EMPOWERMENT OF GREEN CHEMISTRY COMMUNITY FOR TRANSFER TECHNOLOGY OF PATCHOULI OIL PROCESSING TO MSMEs IN SLEMAN AND KULONPROGO

Karna Wijaya[1], Mokhammad Fajar Pradipta[2], Widi Kurniawati[3], Farida[4], Nasih Widya Yuwono[5]

[1,2,3,4] Faculty of Mathematics and Natural Science, Universitas Gadjah Mada, Indonesia
[5]Faculty of Agriculture, Universitas Gadjah Mada, Indonesia

karnawijaya@ugm.ac.id

ABSTRACT

Sustainable education on green chemistry among activists will be more effective and valuable if implemented by following the Education for Sustainable Development principles, namely through developing academic and leadership capacities of green chemistry activists, through education about how to respect the rights of others and nature and training on how to make decisions responsibly. Green Chemistry activists will be deployed directly to be able to transfer knowledge and technology to the community. The development of the sustainable education system is based on the 4 main pillars of ESD, namely: Social, Cultural, Economic and Environmental. The four pillars must be explicitly stated in the module of the green chemistry education system. This activity involved 9 institutions that involving academic, business and government institution. The Micro, Small and Medium Enterprises are involved to receive training from Green Chemistry activists in the processing of patchouli oil with green chemistry principles and SNI standardized products. Empowerment activities carried out include: Making Learning Modules, Making Learning Videos, Socialization, Making Leaflets, and Scientific Publications on Patchouli Oil Processing and Empowering MSMEs. In order for the activities to be right on target and to succeed well, the activities will be carried out sustainably after the project. Empowerment sustainability can be carried out by activists of the Green Chemistry Community by providing training to SMEs on a regular basis. Market their products and update the web / blog empowerment.

Keywords: community empowerment, green chemistry, patchouli oil processing

JEL Classification: D10, D11, J3

INTRODUCTION

The potential of patchouli oil is increasingly shining in national even global fine chemical market. Indonesia is one of the largest patchouli oil producers in the world and supplies almost 90% of the world's needs (Setiawan and Rosman, 2013). Patchouli oil has good prospects because it is needed sustainably, among others, in the perfume, cosmetics and medicine industries. Patchouli oil in the perfume industry is used as a perfume binder, so the fragrance of perfume can last longer. Until now there has been no synthetic material that can completely replace the role of patchouli oil in perfume production. Indonesia supplies the world patchouli oil needs up to 2,000 tons per year (Suarniki, 2009). One of the biggest and even the biggest patchouli oil producing areas in Yogyakarta is Gerbosari Village, Samigaluh District, Kulonprogo Regency. One of patchouli oil MSMEs can produce 30 kilograms of patchouli oil in one run. Moreover, there are still many patchouli oil producers who have become suppliers of patchouli oil for national and export needs. With that great potential, patchouli oil processing plays a crucial role. In order to enter the perfume industry market and other industries, the quality of processed patchouli oil must at least meet the Indonesian National Standard (SNI).

Currently various patchouli oil processing techniques have been developed by researchers, however, there are still few techniques and materials that can truly satisfy patchouli oil MSME industry players, especially those related to the technique of decreasing acidic and iron levels and also increasing the patchouli alcohol content. Unfortunately, the understanding of patchouli oil business actors towards green chemistry or green chemical processes in patchouli oil processing is still limited or still not in line with the expectations of researchers and policy makers. One of the main causes is the absence of a continuous education system about green chemistry among green chemistry activists both in campus and out of campus. Education for Sustainable Develoment (ESD) which was initiated by Prof. Dr. Hans J. A. Van Ginkel, former Chancellor of the United Nations (UN) University and Expert of the Secretary General of the UN are educational concepts that have been proven to have been successfully applied in various fields of education in the world. This concept will be adopted and applied to educate Green Chemistry activists in the Chemistry Department of FMIPA UGM who will later be sent to MSMEs in Sleman and Kulonprogo to introduce green technology to process patchouli leaves into patchouli oil.

