan Pemberdayaan Masyarakat*, 1(2), 23-27.
- Hartiningtyas, L., Purnomo, P., and Elmunsyah, H. (2016). Hubungan antara self-regulated learning dan locus of control internal dengan kematangan vokasional siswa SMK. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 1(6), 1127-1136.
- Irhamasyah, F. (2019). Sustainable development goals (SDGS) dan dampaknya bagi ketahanan nasional. *Jurnal Lemhannas RI*, 7(2), 45-54.
- Khaulani, F., Neviyarni, S., and Irdamurni, I. (2020). Fase dan tugas perkembangan anak Sekolah Dasar. *Jurnal Ilmiah Pendidikan Dasar*, 7(1), 51-59
- Khechekhouche, A., Benhaoua, B., Driss, Z., Attia, M. E. H., and Manokar, M. (2020 A). polluted groundwater treatment in Southeastern Algeria by solar distillation. *Algerian Journal of Environmental and Sciences*, 6(1), 1207-1211.
- Pasaribu, M. Z., and Nainggolan, B. (2022). Pengaruh penerapan model inkuiri terbimbing berbasis video pembelajaran terhadap hasil belajar siswa Kelas XI SMA pada materi laju reaksi. *Jurnal Indonesia Sosial Sains*, 3(03), 538-549.
- Patiung, M. (2019). Analisis permasalahan, isu strategis dan kebijakan pembangunan sDGS kabupaten Mojokerto. *Jurnal Ilmiah Sosio Agribis*, 19(1), 33-52.
- Potutu, Y., Akili, S. N. K., and Assagaf, S. M. Y. (2023). Implementasi praktik kerja lapangan sebagai mata pelajaran dalam kurikulum merdeka. *Normalita (Jurnal Pendidikan)*, 11(2), 330-344.
- Priantini, D. A. M. M. O., Suarni, N. K., and Adnyana, I. K. S. (2022). Analisis kurikulum merdeka dan platform merdeka belajar untuk mewujudkan pendidikan yang berkualitas. *Jurnal Penjaminan Mutu*, 8(02), 238-244.
- Primasti, S. G. (2021). Implementasi program education for sustainable development di sma tumbuh. *Spektrum Analisis Kebijakan Pendidikan*, 10(3), 80-100.
- Purnawanto, A. T. (2022). Perencanaan pembelajaran bermakna dan asesmen Kurikulum Merdeka. *Jurnal Pedagogy*, 15(1), 75-94.
- Rachmawati, R. R., and Gunawan, E. (2020). Peranan petani milenial mendukung ekspor hasil pertanian di Indonesia. *Forum Penelitian Agro Ekonomi*, 38(1), 67-87.
- Sarman, R., and Kartika, R. (2023). Labor welfare affects employee performance and is mediated by work spirit. *Jurnal Riset Bisnis dan Manajemen*, 16(1), 53-58.
- Wicaksono, A. P. N. (2023). Eksplorasi sustainable development goals (SDGs) disclosure di Indonesia. *Jurnal Akademi Akuntansi*, 6(1), 125-156.
- Yorisca, Y. (2020). Pembangunan hukum yang berkelanjutan: Langkah penjaminan hukum dalam mencapai pembangunan nasional yang berkelanjutan. *Jurnal Legislasi Indonesia*, 17(1), 98-111.