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Agriculture Vocational High School (VHS) Strategy in Supporting Sustainable Agriculture: A'WOT Approach

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Abstract

Education integration and sustainable agriculture at Vocational High School (VHS) agriculture was an interesting theme to study. Conventional agriculture has a negative impact on the environment and society. It was important to equip graduates with sustainable agriculture competencies to become adopters and agents of sustainable agriculture diffusion in society. The purpose of this study was to develop a strategy for VHS in agriculture in supporting sustainable agriculture. This research used a quantitative approach, the data collection used interviews, observations, a review of literature, and questionnaires. Using SWOT-AHP analysis that combines Strengths, Weaknesses, Opportunities, and Threats analysis (SWOT). SWOT factors were identified and then paired comparisons were made between factors within each SWOT group and between SWOT groups, Using tools of expert choice 11. Based on the results of the study shows that the Opportunities factor gets the highest value (46,10%), then Strength (40,20%), followed by Weakness (8,10%), and Threats (5,60%). Based on the results of paired comparisons tests using the Saaty scale with a consistency ratio of 0.01 or less than 0.1 (10%), The priority strategies for policies in support of sustainable agriculture at VHS are: (1) implementation of the Operational Curriculum, (2) increasing teacher competence (workshops, benchmarking, etc.), (3) competence (learning tools), (4) carry out innovations, (5) develop project-based learning, (6) carry out dissemination best practices, (7) increase the use of agricultural mechanization, (8) hold mini-exhibitions of cultivated products.

Keywords: Vocational High Schools, Sustainable Agriculture, SWOT, AHP, Kurikulum Merdeka

Introduction

Development has transformed growth-oriented development into sustainable development. Member states of the United Nations are committed to supporting sustainable development. Sustainable development balances economic, social, and ecological aspects. Sustainable development focuses on human life today and in the future (Wood, 2017). Education has a role in supporting sustainable development. Education for Sustainable Development (ESD) aims at acquiring and generating knowledge and reflecting on the further effects and complexities of behavior and decisions from a future-oriented and global responsibility perspective (Barth, Godemann, Rieckmann, & Stoltenberg, 2007). ESD builds students' awareness of sustainability, and ESD paves the way for a more sustainable future (Sinakou, Boeve-de Pauw, Goossens, & Van Petegem, 2018)an on-line survey was conducted based on the principle of comparative judgement. After careful selection, 249 academics were found to fit the specific profile for inclusion into the study. All of them were invited and56 of them participated. The instrument consisted of 16 statements built specifically to reflect different interpretations of sustainable development: fragmented, separated, holistic and integrated perspectives. Each participant compared 12 pairs of statements and were asked to decide which one better represented their interpretation of the concept of Sustainable Development in the context of Education for Sustainable Development. Using the D-PAC methodology for comparative judgement, our results show that the statements that were most often chosen prioritized an understanding of Sustainable Development according to which two or three of the dimensions of the concept (environment, society, economy. Education is an efficient way of forming a social basis for implementing the principles of sustainable development (Nasibulina, 2015). ESD helps students develop knowledge, attitudes, and skills so that they

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are right in making decisions for the benefit of present and future generations (Anyolo, Kärkkäinen, & Keinonen, 2018; Shafieyan, Homayounfar, & Fadaei, 2017). In 2014, UNESCO launched ESD to generate sustainable awareness to create sustainable living behavior in the community.(Lestari, Ali, Sopandi, Wulan, & Rahmawati, 2022)

Sustainable agriculture is a goal of sustainable development. The concept of sustainable agriculture between one region may experience differences. Sustainable agriculture aims to balance economic, environmental, and social aspects, creating a resilient agricultural system in the long term (Rose et al., 2019). Implementation of sustainable agriculture to reduce environmental degradation due to the use of chemicals by implementing organic cultivation, combined with the use of crop residues, biomass, and livestock manure (Sarkar, Azim, Asif, Qian, & Peau, 2021).

