The Role of Fashion Design Education in Developing Ecoprint Technique Clothing to Support Final Projects and Increase Sustainability Awareness

Sri Endah Wahyuningsih*, Widowati Widowati, Adhi Kusumastuti, Maria Krisnawati, Roudlotus Sholikhah, Nurul Azhar Ratna Putri, Risfani Rahmawati

Home Economics Education, Faculty of Engineering Universitas Negeri Semarang, Semarang, Indonesia
**Email: s.endah32@mail.unnes.ac.id*

ABSTRACT

Contemporary mode education requires multidimensional adjustments to curriculum, which reflects the complex nature of sustainability issues. This is a global challenge, compounded by inadequate and uncoordinated public support, problems related to the institutional context of private and public education, and low levels of sustainability awareness. The problem of fashion waste in post covid has become the world's number 1 problem that must be addressed immediately. Fashion Design Education Study Program FT UNNES has a vision that refers to UNNES's vision, namely UNNES for conservation and international reputation. The fashion education study program has a role in preparing prospective educators in fashion vocational high schools, and entrepreneurs as designers who can play a role in the development of sustainable fashion design, because they are able to influence and contribute to the dimensions of the impact of mode or fashion on the environment and culture. Fashion design education should be seen as an opportunity to prepare human resources in the fashion sector who are aware of the challenges and potential of developing local and sustainable fashion-based product designs and equipping students with the knowledge and needed skills to implement a sustainable fashion approach. The 2022 Work Show took the theme Smart Innovation for the creative industry and fashion design highlighting sustainable fashion by utilizing local materials and natural potential in accordance with the principles of sustainable fashion and with a conservation perspective. Clothing materials utilized batik clothes, troso woven fabrics, striated clothes, clothing is made with fabric manipulation techniques, transformation techniques and the use of Zero waste patterns. Development of ecoprint materials with ZWA and without ZWA was also done by utilizing cotton fabrics, eco leaf materials in the campus environment, as well as with the technique of upcycling denim clothing waste. This research is a continuation of the results of research in 2021 concerning diversification of ecoprint products and the fastness quality of ecoprint fabrics in terms of fabric type, natural dyes and mordant. This research is also a continuation of the product being developed for the Yogja Fashion week event at the end of December 2021 with a design based on the ecoprint technique and no research has been done from both the design, material and product aspects. Therefore, empirical research is needed on the role of fashion education in the development of local wisdom and sustainable clothing designs with ecoprint techniques in supporting virtual work shows. This research was done through a research and development (R&D) approach. An analysis of the importance of the role of fashion education in the development of local wisdom and sustainable clothing design for the title work was implemented through FGDs, and continued from design curation and revision and then the process of creation, curation and testing, to surveys. The data was analyzed by qualitative and descriptive percentages and gain scores to see the difference in the results of clothing with the ecoprint technique. The research results showed that the students concern level about sustainable fashion is very good, the results of fashion design with the ecoprint technique have increased so that the learning is quite effective and made a very good clothing products also have increased. It's showed that the learning is very effective.

Keywords: *Education, Fashion, Local Wisdom, Sustainable, Fashion Shows.*

A. Kusumastuti et al. (eds.), *5th Vocational Education International Conference (VEIC 2023)*,
Advances in Social Science, Education and Humanities Research 813,
https://doi.org/10.2991/978-2-38476-198-2_20

1. INTRODUCTION

Fashion education needs to review its philosophy and current practices to respond to changing industries, an evolving generation of students, and a new set of skills and abilities demanded by the profession. Fashion education should also seek to meet these challenges by placing greater emphasis on "design thinking" and conceptual processes to produce graduates who can understand broader contexts, create new innovative products, and rethink business systems.

In Indonesia, it is planned to be the fashion center for Muslim fashion in 2025. UNNES in Central Java is the only state university that has a fashion study program and prepares prospective fashion vocational teachers and entrepreneurs in the fashion sector. Since 2017 the city of Semarang has been proclaimed by the Creative Economy Agency as a fashion creative city. UNNES as one of the state universities having a fashion education study program was appointed as the only representative from academics for the progress of policy making and the progress of the fashion creative city of Semarang. The fashion education study program is often involved in supporting the Semarang creative city program in competitions, fashion show events and also holding the UMKM Award. This increases student career opportunities as educators and designers/entrepreneurs.

