



## SSP of structure and function of plant tissues toward scientific literacy and entrepreneurial interest: A systematic review



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### ABSTRACT

Specific Subjects Pedagogy Biology based on green economy or more commonly known as (SSP), is a learning tool designed as a reference and framework for implementing learning by applying the Green economy principles applied to biology Students. The purpose of this systematic review research is to examine the theory of several previous studies in order to find other new theories about the integration of the learning concept of the local potential of toga village with the green economy concept in biology students toward Scientific Literacy and Entrepreneurial Interest. The method used is a systematic review that using five stages. The articles studied came from Google Scholar and ERIC data-based, and then the search results were directed to national and international journals from 2010-2020. The analysis results showed that the concept integration of the toga village's local potential with the green economy concept was good and efficient. An SSP framework was formed that was integrated with the toga village's local potential toward scientific literacy and entrepreneurial interest and a great opportunity to use the concept of findings to some basic competencies in junior and senior high school.



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### Introduction

Indonesia is one of the mega biodiversity countries in the world, which is rich in biological sources (Putra, Wiryono, & Apriyanto, 2012). The natural wealth of plants in Indonesia includes 30,000 plant species from a total of about 40,000 plant species globally and 940 species of biopharmaceutical plants. (Masyhud, 2010). Biopharmaca is a type of plant that is known to have medicinal properties such as relieving pain,

increasing endurance, killing germs, and repairing diseased organs. Based on the many functions of the toga plant, whose properties are already known, some Indonesians have cultivated the toga plant apart from being a personal family medicine as well as an additional income (Darsini, 2013).

The Central Statistics Agency [BPS] at 2016 conveyed the research results related to biopharmaceutical plants showing the extraordinary number of Indonesian exports in 2016 amounting to 86,144 tons

of cardamom with the largest export destination to Bangladesh, 107,770 tons of turmeric to India, and 340,341 tons of ginger to Vietnam. This data shows a potential for the Indonesian nation that can still be optimized to become the largest biopharmaca exporting country in the world (Makmun, 2011). However, in recent years, biopharmaceutical plants' production has decreased gradually due to a lack of early knowledge from students about the benefits and ways of increasing the productivity of biopharmaceutical plants (Zulyetti, 2019). Iskandar and Aqbar (2019) through his research, he explained that in increasing the productivity of biopharmaceutical plants, it can be done by using environmentally friendly concepts and strategies so as not to increase soil damage due to continuous soil exploitation without considering the quality and nutrient content of the soil. This concept is then referred to as the green economy concept.

United Nations Environment Program or known as UNEP explains that a healthy country must implement a green economy with three characteristics, namely low carbon, socially inclusive, and resource efficient (Iskandar & Aqbar, 2019). The concept of green economy or known as green investment arises because it is to overcome the use and exploitation of natural resources that are not balanced by efforts to conserve soil and its environment, so that the longer the soil nutrients will decrease which results in a decrease in farmer yields (Makmun, 2011). considering the importance of implementing the green economy concept, it would be better if the introduction and learning of this concept was introduced early in the world of education. One of the subjects in accordance with the concept of Green economy is Biology Student.

Natural science learning is in accordance with the concept of green economy because in science learning it must be oriented towards the daily life carried out by students. Purwanto and Hidayat (2013) explained that the Biology learning process can arouse curiosity to encourage students to carry out a scientific investigation process to get answers to questions developed based on the results of analysis of facts (doing science). One of the efforts to make science learning contextual is to use local materials (Wilujeng, Prasetyo, & Suryadarma, 2017).

So that the Biology Subject Specific Pedagogic (SSP) which is able to link the concept of Biology learning with local knowledge (indigenous knowledge) as well as the concept of green economy through the integration of the local potential of the toga village in learning is deemed necessary.

Local potential material is a substance (object) contained in a particular locale that can be used for certain purposes. Local potential material can be local wisdom (Sobiatin, Tibrani, Aznam, Saputra, & Fatharani, 2020). One of the local potentials that can be developed is the potential of Toga Village, located in Blitar Regency, East Java Province. Kampung Toga Blitar is a village which apart from being an educational tourism village about various types of family medicinal plants, is also a production site for various Toga preparations such as candy, syrup, drinks and toga chocolate (Pemerintah Kabupaten Blitar, 2017). The preserved local potential of the toga village will be able to inhibit the negative effects of globalization and modernization which reduce the behavior of young people, especially students to love the environment (Mungmachon, 2012). However, the learning conditions that exist in schools are still very few that implement integration with the local potential of the Toga village. So, it becomes important to compile SSP biology that is integrated with local potential based on green economy. After students know the benefits and types of biopharmaceutical plants, they will also be able to improve students' scientific literacy.