The community service activities are expected to establish and empower the Green Chemistry Community in Universitas Gadjah Mada who are then ready to transfer knowledge and technology of patchouli oil processing which is based on sustainable green chemistry principles so that it can produce patchouli oils that meet Indonesian National Standard (SNI). Finally, MSMEs as the ultimate target of empowerment will be able to obtain useful knowledge to improve their patchouli oil processing technology so that can meet the Indonesian National Standard (SNI) and developing marketing strategies in product marketing.

In the end, the output to be achieved through this activity includes the development of Green Chemistry activists who are not only limited to Chemistry students of the Faculty of Mathematics and Natural Sciences but extends to all Departments within the Faculty of Mathematics and Natural Sciences and the communities. Green Chemistry activists are prepared to educate MSMEs actors as well as industry and society about green chemistry through various media in a sustainable ways. In addition, supporting objects and media will be produced such as training modules, leaflets, videos and posters. Moreover, program article will be published on both campus and regional in order to disseminate information about the activities carried out and patchouli oil processing.

IMPLEMENTATION

These sustainable education system development activities are based on 4 main pillars of ESD, namely: Social, Cultural, Economic and Environmental. The four pillars are listed explicitly in the syllabus of green chemistry education system. These activities involved 3 institutions namely Lab. Physical Chemistry FMIPA UGM as a representative of academic institutions, Surya Wulan MSMEs and CV. Fruitanol Energy as representatives of business institutions, and also local village governments as representatives of government institutions. This program is implemented for one year which is divided into three phase.

PHASE I

Phase I was the process of establishment of Green Chemistry Community in chemistry undergraduate students, Faculty of Mathematics and Natural Sciences. This community would later be sent directly to the business actors of patchouli oil MSMEs in Sleman and Kulonprogo. The next activity is the preparation of Green Chemistry patchouli oil processing training modules for training activists. The material for writing modules was taken from the author’s experience in developing method of patchouli oil processing and purification process using environmentally friendly adsorbents. The training module contains activities that

trainees must be followed during training. In addition, a complementary module was also made which contains the theory and method of processing patchouli leaves into patchouli oil. This module contains stuffs that must be done and prepared by students / trainees so that it serves as a handout during training.

In addition, a training video was made as part of the training material for patchouli leaves processing into patchouli oil based on green chemistry principles. This video contains a demonstration of patchouli oil production by green chemistry activists who have joined the Green Chemistry Community. Moreover, other supporting materials was made in stage I were making Leaflet of Patchouli oil processing which was based on Green Chemistry principles. Training leaflets were used as part of the material and publication of this Education for Sustainable Development activity. The leaflet contains a summary of the material about green chemistry, patchouli oil processing steps and documentation of ESD activities start from green chemistry activists establishment to direct socialization of patchouli oil processing. This leaflet is the guideline for participants during socialization and demonstration of patchouli oil production.

PHASE II

In phase II, Green Chemistry activists received training on processing patchouli leaves into Indonesian National standardized patchouli oil both in class and outside the classroom. Training outside the classroom was direct demonstration of patchouli oil production starting from the preparation of tools and raw materials to become patchouli oil-finished products. The preparation of tools started from distillers to patchouli oil purifier installations was carried out at CV. Fruitanol Energy. Dried patchouli leaves were also prepared in the same place for training in producing patchouli oil for Green Chemistry activists. The activists were trained in the process of distillation of patchouli leaves and purification of patchouli oil using environmentally friendly adsorbents. The purification process used zeolite and bentonite clay. Participants received training include from mixing ingredients, molding adsorbents to pellets, and refining patchouli oil.