Unsustainable development in agriculture has an impact on global warming (CBD, 20009), loss of soil fertility, and unsustainable productivity (Sharma, T, & Sharma, 2019). Land degradation is 2 billion hectares and 75% is found in tropical countries, including Indonesia (Murniati, Dirawan, Gani, & Pertiwi, 2019; Pourzand, F., 2013). Decreased soil fertility, forest destruction, loss of some biological wealth, erosion, and accumulation of chemical substances in the soil (Mukhlis, 2020).

Sustainable agricultural diffusion requires Human Resources (HR) in the agricultural sector. The spread or diffusion of sustainable agricultural innovations requires the role of change agents and opinion leaders. Farmers can act as adopters of sustainable agriculture as well as actors in the diffusion of sustainable agriculture. The low rate of adoption of sustainable agriculture is influenced by the education level of farmers. Based on BPS data for 2018, 68% or 24 million workers in the agricultural sector are dominated by Elementary School (SD) graduates and below. There are 1.2 million people or 3.4% of VHS graduates working in the agricultural sector (BPS, 2018).

The problem of implementing education in sustainable development is still weak, as teachers know about the concept of ESD but there are different perceptions regarding the implementation of ESD due to the lack of seriousness from the government (Sutanto, 2017). Gaps in implementing PPB in the formal education system at the school level (Carbach & Fischer, 2017). Educators do not understand the concept of sustainable development holistically (Sinakou et al., 2018) an on-line survey was conducted based on the principle of comparative judgement. After careful selection, 249 academics were found to fit the specific profile for inclusion into the study. All of them were invited and56 of them participated. The instrument consisted of 16 statements built specifically to reflect different interpretations of sustainable development: fragmented, separated, holistic and integrated perspectives. Each participant compared 12 pairs of statements and were asked to decide which one better represented their interpretation of the concept of Sustainable Development in the context of Education for Sustainable Development. Using the D-PAC methodology for comparative judgement, our results show that the statements that were most often chosen prioritized an understanding of Sustainable Development according to which two or three of the dimensions of the concept (environment, society, economy. Sustainable agriculture has not been integrated into vocational high school education. The studies carried out: *first*, sustainable development has not been integrated into the education curriculum in Indonesia, especially in Vocational High Schools (Sofiana, Kulsum, & Safitri, 2022). *Second*, the vision, mission, and goals of the education unit do not accommodate sustainable agriculture, and vocational teachers' understanding of the concept of sustainable agriculture is still weak (Fitriani. R, 2022).

Based on interviews with alumni of VHS in agriculture who work as farmers, it was stated that the understanding of sustainable agriculture is limited to knowledge of environmentally friendly cultivation and the use of agricultural mechanization. The use of inorganic fertilizers and chemical pesticides is still used during learning. Teachers have taught the use of fertilizers according to the regulations and the manufacture of biopesticides, even if they are not used in pest control practices. The literature study of teaching materials based on the 2013 curriculum explicitly does not contain material on sustainable agriculture.

VHS graduates who work as farmers in the cultivation process have not yet implemented sustainable agriculture. Cultivation is still conventional, following the habits of farmers in their environment. The dominant use of inorganic fertilizers in cultivation and the use of chemical pesticides cannot be abandoned. So, it is very important to create graduates who have sustainable agriculture competencies.

Research on education for sustainable development has been widely studied. Research related to education for sustainable agriculture in higher education was reviewed by (Parr, Trexler, Khanna, & Battisti, 2007)(Monaghan, Swisher, Koenig, & Rodriguez, 2017) (Cruz, 2020; (Braßler, 2021). Education for sustainable agriculture from the teacher's aspect (Sameipour, 2017)(Georgieva, Grau, Berova, Georgieva, & Yordanov, 2021)(Purnomo, Yulianto, Arif, & Subekti, 2023)

However, research specifically examining the role of vocational education in sustainable agricultural development has been poorly studied. Based on this, this study aims to create a VHS strategy for supporting sustainable agriculture.

The use of the A'WOT approach examines internal and external aspects, to reduce the objectivity bias of SWOT analysis the use of expert based AHP is important in strategy making. The article is a reference for policymakers to determine VHS strategies to support sustainable agricultural development.