Post-Covid, the problem of fashion waste has become the world's number 1 problem that must be addressed immediately. The FT UNNES Fashion Design Education Study Program has a vision that refers to UNNES's vision, namely UNNES for conservation and international reputation. Fashion show activities as one of the applications of the Gelar Karya course and as the flagship of the study program. The fashion education study program has a role in preparing prospective educators at fashion vocational schools who can later play a role in developing sustainable fashion designs for students, because they are able to influence and contribute to the dimensions of the impact of fashion or fashion, both environmental and cultural. The Role of Fashion Design Education should be seen as an opportunity to prepare human resources in the fashion sector who are aware of the challenges and potential of developing local wisdom-based and sustainable fashion product designs and equipping students with the knowledge and skills needed to apply a sustainable fashion approach.

The fashion work show takes the theme Smart Innovation for the creative industry. Fashion design promotes sustainable fashion by utilizing local materials and natural potential in accordance with the principles of sustainable fashion and with a conservation perspective. Clothing materials utilize batik cloth, troso woven cloth, lurik cloth, clothing is realized with fabric manipulation techniques, transformation techniques and the use of Zero waste patterns. The development of ecoprint materials with ZWA and without ZWA is also carried out by utilizing cotton fabrics, eco leaf materials in the campus environment, as well as by upscaling denim clothing waste techniques. UNNES is a tertiary institution that has a vision with an international perspective on conservation.

The products that will be featured in this research are products that are made by utilizing the natural potential around the UNNES campus so that these products can be superior and have benefits for the surrounding community. One of the product innovations for this work is a fashion product made using the ecoprint technique, which has a unique motif with a blend of troso fabric from Jepara. Ecoprint is a fabric coloring technique that is made by transferring a natural motif such as leaves, flowers, seeds, stalks, roots, etc. onto a cloth to form a new, unique motif through steaming. The ecoprint technique has been around for a long time, and was popularized in 2006 by Indiana Flint. Flint [1] stated that the ecoprint technique is defined as a process for transferring colors and shapes to fabric through direct contact. This technique is done by sticking plants that have color pigments, both plant parts of leaves, flowers, stems, seeds, or roots, on a sheet of cloth which is then boiled/steamed/beaten. The cloth used for previous coloring is mordanted beforehand so that the pores of the cloth open so that the natural dyes can seep perfectly into the cloth. This study aims to describe the role of fashion education in developing local wisdom and sustainable clothing designs for work shows and to describe the eligibility of local wisdom and sustainable clothing designs and products.

The research problems include the role of the Fashion Design study program in the development of sustainable fashion designs for work shows. The effectiveness of fashion design and products in supporting the title of sustainable fashion creation is also studied. In the end, the quality of the ecoprint material for the degree of work developed by students based on the results of laboratory tests was also investigated.

2. THEORETICAL BASIS

2.1. The role of education in Human Resource Preparation for the Professional World

The future of fashion design and fashion design education will require evolution in pedagogy, mentoring, and student development. As shown, the philosophy of how design programs deliver academic content will change. This will require institutions to provide faculty development so they can learn new teaching methodologies, to engage with professional practice ensuring graduates are prepared successfully, and increase mentoring opportunities so as to support students who are about to enter an increasingly volatile

and uncertain world of professional work. Contemporary fashion education requires multidimensional adjustments to the curriculum, reflecting the complex nature of the problem of low levels of sustainability awareness and consideration of career choices. Graduates pursue careers that are more than just a paycheck, but something that is both fun and personally fulfilling"[2]. Today's young generation views work as something that allows self-development and self-expression [3]. Unlike their parents' generation, in which many assume just having a job is enough, today's young adults are faced with a very global professional step loaded with careers. This research will enable fashion design/fashion education study programs to produce professionals who will lead the fashion industry to a sustainable development. what kind of non-education best prepares graduates.

2.2. Local wisdom and Sustainable

Local wisdom-based education can shape the character of students. Students become more understanding and feel proud of the potential advantages of their region, maintain and develop cultural preservation and utilize resources to become a competitive advantage. This is in accordance with character education which must be developed and applied to real contexts in society. Character education is not only at the cognitive level, but also self-internalization and real application in everyday life [4]. Gaining a competitive (competitive) advantage is a moving goal and does not have to be something fixed. The details that make up excellence require continuous modification and adaptation to meet changing needs. Local advantage is the potential of an area to become a valuable product or service that can add to regional income and is unique and has a competitive advantage [4]. Local excellence must be developed from the potential of each region. The concept of developing local potential includes natural resource potential, human resource potential, geography, culture and history.

