



Sustainable Agriculture in Vocational High School (SMK) agriculture major: CIPP evaluation model

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Abstract

The transformation of conventional agriculture towards sustainable agriculture requires the role of formal education. The purpose of this study is to evaluate the implementation of sustainable agriculture in agricultural vocational schools using the CIPP evaluation model which consists of context, inputs, processes, and products. The methods used in this study are descriptive qualitative and CIPP evaluation models. Research informants were selected using the purposive sampling method with the consideration of productive teachers in agriculture who teach on the competence of Agribusiness Food and Vegetable Crops (ATPH) expertise. The research locations are SMKN 1 Kusambi, SMKN 1 Baula, SMKN 9 Konawe Selatan, SMKN 5 Kendari, and SMKN SPP Wawotobi. Data collection is carried out through interviews, observations, and documentation reviews. The data obtained were analyzed by Miles and Huberman. The results showed that: (1) the importance of pro-sustainable agriculture regulation in agricultural vocational high schools, (2) socialization of sustainable agriculture at the productive teacher level, (3) teaching materials with a sustainable agriculture paradigm, (4) improving agricultural facilities and mechanization

Keywords: sustainable agriculture, evaluation, curriculum, teacher productive, mechanization

1. Introduction

Sustainable development as a criticism of development pursues growth and ignores social and environmental dimensions. Sustainable agriculture was popularized by the Bruntland Commission Report (1987) as a development to meet current needs without compromising the ability of future generations to meet their own needs (Chiong et al., 2017). Sustainable agriculture as a sustainable development goal requires formal education support, and education has the function of realizing social change.

Education for Sustainable Development (ESD) was declared in 2002 at a meeting of the World Summit on Sustainable Development in Johannesburg. ESD is an effort to integrate the dimensions of education and learning with the values, principles, and practices of sustainable development. An empirical study related to Education for Sustainable Development (ESD) was put forward by (Pauw, et al., 2015) that ESD has an impact on students' awareness in terms of sustainability. The results reveal the key role ESD plays in sustainable development that paves the way for a more sustainable future. Nasibulina, 2015 argues that education is the most

efficient way to form social foundations and apply the principles of sustainable development. The educational goal for sustainable development, or continuing education is to integrate the principles, values, and practices of sustainable development into all dimensions of education (Uitto and Saloranta 2017).

In Indonesia, the 2013 Curriculum was born as Indonesia's contribution in supporting sustainable development through education. Themes about the environment, climate change, and environmentally friendly school programs are of concern to the government. It's just that the implementation of education to support sustainable agriculture in Indonesia is still weak. Sutanto, (2017) argues that teachers know about the concept of Education for Sustainable Development (ESD), but there are differences in perceptions about the application of ESD due to the lack of seriousness of the government.

The study of education for sustainable development has been widely studied. Education for sustainable development in higher education has been studied by (Shephard, 2008; Kukeyeva, Delovarova et al., 2014, Monaghan et al., 2017; Filho et al., 2018; Saqib et al., 2020; Aleixo et al., 2020). Educational studies for sustainable development among teacher education (Wolff et al., 2017; Manasia et al., 2020). The study on the integration of continuing education with subjects is proposed by (Dias and Teodoro 2022 ; Charzy et al., 2022).

Studies on the role of vocational schools in agriculture to support sustainable agriculture are still lacking. Previous research has focused more on the concept of agriculture but has not focused on sustainable agriculture. This article evaluates sustainable agriculture in vocational high schools. This study is an evaluation of the implementation of sustainable agriculture from the aspects of context, inputs, processes, and products One of the efforts to develop sustainable agriculture is through Vocational High School (SMK) Agriculture major. Graduates of Vocational High School (SMK) Agriculture major are expected to be able to disseminate their knowledge, attitudes, and skills regarding sustainable agriculture in the midst of a farming community. However, especially in Southeast Sulawesi, there has been no study on the evaluation of agricultural vocational schools in supporting sustainable agricultural development. Southeast Sulawesi has potential in the agricultural sector.