Method

This research used a quantitative approach (Setiawan, Aman, & Wulandari, 2020; Sugiyono, 2020). The stages of the research were carried out by (1) conducting interviews, observing, and reviewing documents. Interviews, observations, and document reviews aim to identify the strengths, weaknesses, opportunities, and threats of VHS in supporting sustainable agriculture. (2) Weighing SWOT elements and SWOT factor elements, using AHP with pairwise the Saaty scale and Expert Choice 11 tools, (3) developing alternative VHS strategies in supporting sustainable agriculture in Southeast Sulawesi using SWOT analysis, (4) determining the priority of agricultural development strategy based on the total weight. The strategy with the largest amount of weight is the top priority.

Participants

The research participant was 6 experts consisting of policymakers, two education practitioners, one alumnus of a vocational school in agriculture, and one researcher from the Center for Agricultural Technology Studies (BPTP). The selection of experts was done using purposive sampling, consideration of experts who know about sustainable agriculture or are directly involved in vocational education.

Data Collection Tools

Data collection techniques used interviews, document reviews, observation, and questionnaires (Surandi, Supardi, & Setiawan, 2020). Interviews, document reviews, and observations were conducted to explore strengths and weaknesses as internal factors and opportunities and threats as external factors. The data that has been collected becomes the input for the preparation of a questionnaire which will be assessed by experts.

Data Analysis

Data analysis using A'WOT analysis is a hybrid analysis combining SWOT and AHP analysis. The Analytic Hierarchy Process (AHP) is a theory of measurement through pairwise comparison and relies on expert judgment for priority scales (Saaty, 2008), with the help of expert choice 11. The Saaty scale is presented in Table 1

Findings

Factors of strengths, weaknesses, opportunities, and threats

SWOT weighting uses AHP to minimize weaknesses or subjectivity in SWOT analysis. SWOT factor elements were obtained through interviews, observation, and document review. VHS's strength factors in supporting sustainable agriculture: (1) teachers have learning tools, including syllabus, lesson plans, and modules, (2) students have competency expertise in agriculture (land processing, cultivation, post-harvest and marketing of cultivated products), (3) system learning is 30% theory and 70% practical learning, (4) schools have competence in poultry farming and fisheries expertise so that an integrated farming system can be developed, (5) using certified seeds in cultivation, (6) using mulch to prevent weeds in learning practices, and (7) using agricultural mechanization in learning practices (tractors, cultivator machines, water sprinklers).

The weaknesses of VHS in supporting sustainable agriculture include: (1) teachers' understanding of sustainable agriculture is not yet holistic, (2) students' interest in choosing Agribusiness and Agrotechnology expertise programs is lower than other expertise programs, (3) teachers have never received training or socialization about sustainable agriculture, (4) crop cultivation still uses inorganic fertilizers and chemical pesticides, following the teaching materials as references, (5) patterns of cultivation practices using excessive inorganic fertilizers and chemical pesticides in the past, currently have an impact on soil fertility for cultivation practice.

External factors consist of opportunities and threats. Opportunities for VHS in agriculture in supporting

Table 1: **Rating scale Saaty**

Value	*Definition*
1	Both attributes/criteria are equally important.
3	One attribute/criterion is slightly more important than the other
5	One attribute/criterion is essential or more important than the other attributes/criteria.
7	One attribute/criterion is clearly more important than the other attributes/criteria.
9	One attribute/criterion is absolutely more important than the other attributes/criteria
2.4.6.8	Thevalue between the two reciprocal assessments

sustainable agriculture include: (1) *Permendikud* no 34 of 2018, in the content standards explicitly contain integrated agrotechnology, agribusiness, and sustainable agrotechnology materials, (2) Operational Curriculum of Education Units in VHS Centers of Excellence (CoE) explicitly accommodates sustainable agricultural systems, (3) government support through the VHS Center of Excellence (CoE) program, (4) agriculture is a local/regional potential, and (5) some VHSs develop hydroponic vegetable cultivation, not using inorganic fertilizers and chemical pesticides.