The results of Claoudia's research [5] on the criteria for sustainable clothing can be viewed from the process of Forward Thinking, Innovation, Ethical/sustainable Design, Ethically Sourced, Meaningful, Interesting, Local Production, Production Techniques (recycling, traditional techniques) and Versatile. Based on the sustainable fashion Matrix broadly includes 1. Promoting fair trade, fair wages,2. Transparency/traceability 3. Checking for hazardous substances 4. Long term focus 5. Environmental standards 6. Human rights/working conditions 7. Community support/integration 8. Financially eligible 9. Environmentally friendly materials 10. Renewable sources.

According to Brunna [6] stated that sustainable fashion must maintain adherence to core sustainability values, which are closely related to important drivers such as fair trade, commitment to recycling, upcycling, and the use of sustainable materials, the insight refers to the importance of a sustainable business ecosystem. like-minded people who share sustainability values. Shared values enhance knowledge and resource sharing and facilitate the establishment of collaborative efforts that encourage business model experimentation, especially in the startup stage. Sustainable fashion or sustainable fashion is the concept of making clothing by paying attention to the values of the parties involved, especially the environment and humanity. Sustainable fashion is a step to reduce the influence of fast fashion, which in turn creates world fashion waste. Fast fashion is only used a few times and then discarded or not reused because of the fast changing fashion trends. Fashion is the world's second largest waste contributor after oil. Sustainable fashion aims to bring together various groups in the fashion industry, from designers, manufacturers, distributors, to consumers, to work together in producing and consuming fashion products effectively and efficiently.

One application of sustainable fashion is the selection and use of natural fibers as raw materials for clothing, as well as the manufacture of fabrics that do not have a negative impact on the environment. With the theme of sustainable fashion in this year's work show, UNNES 2019 Dressmaking Education students use various techniques of fabric making and fabric manipulation that are guided by the 2021/2022 Trend Forecasting, namely Essentiality, Spirituality, Exploration, and Exploitation. The fabric making techniques used are among the shibori, tsuminagashi, and ecoprint techniques. The application of zero waste clothing, transformation, upcycling, and manipulation of batik and lurik fabrics is also raised in the theme of this work. Essentiality is applied to tsuminagashi and zero waste. Spirituality is applied to shibori ecoprints, and lurik fabric manipulation. Exploration is applied to transformation, and exploitation is applied to shibori, batik fabric manipulation, and upcycling.

The ecoprint technique needs to pay attention to plant species according to Paryanto [7] which states that each plant is a source of natural dyes because it contains natural pigments. one type of plant can contain more than one type of coloring matter that varies. This causes the resulting color to be unstable. Pigments (coloring matter) are organic compounds that determine the color direction of natural dyes (contained in the source of the dyes themselves). Natural dyes are easier to find in plants. In the UNNES environment, there are various types of plants that grow around the campus that can be used for dyes. Plants that can be used for their dyes include teak trees, ketapang trees, jatropha trees, mahogany trees, and others.

One of the techniques and products that are currently popular and inspired by nature is ecoprint. This technique has been developing for a long time, and was popularized

since 2006, one of which was by Indiana Flint. Derived from the eco dyeing technique then Flint developed it into an ecoprint technique. Irianingsih [8] states that, ecoprint is transferring patterns (shapes) of leaves and flowers onto the surface of various fabrics that have been treated to remove layers of wax and fine dirt. on the fabric so that the plant colors are easily absorbed (mordant technique). The ecoprint technique is used to decorate the surface of a cloth with various shapes and colors (staining) made from natural materials. Ecoprint coloring is generally applied to materials made from natural fibers such as cotton, silk, canvas, and others. Fabrics that use synthetic base materials will experience difficulties because the colors will not stick to the fabric. There are several studies on eco dyeing and eco printing, they use a lot of materials derived from natural fibers [9]. The ecoprint technique uses the ecoprint dye bundle method by Flint [1], namely: it is an ecoprint technique that requires a steaming process. All plant material is arranged on a cloth that has been mordanted then rolled up using the help of wood or metal pipes and tied tightly using a rope or thread. Then steamed for about 1-2 hours. Coloring with natural dyes consists of several steps that must be passed for successful coloring.