Scientific literacy about biopharmaca should be trained and taught from an early age in formal education so that students understand from an early age the importance of knowing the potential of the nation in the field of biopharmaceutical plants. The Organisation for Economic Cooperation and Development [OECD] (2016) added that the realm of scientific literacy consists of conditions, knowledge, abilities, and attitudes, so that through increasing scientific literacy it is hoped that it will increase the entrepreneurial interest of students so that later innovations in processed products from raw materials of biopharmaca plants will emerge. Entrepreneurial interest is a demand for the young generation of the Indonesian nation after officially the MEA (*Masyarakat Ekonomi Asean*) in effect since 2015

(Kementerian Perdagangan Republik Indonesia, 2015). So that it would be a big finding when researchers are able to intensify the preparation of SSP integrated local potential of toga village based on green economy towards scientific literacy and students' entrepreneurial interest.

The research problems that arise include: (1) How is the integration of the local potential of the toga village with the green economy concept? (2) How is the SSP Biology framework integrated with the local potential of Kampung Toga on scientific literacy and entrepreneurial interest? (3) What are the effects of using different kinds of SSP Biology Integrated with Potential Local Toga village based on Green economy on students' competencies? (4) what are the opportunities for using and developing the SSP as a result of the review?

## Method

This study used a systematic review meta-analysis method which consisted of 5 steps adopted from Khan, Kunz, Kleijnen, and Antes (2003). These stages were: (1) creating a question frame for the topic to be reviewed (2) identifying relevant research (3) assessing the results of the research that has been reviewed (4) writing the results of the review (5) analyzing and interpreting the research results.

The first stage was to systematically determine questions on the topic of review: (1) How was the integration of the local potential of the toga village with the green economy concept? (2) how was the SSP framework integrated with the local potential of Kampung Toga on scientific literacy and entrepreneurial interest? (3) What were the effects of using different kinds of SSP Integrated with Potential Local Toga village based on Green economy on students' competencies? (4) Had anyone used toga village in the compilation of SSP?

The second stage identified relevant research. The process of identifying relevant research began with determining the keywords of the search that will be carried out. The keywords used were Subject Specific Pedagogy, Local Potential, Green Economy, Science Literacy and students' entrepreneurial interests. The search was carried out from two search engines Google Scholar and the Education Resources Information Center (ERIC). To make the study more accurate, the search

for articles used the last 10 years (2010-2020).

After a number of articles were selected, the third stage was an assessment of all the articles that had been selected. Two experts in the field of scientific articles are assessing the quality and accuracy of the data.

The fourth stage was to write the review results into the processing sheet for further analysis in the fifth stage. The analysis was focused on several questions that had been compiled in stage 1.

## Results and Discussion

This research began by looking for articles from two online search engine sources, namely the Education Resources Information Center (ERIC) and Google Scholar, which are then displayed as follows Table 1.

Table 1. List number of articles found

Keywords	Number of Articles found	
	ERIC	GS
Subject Specific Pedagogy	310	99300
Local potential	33	17100
Green economy	179	835000
Scientific literacy	6155	16500
Entrepreneurial interest	204	18100

Based on Table 1, it is known that Google Scholar has a much higher number of search results than ERIC. However, when viewed from the specifications and quality of the articles found, Eric has a high degree of accuracy because in ERIC it focuses on articles with the theme of Education only. Based on several articles that have been selected, the next step is to answer and solve some of the questions that have been compiled previously.

### Integration of the local potential of the toga village with the green economy concept

Taking the theme of SSP Biology integrated local potential of the toga village is based on concern for the potential of the Indonesian people for the importance of preserving spices and biopharmaca plants in Indonesia, besides learning based on local potential will make learning more contextual (Marlina, Hardigaluh, & Yokhebed, 2015). The use of local potential integrated learning is in accordance with the basic competences of science (Parmin,

Sajidan, Ashadi, & Sutikno, 2015). The following is the suitability of basic science competencies with local potential (Table 2).

In addition, to increase the emphasis on innovation and renewal of learning development, it will be a new finding when SSP Biology is based on one of the sub-sections of education for sustainable development goals, namely Green economy. The Green Economy concept has a very big role in everyday life because this concept has been able to integrate economic, social and environmental aspects. Through a combination of

economic, social and environmental concepts, the green economy will be able to streamline expenses, improve the community's economy, increase innovation in the field of environmentally friendly innovation and preserve the environment (Sharp, 2011). Alisjahbana and Murniningtyas (2018); Dudin, Frolova, Kucherenko, Samusenko, and Voikova (2016) explained that the implementation of learning using the green economy will be successful when referring to the green economy aspects and indicators (Table 3).