External factors in the form of threats to VHS in supporting sustainable agriculture in this study include: (1) the image of agriculture is not good among students, (2) the existence of SMA/VHS as competitors, (3) farmers who implement sustainable agriculture are lacking, and (4) the decline in students' interest in choosing to attend school in vocational schools, especially the competency skills of Food Crops and Horticulture Agribusiness (ATPH).

SWOT (Strenght, Weakness, Opportunity, Threats) weighting

Based on the SWOT element's weighting results, the highest weight is an opportunity, while the lowest weight is a threat. Based on the results of this weighting, the top priority in the VHS strategy in supporting sustainable agriculture in Southeast Sulawesi is taking advantage of opportunities. The results of the SWOT element weighting are presented in Figure 1.

The Results of the weighting of the SWOT factors

Based on the results of the weighting of the strengths, weaknesses, opportunities, and threats the highest weight on the strengths are the learning system 70% practice, and 30% learning theory. The lowest weight is the teacher having learning tools including modules, syllabus, and Learning Implementation Plans (RPP). Learning factors that emphasize practical learning must be a priority that can be optimized by VHS in supporting sustainable agriculture in Southeast Sulawesi.

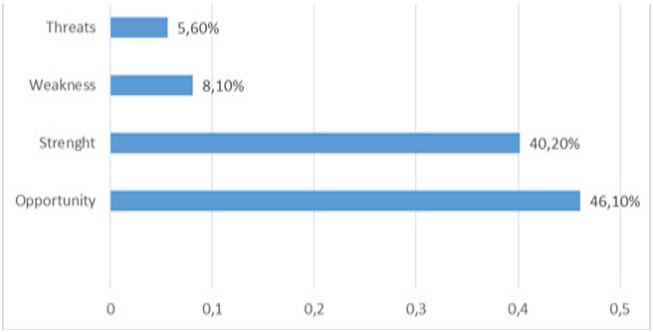

Fig. 1: The results of the weighting of the SWOT elements

The highest weighting of the weak factors of VHS in supporting sustainable agriculture is that the teacher's understanding of sustainable agriculture is not yet holistic. The lowest weight is cultivation practices that still use inorganic fertilizers and chemical pesticides following the reference teaching materials. The weighting of the strengths and weaknesses of VHS in supporting sustainable agriculture in Southeast Sulawesi is presented in table 2.

Table 2: **Weighting of Strengths and Weakneses**

Factors Elements of SWOT		*factors Priority of factors in compo-nents*	*Priority overall factors*
Strengths			
S1	*Teachers have learning tools including modules, syllabi, and lesson plans*	*0.095*	*0.038*
S2	*Students have competency expertise in agriculture (land processing, cultivation, post-harvest, and marketing of cultivated products)*	*0.186*	*0.075*
S3	*Learning system 30% theory and 70% practical learning*	*0.191*	*0.077*
S4	*Schools have competence in poultry husbandry and fisheries expertise, so that an integrated farming system can be developed, which is able to reduce waste*	*0.153*	*0.062*
S5	*Use certified seeds in cultivation*	*0.134*	*0.054*
S6	*Use mulch for preventing weeds in learning practice, so that the use of chemical pesticides can be minimized*	*0.121*	*0.050*
S7	*Using agricultural mechanization in practice (tractors, cultivator machines, hydroponic plant installations, water sprinklers, etc.).*	*0.118*	*0.048*

Factors Elements of SWOT		*factors Priority of factors in components*	*Priority overall factors*
Weaknesses			
W1	Teachers' understanding of sustainable agriculture is not holistic	0.287	0.023
W2	Students' interest in choosing Agribusiness and Agrotechnology expertise programs is lower than other expertise programs	0.155	0.013
W3	Patterns of cultivation practices using excessive inorganic fertilizers and chemical pesticides in the past, currently have an impact on reducing soil fertility for learning practices	0.147	0.012
W4	Teachers have never received training or socialization on sustainable agriculture	0.260	0.021
W5	Plant cultivation practices still use chemical fertilizers and chemical pesticides, in accordance with teaching materials as references	0.152	0.012

Results of data processing (expert choice 11)

The highest weighting result for opportunity factor elements is support government through the Center for Excellence Vocational School (VHS-CoE) and the lowest is Permendikud no 34 of 2018, in the content standard it explicitly contains material on integrated agrotechnology, agribusiness, and sustainable agrotechnology. The results of weighing opportunities and threats can be seen in Table 3.