2.3. Fashion Work Show

Exhibition of fashion creations is one of the parades held to showcase or introduce clothing that is exhibited for a specific purpose. According to Riyanto [10] fashion shows are activities done by designers, and textile entrepreneurs to promote or show their products or designs to public. Meanwhile, according to research by Huanghe [11] that the exhibition of fashion works in the form of a fashion show is a communication activity through information transmission, also social and cultural transmission. Fashion show plays a huge role in the culture transmission as "gatekeepers" to the public. Fashion shows, also play the role of "opinion leader" models, directors, etc. play positive and negative roles, actively and passively in social and cultural transmission. According to Kim [12] about described virtual exhibitions as an effective, powerful medium of communication with great potential and unique opportunities to promote and influence visitors.

3. RESEARCH METHOD

The selected procedural model adopted the research and development model of Borg and Gall [13], and the procedural design developed by Sugiyono [14] and Rachman [15] that in the implementation of research and development (R & D) includes ten stages, namely: (1) research and data collection (needs and objectives analysis), (2) planning, (3) product draft development, (4) initial trial, (5) revising the trial results, (6) field trial, (7) product improvement from field test results, (8) field test implementation, (9) final product improvement, and (10) dissemination and implementation. Meanwhile Sugiyono [14] describes the ten steps of research and development as follows: (1) potential and problems, (2) data collection, (3) product design, (4) design validation, (5) design improvement, (6) test product trials, (7) product revisions, (8) use trials, (9) product revisions, and (10) mass production. Stages through preliminary studies of literature review and surveys, data collection, creation of sustainable fashion designs, design validation, design improvements, product trials, product revisions, fitting trials, and product revisions and mass production. Methods of data collection using questionnaires, guidelines for observation and testing. The data analysis technique uses descriptive analysis to identify respondents in the form of an analysis of student trends regarding knowledge of sustainable design inspiration, material preparation, and clothing-making techniques. Data Analysis of the Effectiveness of the Ecoprint Technique for the design of work shows. The pretest was done to determine the initial abilities of students who will design sustainable clothing. The posttest is given after making sustainable clothing as outlined in the work show clothing. Data analysis to measure the effectiveness of the design and manufacturing techniques for clothing creations. To measure the effectiveness seen from the results of the design and work of fashion design works with the ecoprint technique, students can use the two-party T-test formula. H0 accepted = There is no difference in the results of the design of the work show in terms of the design and the results of clothing products. Ha received = There is a difference in the results of the design work with the ecoprint technique.

To find out the effectiveness of clothing design with the sustainability technique of clothing titles, the final step is to test the N-Gain in the following formula:

$$N - Gain = \frac{Skor\ Post\ Test - Skor\ Pre\ Test}{Skor\ Ideal - Skor\ Pre\ Test} \quad (1)$$

The N-Gain score grouping category can be determined based on the N-Gain score in the form (%) as follows.

Table 1. N-Gain Score Category

N-Gain Score	Category
g > 0.7	High
0.3 ≤ g ≤ 0.7	Medium
g ≤ 0.3	Low

The N-Gain score category (%) will later be interpreted into several categories according to the following provisions.

Table 2. N-Gain Score Interpretation.

Persentase (%)	Interpretation
<40	Not effective
40-55	Less effective
56-75	Effective enough
>76	Effective

4. RESULTS AND DISCUSSION

4.1. The role of fashion education study program students in fashion designs development using the ecoprint technique for virtual work show

The results of a student survey about the role of study programs and fashion design students showed that there is a strategic role as a study program that prepares prospective fashion teachers. The following shows the results of the description about student perceptions percentage in developing sustainable fashion product designs:

1. The fashion education study program plays a role in the service and preparation of prospective fashion teachers who care about the concept of sustainable fashion
2. Students will develop sustainable clothing designs and products to support UNNES conservation
3. Students need direction on sustainable fashion
4. Students are interested in material about sustainable fashion for the Work show course
5. Students after graduated will continue to pursue sustainable fashion while working as teachers or designers
6. Students feel challenged and become opportunity with the impact from lots of fashion waste.
7. Students have difficulty in making technical drawings for sustainable clothing.
8. Students, technical drawing difficulties for sustainable clothing
9. Students have difficulty finding materials for sustainable and local wisdom clothing
10. Students still have many limitations in sewing sustainable clothing
11. Students have difficulty in making sustainable textiles with the ecoprint technique by steaming
12. Students make textiles using simunagasi and shibori techniques to support sustainable fashion
13. Students have no difficulty making effective clothing with transformation techniques so that 1 look produces various appearances
14. Students have no difficulty in making clothes with fabric manipulation techniques through woven, crocheted, stitched
15. Students in designing pay attention to traditional sources of ideas and materials that come from cultural heritage
16. Students are more interested in making textile materials with traditional techniques
17. Students like the techniques of making clothes that are mostly done by hand such as patchwork, quilting, smock, slashing, pleating, flounce, plait, macrame, cloth attachment and clasps.
18. Students are interested in designing clothes from recycled denim
19. Students are interested in designing and making clothes with a zero_ wastes education pattern.

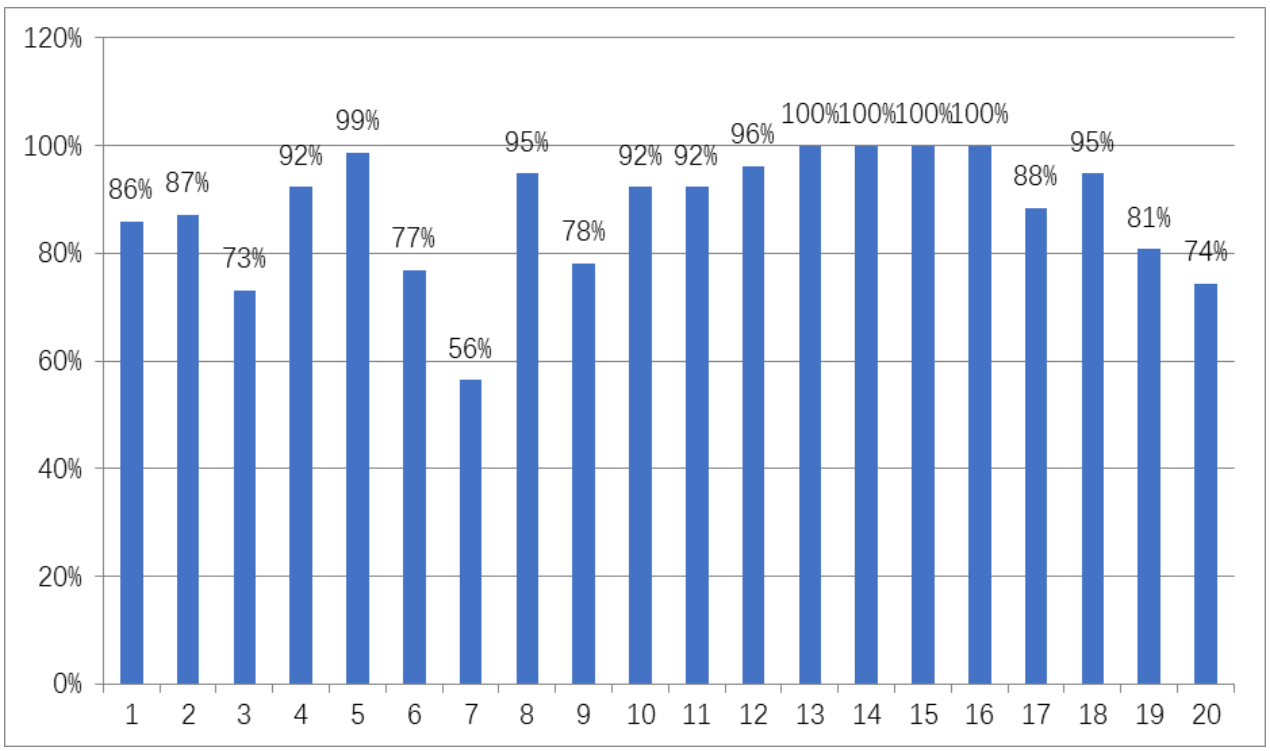

Figure 1. Student response in developing sustainable clothing histogram.

Table 3. Ecoprint cotton natural clothes and mangrove colors combining plain and troso weaves.