PHASE III

In phase III of the ESD program, green chemistry activists were sent directly to patchouli oil MSMEs in Sleman and Kulonprogo. They make direct observations of the partner's problems and conditions. Authors and activists provided direct learning and demonstration of patchouli oil production so that patchouli oil that was produced could meet Indonesian National Standard (SNI). The authors collaborated with the Gerbosari village government to gather local people and business actors of patchouli oil MSMEs. The socialization of patchouli leaves processing into patchouli oil was carried out gradually through two visits to village partner. The transfer of knowledge and technology included the selection of good patchouli seeds, the use of efficient and environmentally friendly distillation fuels, the use of affordable and environmentally friendly adsorbents, and the steps that could be taken to increase the content of patchouli alcohol.

RESULTS AND OUTPUTS

The program is conducted by researcher and green chemistry activists during its one year of activity, this program has been successful in establishing of Green Chemistry Community in chemistry undergraduate students, Faculty of Mathematics and Natural Science Universitas Gadjah Mada. These activists has done technology transfer of patchouli oil processing to the business actors of patchouli oil MSMEs in Sleman and Kulonprogo.

Patchouli oil MSMEs targeted for the program have unique characteristics and potential which are presented by these following SWOT analysis:

Tabel 1. SWOT Analysis of MSMEs in Kulonprogo

Strengths	Weakness	Opportunity	Threats
• Company expertise • Qualified to Indonesian National Standard • Strategic location • Large quantities of production	• Minimal marketing knowledge (marketing) • Products produced cannot be distinguished from competing products • Location of a remote company or institution • Low product quality	• Market that continues to grow • Company merger • The emergence of new market segments • International markets • Market emptiness because of competitors' inability to meet customer demand	• New competitors in the same market segment • Price competition with competitors • Competitors issue better quality products • Competitors dominate the largest market share • MSMEs still play a price taker role

This Green Chemistry Community empowerment program has been reached the outputs i.e. successfully established Green Chemistry Community including the trainings, learning modul and videos, leaflets, poster and published article both in campus media and Yogyakarta media.

Figure 1. Green Chemistry Community

Figure 2. Socialization to the communitites

Figure 3. Training in class

Figure 4. Direct Demonstration

Figure 5. Authors and patchouli oil business actors

While this education for sustainable development program had been successfully conducted; analysis of the implementation suggest that more involvement by researchers and government partners (Ministry of Research, Technology and Higher Education, Ministry of Industry, Manpower and Community Empowerment Agency in Yogyakarta would improve the technology and human resources potential due to great prospects of patchouli oil MSMEs. This suggests that the government, through related agencies, and university researchers could provide further mentoring to the ESD program so it would be sustainable and eventually it will become the biggest patchouli oil producer area in Indonesia. Sustainable efforts should not only focus on the production aspects, but also on the marketing aspect. For the community, they are very creative and enthusiastic in producing patchouli oil but has little network on marketing their products.

CONCLUSION

Education for sustainable development can work effectively through collaboration between elements of the academic-business-government. Education about patchouli oil processing that is based on green chemistry has become very important in patchouli oil processing industry. ESD can be achieved by empowering the green chemistry community in the campus environment to transfer patchouli oil processing technology to business actors of MSMEs and communities. This program achieved targeted outputs, namely the establishment of Green Chemistry Community which was formed in the scope of chemistry undergraduate students as agents of knowledge and technology transfer to MSMEs actors in Kulonprogo and Sleman. The supporting objects produced were learning modules, videos, leaflets, posters and media publications.

REFERENCES

Suarniki, N. N., 2009, Potensi dan Permasalahan dalam Pengembangan Komoditi Nilam melalui Pendekatan Klaster di Kabupaten Tanah Laut, *Jurnal Aplikasi Manajemen*, 7(2):315-325.

Setiawan dan Rosman, R., 2013, Status Penelitian dan Upaya Peningkatan Kadar Patchouli Alkohol pada Minyak Nilam, *Prespektif*, 12(2): 101-111