Based on tables 2 and 3, alternative strategies for VHSs are formulated in support of sustainable agriculture. Alternative strategies consist of Strength-Opportunity (SO) strategy, Weakness-Opportunity (WO) strategy, Strength-Threats (ST) strategy, and Weakness-Threats (WT) strategy. Strategic alternatives are presented in Table 4.

Based on table 4, there are eight VHS strategies to support sustainable agriculture. To determine strategic priorities, a pair test is carried out using the Saaty scale.

Discussion

Integration of education and sustainable agriculture requires a strategy. Strategy means a plan drawn up to achieve certain goals. Based on paired tests obtained eight strategies of VHS in agriculture in supporting sustainable agriculture. The first strategy's main priority strategy is the implementation of the Operational Curriculum in Education Units (KOSP) integrated sustainable agriculture in all VHS. KOSP is part of the independent curriculum (*Kurikulum Merdeka*). The curriculum is a reference for the development of educational units. The difference between KOSP and curriculum 2013 is in the basic framework, the intended competence, learning, curriculum structure, and assessment.

The goals of the National Education System, National Education Standards, and developing a Pancasila student profile among students form the basic framework of the

Table 3: Weighting of Opportunities and Threats

Elements of SWOT		*Factors Prioritization of factors in components*	*Priority of factors overall*
Opportunity			
O1	Permendikud no 34 of 2018, in standard content explicitly contains integrated agrotechnology, agribusiness, and agrotechnology material sustainable	0.106	0.049
O2	The Operational Curriculum of the Education Unit in VHS Centers of Excellence (CoE) explicitly accommodates sustainable agriculture, this can be seen in element E	0.203	0.093
O3	Government support through the Vocational School Center of Excellence (CoE)	0.311	0.143
O4	Agriculture is a local/regional potential	0.210	0.097
O5	There are VHSs that develop hydroponic vegetable cultivation, not using inorganic fertilizers and inorganic	0.170	0.078
Threats			
T1	image of agriculture is not good among students	0.477	0.027

T2	There are SMA/VHS as competitors	0.117	0.007
T3	Farmers who implement very sustainable agriculture less	0.222	0.12
T4	The declining interest of students to continue their education at Vocational High Schools, especially agribusiness and agrotechnology expertise programs	0.184	0.010

Results of data processing (expert choice 11)

Table 4: **Alternative strategies to support sustainable agriculture.**

No	*Strategy*	*Number of weights*
1	Implementation of Operational Curriculum in the integrated sustainable agriculture Education Unit in all agricultural vocational schools (S1, S3, S4,01,04,05)	0,185
2	Improvement of teacher competencies related to sustainable agriculture through workshops, bench-marking, visiting teachers, and counseling (W1, W4, W5, 01, 02, 03, 04, 05)	0,163
3	Carrying out innovations in plant cultivation (W2,W3, T1,T3,T4)	0,126
4	Increasing teacher competence in making learning tools integrated with sustainable agriculture and utilizing local potential (S7,02,03,05)	0,116
5	Develop project-based learning integrated sustainable agriculture based on local potential (S1, S2, S3, S4, S5, S6,02,05)	0,114
6	Increasing the use of agricultural mechanization in the learning process (S2,T1,T3,T4)	0,114
7	Carry out dissemination o best practice teachers who have implemented sustainable agriculture in learning (W1, W4, W5,01,03,04)	0,103
8	Schedule mini exhibitions of cultivated products that apply sustainable agriculture (W1, T1, T2, T3, T4).	0,079

Inkonsistensi 0,01

Source: Pairwise comparison results

KOSP. Realizing Pancasila Student Profiles through the Project to Strengthen Pancasila Student Profiles Based on Work Culture (P5-BK) for vocational schools. P5-BK aims to build students' understanding of important issues and train problem-solving skills in themes or issues related to sustainable development.