Table 2. The suitability of basic science competencies with the local potential context

Science Basic Competencies	The Context of Potential Local
Understand the procedures for the classification of living things and their environment using a scientific framework	Naming plants Ecotourism business by highlighting the name of the plant Zoo and educational tours Agricultural system
Understand the characteristics of matter as a useful physical and chemical change in everyday life. Describe the interaction of living things with their environment	Rocks and gravel as a filter for turbid water become clear Separation of coconut oil from coconut milk Salt making process Use spring to keep bees out of the hive Acceleration of making organic fertilizers using decomposer bacteria Forest distribution as a conservation effort in the community
Describe pollution and its impact on living things	Planting carbon sink plants Gontoh watering plant cultivation to neutralize river limbah Plant aromatherapy plants
Describe the causes of global warming and its impact on ecosystems	Greening by planting crops and fruit Grow oxygen-producing plants in the garden Doing selective logging Planting trees as a condition of marriage

The green economy concept is also applied to one of the Toga villages located in Blitar, East Java. based on an interview with the head of Kampung Toga's management, the 6 M concept was obtained which is the realization of the green economy principle as the theory put forward by Parmin et al. (2015):

- 1) **Planting**, Blitar toga village cultivates various medicinal plants with certain properties and benefits. Most of the medicinal plants that are planted are plants that are able to produce a lot of oxygen because as one
- 2) **Fertilize**, Blitar toga village processes its own fertilizer using waste from the processing of biopharmaceutical plant products and is assisted by decomposer bacteria
- 3) **Harvesting**, the toga villagers harvest the biopharmaceutical plants at different times. This is what makes production never shortage or even out of stock of raw materials.

- 4) **Processing**, toga Blitar village processes and produces various processed biopharmaca plants into various preparations; such as syrup, candy, sweets, energy drinks, and various other preparations.

- 5) **Marketing**, a vital stage in the sustainability of this toga village lies in the marketing process. Marketing is carried out using online and offline strategies, by selling various preparations, seeds and educational tours.

- 6) **Educating**, in addition to being oriented towards a business based on economy and environment, Blitar toga village also focuses on the social sector, namely by educating tourists on the properties and benefits of toga plants, the planting process to processing and marketing.

The application of green economy in the development of a learning curriculum can reduce carbon effects and create

environmental sustainability (Chakraborty, Singh, & Roy, 2018). In line with this opinion Kolenick (2018) explained that in an effort to meet the targets of the education for Sustainable Development (ESD) concept, the application of green economy in learning will be able to reduce

carbon, increase the principles of the community's economy from an early age. Green economy when implemented in students from an early age, students will start designing and preparing an environmentally friendly economic concept in the future (Williamson, 2011).

Table 3. Green economy aspects and indicators

Murniningtiyas, 2018		Dudin, 2016		Final synthesis	
Aspect	Indicator	Aspect	Indicator	Aspect	Indicator
Economy	The existence of production activities to add value to an item Economic activities are carried out in the main structure, namely the agricultural sector	Brain-storming	Looking for problems in the social, economic and environmental fields. Looking for linkages between social, economic and environment aspects Looking for solutions for solutions that prioritize environment sustainability.	Brain-storming <i>(Economy)</i>	Looking for problems related to the social, economic and environmental fields. Looking for a solution that prioritizes environment sustainability
Environment	Production activities are carried out to reduce greenhouse gas emissions or production activities that are low carbon in nature. Production activities are carried out by recycling waste. Production activities take advantage of the potential of the local environment Production activities are carried out with an awareness of environmental care	Activity Design  Implementation activities	Designing green economic activities to save energy and streamline costs while still paying attention to environment sustainability  Recycle waste. Utilizing and processing the potential of the local environment Reducing production costs by seeking alternative natural materials	Activity Design <i>(environment)</i>  Implementation activities <i>(environment)</i>	Designing economic activities to save energy and streamline costs while still paying attention to environment sustainability Recycle waste. Utilizing and processing the potential of the local environment Reducing production costs by seeking alternative natural materials
Social	Economic activities are oriented towards efforts to equalize welfare	Social Interaction	Responsible for the community and the environment	Social Interaction	Economic activities are oriented towards efforts to equalize welfare Responsible for the community and the environment

**The framework of thinking SSP Biology integrates local potentials of Kampung Toga on scientific literacy and entrepreneurial interest.**

The development of SSP Biology integrated with the local potential of the toga village based on green economy has the potential for the development of scientific literacy and student entrepreneurial interest. Scientific literacy includes knowledge from science, knowledge of science, fundamental

understanding of scientific concepts, understanding inquiry and explanation of natural science (Bybee, McCrae, & Laurie, 2009; Nusantari, Utina, Katili, & Tamu, 2020). Adolphus, Telima, and Arokoyu (2012) explained that someone who has scientific literacy is required to have the following competencies: (1) to explain a phenomenon scientifically; (2) evaluate and design understanding of science through inquiry. (3) interpret data and show scientific evidence.