Based on the review of previous research, this research study is different from previous research in terms of: (1) Research evaluates the implementation of sustainable agriculture in agricultural vocational schools, (2) The studies studied are holistic sustainable agriculture covering social, economic, and social dimensions. ecology. (3) Research using the CIPP evaluation model. The purpose of this study is to evaluate the implementation of sustainable agriculture in agricultural vocational schools using the CIPP evaluation model which consists of context, inputs, processes, and products. The results of the study provide recommendations to policymakers to support sustainable agriculture through vocational high schools, especially in Southeast Sulawesi

2. Method

2.1. Research and participant approaches

This study used a qualitative design and CIPP evaluation model (context, input, process, and product) developed by Stufflebeam. Qualitative research describes events or phenomena that cannot be quantitatively measured (Gulmira and Street 2022). The study was conducted in five vocational schools that have a spectrum of Agribusiness and Agrotechnology expertise using purposive sampling methods. Researchers selected 6 teachers who taught Vegetable Crop Agribusiness, and conducted snowball sampling of alumni who worked as farmers as participants.

2.2. Evaluate the CIPP Model

This study used the CIPP evaluation model (context, input, process, product). This model was developed by Stufflebeam and colleagues (Effendy and Haryanto 2021). The Context, Inputs, Processes, and Products (CIPP) evaluation model is systematically a framework for guiding the conception, design, implementation, and feedback as well as the assessment of the effectiveness of programs for sustainability (Zhang et al. 2011).

The CIPP evaluation model applied in this study determined four stages including context, input, process, and product, shown in Figure 1.