The competencies aimed at KOSPN are based on learning outcomes arranged per phase. Learning outcomes include knowledge, attitudes, and skills. Learning the theme of Sustainable Agriculture has explicitly been accommodated in learning phase E or class X. Accommodating the theme of sustainable agriculture in learning, proves that education in Indonesia has adapted the concept of sustainable development to sustainable agriculture goals. The study that curriculum and learning methods for sustainable development are important issues in higher education because teaching methods and curriculum design will have a major impact on the future of students (Wu & Shen, 2016). (Khoshnodifar et al., 2020) concluded that curriculum is an important element that has a greater influence compared to other elements in supporting work behavior (Khoshnodifar et al., 2020). Curriculum development in agricultural vocational schools to meet industry needs in supporting sustainable development.

Differentiated learning departs from the differences that are owned by students so that learning cannot be uninformed Differentiated learning is a way for teachers to meet the diverse needs of each student (M. Purba, Purnamasari, Soetantyo, Suwarma, & Susanti, 2022; R. Purba, 2018). Differentiation learning lies in content aspects, process aspects and meaningful activities, and assessment aspects. Learning must focus on student characteristics and student needs (Mahfud, Siswanto, Wijayanto, & Puspitasari, 2020).

Assessment as part of the learning process. The assessment consists of a cognitive assessment and a non-cognitive assessment(Aman, 2019; Amrina, Deskoni, & Mardetini, 2020; Ramadhan, Mardapi, Prasetyo, & Utomo, 2019; Sarigoz, 2012; Suherman & Vidákovich, 2022; Yusuf, 2017)which can be used to measure the higher-order thinking skill (HOTs Assessment can be done before learning, during the learning process, and after learning (Fantula, Aman, & Setiawan, 2021; Jansena & Möller, 2022; Tery, Sunardi, & Musadad, 2018). The results of the assessment can be used as a reflection for teachers to develop learning strategies (Mohamed & Lebar, 2017). Non-cognitive assessment of class X students before learning is very important. Non-cognitive assessments can explore the family background, parents' work, and students' motivation or interest in choosing agriculture. This information is very useful for teachers and becomes teacher material for implementing differentiation learning.

The second strategy is to increase teacher competence related to the concept of sustainable agriculture through workshops, benchmarking, guest teachers, and counseling.

The findings of the research are that most of the productive teachers of ATPH competency skills do not yet understand the concept of sustainable agriculture holistically. This research is in line with the findings of the research, that teachers have never received socialization about continuing education. Teachers have received socialization about sustainable development, but it is only a formality and there are no technical implementation instructions in the education unit. The need for teacher education programs to focus on sustainable agriculture to be able to teach skills and knowledge adequately (Okeafor, 2002). Subject teacher awareness of continuing education competencies is important to encourage teachers to plan and implement discipline-based and interdisciplinary continuing education in their teaching (Uitto & Saloranta, 2017)values, and practices of sustainable development (SD.

The third strategy to innovate in plant cultivation, this strategy is needed in the learning process. Innovation in cultivation can be done by using technology, cultivation techniques, and using certified seeds. Cultivation innovations still pay attention to local potential, so that learning accommodates local potential. Innovation in cultivation can be done by developing urban farming for schools that have small land. Using a hydroponic system. Implementing an integrated agricultural system that combines agriculture, animal husbandry, and fisheries, as part of agriculture that applies the LEISA concept.

The fourth strategy *is increasing* teacher competence in making integrated learning tools for sustainable agriculture. Making learning tools is part of learning planning. Learning planning in the 2013 Curriculum includes syllabus and Learning Implementation Plans (*RPP*). The syllabus is a reference for developing lesson plans. Making a syllabus can be done by the teacher independently or in groups.

RPP includes subject identity, competency standards, basic competencies, competency achievement indicators, learning objectives, teaching materials, time allocation of learning methods, learning activities, assessment of learning outcomes, and learning resources. Learning tools in KOSP include teaching modules, textbooks, and projects to strengthen Pancasila student profiles and work culture. Sustainable agriculture-integrated learning tools are important to develop as a reference for teachers in carrying out learning. The results of this study have implications for curriculum developers, education experts, teachers, teaching material developers, and educators (Sameipour, 2017).