Table 4. The framework for using SSP Biology is integrated with the local potential of the toga village based on green economy towards students' scientific literacy and entrepreneurial interest

Aspect SSP Green Economy	Scientific Literacy		Entrepreneurial Interest	
	Aspect	Indicator	Aspect	Indicator
Brainstorming  (Social economic environment)	Context	Understand Personal, Local and Global issues regarding the development of chemical drugs, hazards and anticipated solutions using the local potential of biopharmaceutical plants	Planning a new venture	Trying to provide a solution to a problem Trying to find a solution until you find it Able to see opportunities that other people perceive as a problem
Designing Activities  (economic environment)	Knowledge	Understand the concept of plant structure and function Designing a mind map regarding the types, benefits and structure of the leaves, root stems and flowers of plants.	Seek knowledge about entrepreneurial opportunities	Glad to see people entrepreneurial in the environmental field Enjoys hanging out with environmental entrepreneurs Interested in becoming an entrepreneur in the environmental field
Implementation activities  (economic environment)	Competence	Explain phenomena scientifically Evaluating and designing scientific investigations Interpret data and evidence scientifically	Confidence in starting a business	Having self-confidence will get you success in life Have the confidence to be successful in trying new things Able to complete the assignment given
Social interaction  (Social)			Response to new ventures	Able to appreciate every new business Have a sense of pleasure in starting a new business Respond positively in starting a business

Meanwhile, entrepreneurial interest is a personal skill and motivation that attracts someone to involve their abilities and efforts in creating new products and services, with business value provided by the ability to meet market demand (Bellotti et al., 2012). Entrepreneurship is also defined as a way to see opportunities and

opportunities in advancing the economy. Entrepreneurial interest can also be interpreted as a description of a combination of interest in risk, creativity and innovation as well as personal success (Cárcamo-Solís, Arroyo-López, Alvarez-Castañón, & García-López, 2017). The following is the result of the synthesis and

integration of the use of SSP Biology, which is integrated with the local potential of a toga village based on green economy for scientific literacy and student entrepreneurial interests.

Table 4 has shown a frame of mind for thinking about the final synthesis of SSP IPA development based on green economy on scientific literacy and student entrepreneurial interest, so that in the next stage it can be used as a reference as a reference for developing SSP, media and learning tools that apply the local potential of the toga village.

### The effect of SSP Biology Integrated with Potential Local kampung Toga based on Green economy on students' competencies in the 2013 curriculum

Based on the 2013 curriculum analysis that has been carried out by SSP Biology researchers Integrated with Local Potential, Toga village, based on the Green economy, which was developed, can be used as a reference for learning in several KD at the junior high and high school level in biology subject as described in Table 5 (Kemdikbud, 2018).

Table 5. Analysis of the use of integrated biology material on the local potential of toga village based on green economy on the basic competencies of the 2013 curriculum

Education unit level	Class/Semester	Basic Competence
Junior High School	VIII/I	3.4 Analyze the relationship between plant tissue structure and function, as well as technologies inspired by plant structures
Senior High School	X/I	3.2 Analyzing various levels of biodiversity in Indonesia and their threats and conservation.
	X/II	3.8 classifying plants into divisions based on general characteristics and linking their role in life
	X/II	3.11 Analyze data on environmental changes, their causes and impacts on life
	XI/I	3.3 Analyzing the relationship between cell structure in plant tissues and organ functions in plants.

Based on the Table 5, it is known that the development of integrated Biology SSP. The local potential of the toga village based on green economy is very possible to be used and developed in 1 basic competency at the junior high school level and 5 basic competencies at the senior high school.

#### Position of product innovation against previous research products

Based on searches conducted on the Education Resources Information Center search engine and Google Scholar using the following keywords: Subject Specific Pedagogy, Local potential, Science Literacy and Entrepreneurial Interest found around 6,677 articles from ERIC and 967,900 articles from Google Scholar. However, for learning media, as well as SSP that use the integration of the local potential of the toga village in Biology and Science learning has never been done, so it will be a very big opportunity for further researchers to continue research by integrating the local potential of the toga village based on green economy in learning.

#### Conclusion

Based on a search using ERIC and Google Scholar, 6677 ERIC articles and 967,900 Google Scholar articles were

found. The concept of green economy has been developed in various parts of the world, but not many have applied it in the field of science learning, especially biology. In addition, the use of integrated Biology SSP with local potential in the toga village based on green economy towards scientific literacy and student entrepreneurial interest has not been developed at all, so it will be an opportunity to continue learning innovation using the integration of local potential and green economy. Great opportunities in developing ideas and learning innovations based on the local potentials that have been discussed, because they have wide opportunities in their development. Based on the 2013 SSP Biology curriculum analysis, this is in accordance with 1 KD material for SMP and 5 KD material for SMA, so that it can be a reference for the development of teaching materials, as well as learning tools for further research and development.

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