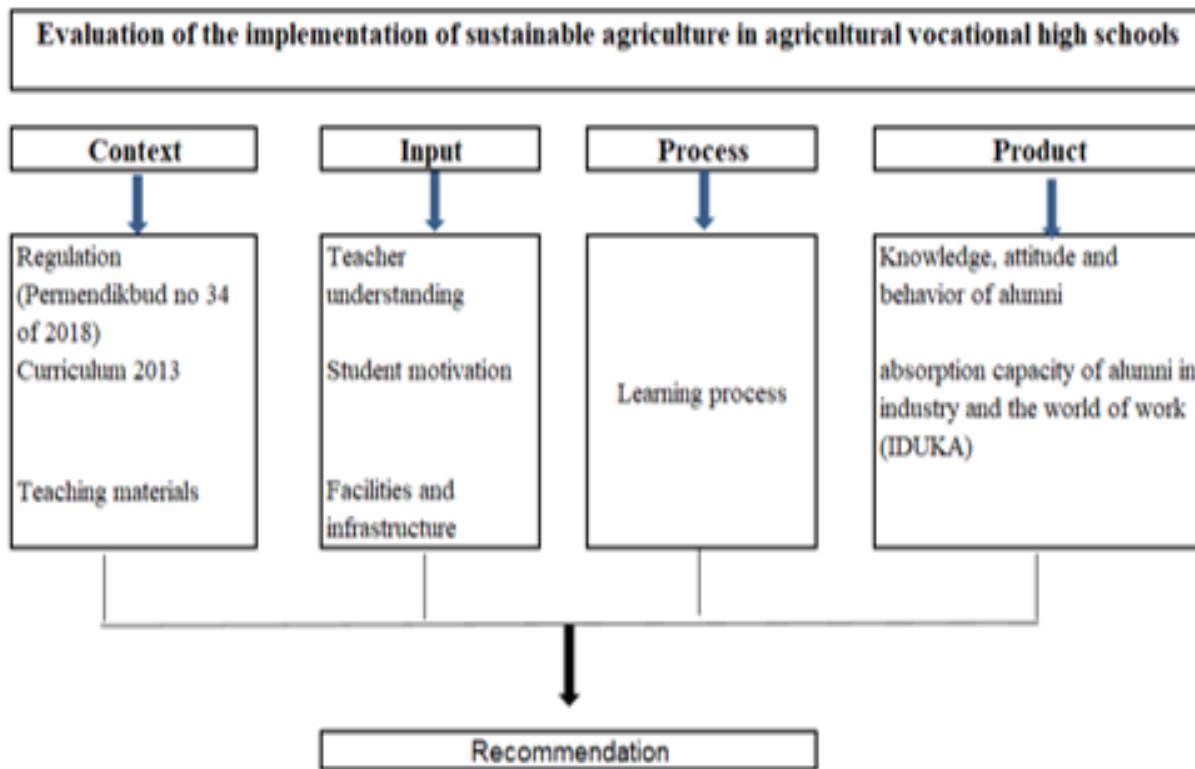


Figure 1. CIPP evaluation model

2.3. Data Collection Tools

Research data is collected/obtained through interviews, observations, and literature review. In-depth interviews to explore teachers' understanding of sustainable agriculture, the learning process. Researchers conducted interviews with alumni of agricultural vocational schools who work as farmers. Observation is carried out by observing the learning process of the theory and practice of vegetable cultivation. Literature review through a review of the 2013 curriculum document, Regulation of the Minister of Education and Culture number 34 of 2018, and textbooks used. For the validity of the data, researchers used triangulation techniques.

3. Results and Discussion

3.1. Context Evaluation

3.1.1 Government regulations support sustainable agriculture.

Republic of Indonesia *Sisdiknas* number 20 of 2003 article 15 states that vocational High School (SMK) as a secondary education level aims to equip its graduates with certain skills. *SMK* can continue their education to a higher level, become entrepreneurs, or be absorbed by the world of industry and the world of work. *Sisdiknas* does not explicitly include the word "sustainability" This implicitly indicates that the purpose of the existence of SMK is to produce human resources in certain fields, including agriculture. Producing human resources graduates, especially in agriculture, shows the sustainability of agriculture in the social aspect.

Study of derivative regulations from the *National Education System*, Peraturan of the Minister of Education and Culture (*Permendikbud*) of the Republic of Indonesia number 34 of 2018 concerning National Standards for SMK/MAK Appendix II concerning Content Standards for Competence of Contents of SMK Agribusiness Plants as presented in table 1.

Table 1. Content standard (*Permendikbud* number 34 of 2018)

No	Graduate Competency Standards		Content Standards	
	Competency area	Graduate competency standards	Substandards of graduate competence	Scope of material
1.	Technical capabilities	Have basic abilities in certain areas of expertise in accordance with the needs of the world of work.	Has the basic capabilities of agrotechnology	1. The history of the development of agriculture. 2. The concept of agriculture integrated. 3. The concept of agrotechnology. 4. d. Future agrotechnology.
		Have the ability to run tasks his expertise with Apply Environmental safety, health and security	Have the ability to work with concern for the safety of the work environment.	1. Types of Waste (organic, organic, and B3) 2. Waste pollution (soil, water, air of living organisms) 3. Waste handling and management 4. Agribusiness and sustainable agrotechnology.

Based on table 1, it shows that the Government of the Republic of Indonesia in its laws and regulations has contained: (1). The concept of integrated agriculture, (2). Waste handling and management, and (3) Agribusiness and sustainable agrotechnology Integrated agriculture or integrated agricultural system is one of the implementations of sustainable agriculture that combines agriculture, animal husbandry, and fisheries so that the use of inorganic fertilizers and pesticides can be reduced. Researchers conduct curriculum studies in educational units.

3.1.2. Identify curricula to support sustainable agriculture in vocational schools

The results showed that there are two curricula used in SMK. SMKN 5 Kendari and SMKN 1 Baula, since 2021 have been registered as SMK Center of Excellence (CoE) SMK using the 2013 curriculum for classes XI and XII and the Operational Curriculum of Education Units (KOSP) as part of the Independent Curriculum for class X SMKN 1 Kusambi, SMKN 9 Konawe Selatan, and SMKN SPP Wawotobi using the 2013 curriculum for all levels.

The presence of the 2013 curriculum is a manifestation of the responsibility of the Indonesian government in supporting sustainable development through education. Former Minister of Education of the Republic of Indonesia, Muhammad Nuh said, the presence of the 2013 curriculum is a momentum for the realization of the concept and application of Education for Sustainable Development for the Indonesian nation. (Mochtar et al. 2014).

The 2013 curriculum at the unit level of education is called the Education Unit Level Curriculum (*KTSP*). *KTSP* recognizes the terms document 1 and document 2, document 1 contains the vision, mission and objectives of the education unit, the structure and content of the curriculum, study load and educational calendar. Document 2 contains the syllabus and learning documents for all subjects, and document 3 contains the Learning Implementation Plan.