The five strategies are project-based learning integrated with sustainable agriculture based on local potential. The project-based learning model with six learning phases is proven to be able to improve students' learning abilities and students' learning motivation becomes higher. Students learn through experiences that link class to fieldwork(Parr et al., 2007). Students are also encouraged to think critically, independently, and creatively but are still responsible for meeting learning objectives (Lubis, 2019).

The importance of project-based learning and real experience to equip graduates with sustainable agriculture competencies. Learning in a setting through experiences such as apprenticeships, short-term visits, and dialogue with farmers is one method of producing graduates who are compatible with sustainable agriculture (Edwards et al., 2020). Project-based learning encourages students to work in the real world to develop knowledge and skills, and students work collaboratively (Lozano, Lozano, Merrill, Sammalisto, & Ceulemans, 2017).

Project-based learning practices that integrate sustainable agriculture can be done by practicing agriculture LEISA (Low External Input Sustainable Agriculture), Students reduce the use of chemical fertilizers and chemical pesticides. In addition, it can practice the cultivation of hydroponic plants. For vocational schools that have competence in animal husbandry and fisheries expertise can integrate integrated agriculture by utilizing animal manure as fertilizer. This learning practice is to raise awareness among students of the importance of productive agriculture, while still protecting the environment and socially acceptable.

The sixth strategy, increasing the use of agricultural mechanization in learning practicum. Facilities and infrastructure standards are one of the standards that are still weak in VHS. Agricultural mechanization is a very important technology in agriculture. Educators must integrate appropriate technology into the school curriculum, enabling students to develop knowledge to help students realize the potential they see in sustainable agriculture (Williams, 2000). Vocational education must have the courage to develop technologies that are and will develop (Junus, 2007). Sustainable agricultural mechanization is the key to agricultural development (G.C.Mrema, Mpagalile, & J.Kienzle, 2018).

Agricultural modernization can be through the application of agricultural mechanization technology and *smart farming* or *digital farming* attracts the interest of the younger generation because it opens opportunities for the availability of economically viable land, based on the specialization of expertise, the use of agricultural machinery and increases the bargaining position of farmers (Anwarudin, Sumardjo, Satria, & Fatchiya, 2020). The success of agricultural education in tertiary institutions by implementing technology-based learning (Cruz, 2020).

The seventh strategy carries out the dissemination of best practices for teachers who have implemented sustainable agriculture in learning. The best practice is the teacher's best experience containing real experiences in learning. Dissemination of best practices to provide an understanding of teachers who have not yet implemented them. The eighth Strategy of a scheduled mini-exhibition of the results of student cultivation that implements a sustainable agricultural system. The teacher's experience in motivating students to succeed, among other things, is done using exhibitions of work (Mulyatiningsih, 2015)

Conclusion

Based on the paired test with the help of expert choice 11 tools, eight VHS strategies in supporting sustainable agriculture were obtained: (1) implementation of the Operational Curriculum in the integrated sustainable agriculture Education Unit, (2) increasing teacher competence related to sustainable agriculture through *workshops*, benchmarking, visiting teachers and counseling, (3) innovating in plant cultivation, (4) increasing teacher competence in making integrated learning tools for sustainable agriculture and utilizing local potential, (5) developing project-based learning integrated sustainable agriculture based on local potential, (6) carry out the dissemination best practices for teachers who have implemented sustainable agriculture in learning, (7) increase the use of agricultural mechanization in the learning process, (8) schedule mini-exhibitions of cultivated products and cultivated products that apply sustainable agriculture (hydroponic cultivation, integrated farming, organic vegetables)

Suggestion

Researchers expect that the results of this study might be used by the government as a basis or reference when formulating agricultural sustainable policies to promote agriculture sustainability in Indonesia. In addition, the researcher expects that teachers might use the findings of this study to improve the quality of their student's learning. Researchers can conduct research with different approaches and more participants. In addition, in-depth research is needed to be related to curriculum implementation to support sustainable agriculture.

Limitation

This study was not examined in depth the impact of curriculum and learning on the impact of graduates who have sustainable agriculture competencies

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