No	Design					Fashion Products			
	Code	PRE TEST 2	POST TEST 2	Residual	Category	Pre 2	Post 2	Gain	Category
1	R-01	72	90	0.64	Medium	65	90	0.71	High
2	R-02	73	95	0.81	High	75	95	0.80	High
3	R-03	80	95	0.75	High	75	90	0.60	Medium
4	R-04	75	86	0.44	Medium	70	90	0.67	Medium
5	R-05	78	90	0.55	Medium	80	90	0.50	Medium
6	R-06	72	90	0.64	Medium	75	90	0.60	Medium
7	R-07	70	90	0.67	Medium	70	95	0.83	High
8	R-08	75	87	0.48	Medium	77	90	0.57	Medium
9	R-09	80	95	0.75	High	75	95	0.80	High
10	R-10	77	90	0.57	Medium	70	90	0.67	Medium
11	R-11	75	90	0.60	Medium	70	95	0.83	High
12	R-12	73	86	0.48	Medium	70	90	0.67	Medium
13	R-13	77	95	0.78	High	80	95	0.75	High
14	R-14	68	86	0.56	Medium	70	95	0.83	High
15	R-15	68	90	0.69	Medium	70	90	0.67	Medium
16	R-16	60	90	0.75	High	70	95	0.83	High
	Average	73.31	90.3125	0.635	Medium	72.625	92	0.71	High

20. Students are more interested in fashion publications through virtual fashion work shows to ensure fashion and business sustainability.

The results of the data can be described as in figure 1.

4.2 Eligibility analysis of clothing with ecoprint techniques

4.2.1 The effectiveness of design and clothing using the ecoprint technique develops sustainable fashion

4.2.2 The quality of ecoprint materials is reviewed from the results of laboratory tests for material discoloration and sharpness or aging of colors or ecoprint fabric motifs with ZWA mangrove blankets and without mangrove ZWA

The table 4 shows that the quality of the ecoprint fabric for the work event has good fading quality for fabrics that use blankets with natural and natural dyes, and the aging or sharpness of the color shows that the ecoprint fabric uses blankets with ZWA mangroves, the results are more concentrated, darker and sharp, the best results are under 6 or 6, so with teak leaves as ecoprints and blankets with ZWA mangrove the darkest and sharpest aging results. Whereas natural ecoprint fabrics also show good fastness but lower than using ZWA, the level of sharpness of colors and patterns shows more whiteness and patterns are not clear.

Table 4. The results of the study show the level of color fastness and color sharpness of ecoprint fabrics with and without ZWA.

Sample	Test No	Test Value Fastness rate of ecoprint fabric to soap washing	Ecoprint fabric color aging test (R%)
		Ecoprint fabric with ZWA mangrove blanket	107.32
A variasi 1 jati	1	4-5 (Good)	2.26
	2	4-5 (Good)	3.33
A variasi 2 tabebuya	1	4-5 (Good)	24.29
	2	4-5 (Good)	15.05
A variasi 3 variasi 3 Kenikir	1	4-5(Good)	24.59
	2	4-5(Good)	22.36
		Ecoprint fabric without blanket and ZWA	
B variasi 1 daun jati	1	4-5 (Good)	48.44
	2	4-5 (Good)	38.91
B Variasi 2	1	4-5(Good)	42.80
	2	4-5 (Good)	35.97
B Variasi 3	1	4 (Good)	35.16
	2	4 (Good)	36.42

4.3 Discussion

Students of the fashion education study program, according to UNNES' vision with conservation and sustainable policies, are very concerned about and responsive to problems in the world of fashion related to waste and sustainable clothing. The survey via Google form shows the high role of students in supporting

conservation-minded fashion and supporting sustainable fashion programs. Sustainable clothing or fashion has the following criteria: designed with conscientious considerations thinking of the future, innovation, ethical design, ethically sourced, meaningful, attractive, environmentally friendly materials, local production, recycled production techniques and traditional techniques, versatile, financially eligible, and raise the legacy [5]

Recycling/Upcycling refers to the use of wasted materials to produce new goods with the same or higher perceived value, usability, and/or quality than the original product [16]. It achieves sustainability by reusing resources that would otherwise be wasted as raw materials for new products, thereby extending their lifespan and reducing the need for natural resources. In vogue, upcycling has a direct impact on resources and key activities as access to good materials for recycling can be a source of profit.