The author conducts a review of curriculum documentation which includes the vision, mission, and objectives of the educational unit. The results showed that the vision and mission of the education unit only accommodated environmental aspects, creating graduates who worked in the agricultural sector. The use of the word "sustainable agriculture" is not contained in the vision, mission, and objectives of SMK which is the object of research. These findings show that sustainable agriculture to support sustainable development has not been important for education units/vocational schools. Education units need to be strengthened to implement sustainable agriculture in the vision, vision and objectives of education. So that sustainable agriculture can be operationalized in vocational schools.

Supporting sustainable agriculture requires the support of a curriculum that has a sustainable paradigm. Wu & Shen, (2016) states that curriculum and learning methods for sustainable development are important issues in education because they both have a major impact on the future of students. Curriculum as a determinant of the function of education (Barnová and Gabrhelová 2022). The SMK curriculum with the concept of education for sustainable development needs to be integrated (Sofiana et al., 2022).

Based on a literature review of reference books used by students based on the 2013 curriculum. The theme of making organic fertilizers and biopesticides has been taught, as well as the theme

of environmental conservation. It's just that this theme explicitly doesn't offer the concept of sustainable agriculture holistically. Education for sustainable development is limited to environmental dimensions.

3.2. Evaluation of inputs

3.2.1. Teacher's understanding of sustainable agriculture

The majority of teachers have never received training on sustainable agriculture, so teachers' understanding of sustainable agriculture is still diverse. Informant R, a productive teacher who teaches at SMKN 1 Kusambi understands sustainable agriculture from ecological and economic aspects. Informant S productive teacher of SMKN 1 Baula said that agriculture is sustainable in the social dimension, where graduates of agricultural vocational schools are expected to work in the agricultural sector.

Informan N, a teacher of SMKN 5 Kendari stated that sustainable agriculture is environmentally friendly agriculture. Sustainable agriculture is understood by teacher informant F at SMKN 9 Kendari and as a question that accommodates environmental and social aspects. U.S. informant, teacher of SMKN SPP Wawotobi in addition to the ecological dimension, sustainable agriculture means the use of agricultural technology.

Based on the research findings, teachers' understanding of sustainable agriculture is limited to one or two aspects. This understanding is not holistic as a whole. The diversity of teachers' understanding of sustainable agriculture is in line with the findings of the study (Mochtar et al., 2014). The challenge of implementing ESD internally lies in the dimension of educators' ability to translate ESD concepts and values as well as the ability and availability of professional educators in the application of ESD. The findings of this study are the same as those of Ngabekti (2012). Sinakou, et al., 2018 posits that teachers do not yet understand the concept of holistic sustainable development.

The need for teacher education programs that focus on sustainable agriculture in order to be able to teach skills and knowledge adequately. (Okeafor 2002) subject teachers' awareness of continuing education competencies is important to encourage teachers to plan and implement discipline-based continuing education and disciplinein their teaching (Uitto and Saloranta 2017). Training and socialization on sustainable agriculture is very important for teachers. Training as an effort to improve the quality of teachers is organized by the government (Hadi and Andrian 2018). Teachers in vocational schools need vocational education and competency training for sustainable development to support students in developing sustainability competencies Georgieva et al., 2021).

3.2.2. Students

There are fewer students who choose the Agribusiness and agrotechnology expertise spectrum than students who choose the nonagribusiness and agrotechnology expertise spectrum. Data on the number of students based on expertise competencies in 5 schools are presented in Figure 2.

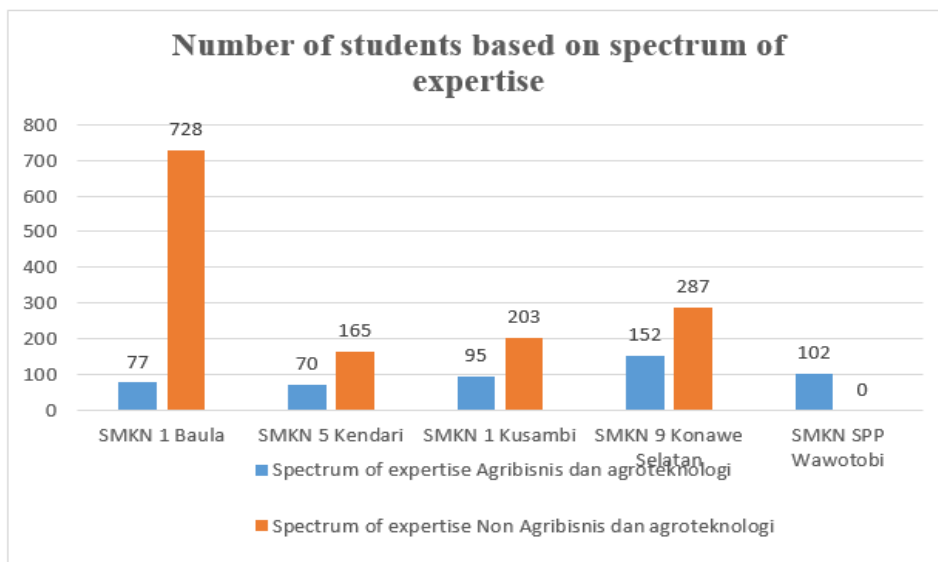


Figure 2. Number of students based on skill spectrum selection

Based on Figure 2, it can be seen that students choose less agribusiness and agrotechnology skills than other spectrums. SMKN SPP Wawotobi as the only vocational school in Southeast Sulawesi still maintains its identity as an Agricultural Development School, so it does not open up another spectrum of expertise. Based on interviews with productive teachers, students' motivation for choosing the spectrum of agricultural skills is due to: (1) parents' economic conditions, (2) the distance of the school not far from where the students live, (3) the motivation of parents who work as farmers, (4) not passing the specialization in the non-agribusiness and agrotechnology spectrum.

The motivation for choosing the competence of Agribusiness and agrotechnology expertise, is due to external factors. The image of agriculture among teenagers is not very attractive, so internal motivation is weak. This affects the learning process. Siswta is not motivated to undergo learning.

3.2.3. Facilities and infrastructure

Based on interviews and observations, it is known that the school has a fairly large area, SMKN 1 Kusambi has a school area of 70 ha, SMKN SPP Wawotobi has an area of 50 ha, SMKN 9 South Konawe and SMKN 1 Baula have an area of 1 ha, and SMKN 5 Kendari has a land area of less than 1 ha. Challenges faced in developing sustainable agriculture. Previous learning conditions used a lot of inorganic fertilizers and pesticides which resulted in decreased soil fertility, so schools needed technology to restore soil fertility.

All schools are not yet equipped with adequate laboratory facilities to support tissue culture learning. The mechanization used is still simple. Some schools are equipped with tractors and cultivators; however, their number is very limited. The school does not yet have a waste processing unit to be used as compost. The development of agricultural technology is not accelerated by the technology used by vocational high school students.

3.3. Evaluation of the Results Process

Penelitian showed that the learning process of vegetable and fruit cultivation practices in SMK still uses inorganic fertilizers, this is in accordance with the book that is a reference for teachers and students. However, teachers still equip students with knowledge and skills about the wise use of inorganic fertilizers.

The use of organic fertilizers includes manure, *bokashi* has been carried out in accordance with the demands of the teaching material, students are taught how to make *bokasi*, compost, while manure is obtained by buying from the community, or obtained from processed animals. manure from the competence of animal husbandry expertise.

Based on observations, researchers still found students using pesticides to eradicate weeds. Some vocational schools have used organic mulch to inhibit the growth of weeds. The use of mulch may reduce the use of herbicides. In general, the use of pesticides to prevent the growth of pests is still taught according to the demands of learning. In the 2013 curriculum, students have been taught to make biopesticides which are pesticides derived from plants.

SMKN 1 Baula slowly began to reduce the use of chemical fertilizers and pesticides in learning. The principal has been socializing with teachers to lead to organic cultivation. SMKN 5 Kendari is a center of excellence that implements an independent curriculum. Developing the concept of urban agriculture, including the cultivation of crops and the cultivation of hydroponic plants the cultivation of hydroponic plants is one of the implementations of sustainable agriculture, the use of chemical fertilizers and zero chemical pesticides. SMKN 5 Kendari is SMKN 5 Kendari which has small land, small land planning, urban agriculture development, including cultivation using certain media, and development of hydroponic plant cultivation.

SMKN SPP Wawotobi is the only vocational school that maintains its characteristics as an agricultural vocational school that does not open other competencies outside of agriculture. SMKN SPP Wawotobi used to be a school for the Tani Mas Entrance School (*Tani Mas*) project initiated by the Ministry of Agriculture. The developed cultivation is oriented towards sustainable agriculture, it's just that when this program is completed, this program is not sustainable, considering that the cultivation of hydroponic plants requires a lot of money.

SMKN 1 Kusambi has expertise competencies in the field of fisheries and poultry farming. The existence of this competence provides an opportunity for the application of integrated agriculture by combining animal husbandry and fisheries. Integrated agriculture can reduce waste, the concept of integrated agriculture has not been implemented at SMKN 1 Kusambi. Based on

interviews with teachers of SMK Konawe Selatan, the use of organic and inorganic fertilizers is still used in accordance with learning demands. If we can learn, we use organic fertilizer using manure purchased in the community, but during the competency exam. Students use inorganic fertilizers, as they require rapid plant growth.

3.4. Product Evaluation

Successful learning in supporting sustainable agriculture measures the knowledge, attitudes and skills of SMK alumni in agriculture, especially those who work as farmers. Of the 5 informants who completed their education spanning 2016-2018. The knowledge aspect shows that learning at SMK equips them with knowledge ranging from proper land management, breeding, types of fertilizers and rules for the use of fertilizers, and pesticides to packaging of cultivated and marketing products. There are even informants who get knowledge about hydroponic cultivation at SMK, after graduation they deepen the knowledge of hydroponic cultivation through the hydroponic farming community.

The attitude of informants about environmentally friendly agriculture by reducing the use of inorganic fertilizers and chemical pesticides, all informants are negative. Productivity and difficulty in obtaining organic fertilizers, and biopesticides according to cultivation needs on large areas, as factors of farmers' negative attitudes towards the use of organic fertilizers and biopesticides.

In terms of skills, alumni get skills in making good beds, using agricultural mechanization, making organic fertilizers and making biopesticides by utilizing plants around the school environment. It's just that the skills of making fertilizers and biopesticides are not used by alumni who work as farmers. Farmers want optimal cultivation results so that the use of inorganic fertilizers and pesticides to prevent pest diseases cannot be avoided. Farmers who graduated from SMK have difficulty getting organic fertilizers and biopesticides according to cultivation needs. To make organic fertilizers and biopesticides takes a relatively long time, so it is considered inefficient in terms of time, inorganic fertilizers and pesticides are easy to obtain. The second evaluation is based on alumni tracking data. Of the 5 vocational schools that are the object of research. SMK graduates are not interested in working as farmers or entrepreneurship in agriculture. Likewise with the absorption of Alumni in the industrial world and working in the agricultural sector. The problem is that the agricultural industry in Southeast Sulawesi is still limited and there is no agreement to accommodate SMK graduates in agriculture. Likewise, by continuing their education to a higher level, most alumni choose to continue their education in majors other than agriculture.

4. Conclusion

Education at agricultural vocational schools equips graduates with agricultural competencies in the dimensions of knowledge, attitudes, and skills. The paradigm shift of conventional agriculture towards sustainable agriculture is a challenge for agricultural vocational schools. Based on the evaluation of the CIPP model, it can be seen that the government needs to seriously integrate sustainable agriculture through pro-agriculture regulations. Sustainable. The curriculum used at the education unit level needs to be further studied so that the education unit can adopt sustainable agriculture and be formulated in the vision, mission, and objectives of the education unit. Reference books used by teachers and students, emphasize sustainable agriculture more. Sustainable agriculture learning requires teachers who have sustainable agriculture competencies, so teachers need to receive training and technical guidance on sustainable agriculture. Increasing the use of agricultural technology and meaningful learning, so that graduate competencies which include the knowledge, attitudes, and skills possessed by students and alumni are sustainable agricultural competencies. To improve sustainability in the curriculum, academics must develop collaborative approaches (Filho et al., 2018).

The novelty of this research is the evaluation of the implementation of sustainable agriculture using the CIPP model with internal research objects including curriculum, teachers, students, infrastructure, and external are alumni of agricultural vocational schools who work as farmers. The limited research location is because the research only selected 5 vocational schools in agriculture and it is necessary to conduct research for more vocational schools.

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