Recycling drives are based on converting materials from existing products to create different products. Because it often involves high-energy processes, it is considered a last resort among the 3Rs (reduce, reuse, recycle), although it is an important alternative to implementing circular economy principles as it reduces the need for new materials and natural resource consumption. . Adopting recycling in the business model implies a transformation in cost structure, key activities and key partner parameters as companies in the fashion industry tend to acquire recycled materials instead of processing them themselves. Vegan refers to an approach to fashion production that deliberately refrains from using raw materials of animal origin and that the apparel product is made by hand from reused textiles and sustainable alternative materials (recycled, sustainable fibres). Taking from locally sourced movers, production is outsourced to local artisans, which limits scalability and growth. Following the principles of consumerism, products are designed to be timeless and versatile, so that clothing can be used in a variety of ways and situations. The main challenge of the design phase strategy is to rethink the design phase from continuous product development. Decisions affecting the entire product are made during the design phase regarding quality, appearance, materials, manufacturing processes, and production costs. Design decisions impact the entire business model and have a critical influence on the translation of sustainability principles to a value proposition. In this sense, the adoption of eco-friendly materials (e.g., sustainable fibers or recycled materials) and production processes (e.g., natural dyeing techniques, zero waste mechanisms, slow mode methods) can generate relevant business benefits. However, the decision to adopt such material is still a challenge for fashion companies who still do not consider it a strategic priority for the industry. In addition, the design phase is full of technical challenges. Gain score results for clothing design using ecoprint technique show moderate results and results for clothing products made with ecoprint using ZWA mangroves and without color show high quality clothing products so that learning to design clothing and make ecoprint clothing products shows an effective level which is high because it is obtained more than 0.7.

The type of mordant affects the ecoprint results in both the motif and color aspects. This is in accordance with the research. The quality of the results of the color value of the cloth can be changed by using various metal salts as mordant. Mordant ferrous sulfate/tunjung gives the best staining results but shows a darker color. The use of mordant also produces different pattern motifs on the cloth [17]. Teak leaves have more potential to provide color and motifs to the entire fabric, both with mordant tunjung and alum. Mangrove natural dyes and mordant alum on cotton silk fabrics are more absorbent, creating motifs using the ecoprint technique teak leaves, tabebuya distance, guava leaves, jenitri leaves, kenikir, ferns leaves. Nurwati [18] stated that young teak leaves contain several pigment compounds, especially anthocyanins which can be used as natural dyes. Pigments (coloring matter) are organic compounds that determine the color direction of natural dyes (contained in the source of the dyes themselves) and pigments are chemical compounds that change the color of visible light as a result of a selective absorption process for wavelengths in a certain range. The red color produced from young teak leaf filtrate comes from anthocyanin dyes contained in young teak leaves [19]. One of the dyes in the anthocyanin group found in teak leaf extract is cyanidin. Teak leaves (Tectona Grandis) have leaf veins and leaf surfaces that can be used as textile motifs in ecoprint techniques [20]. Maharani [21] also believes that the ecoprint motif, which comes from teak leaves on the fabric, looks similar to the original leaves. The aesthetic value, the protrusion of the teak leaf motif is more dominant, and has a distinctive color compared to other types of leaves. The above is in accordance with the results of research on the level of fastness of ecoprint fabrics with mordant alum, ZWA mangrove, teak leaf ecoprint showing good results and the color sharpness results are darker and sharper from the aspect of the motif. Agrawal & Chopra [22] Plants are the main source of natural dyes, parts such as stems, wood, bark, roots, leaves, fruit, can be used to extract color components to produce various hues. The type of mordant has an influence on the strength of the color and hue on the fabric [23].

5. CONCLUSION

1. Students of the Fashion Education Study Program showed that they have a high role in the development of sustainable clothing and are awared of fashion waste and strategies to overcome it.

2. Effective learning is implemented for projects to make clothes with natural zwa, local fabrics and local materials.
3. The level of flexibility of the material shows good results, and for the sharpness of the motif it is better to use natural mangrove zwa than without color.

AUTHORS' CONTRIBUTIONS

This article can be useful for developing fashion education and increasing awareness of sustainability.

ACKNOWLEDGMENTS

Thank you to the Faculty of Engineering, Semarang State University for providing financial assistance to conduct research and publications

REFERENCES

[1] I. Flint, Eco Colour, Australia: Murdoch Books, 2008.

[2] J. J. Arnett, Oh, grow up! generational grumbling and the new life stage of emerging adulthood-commentary on trzesniewski & donnellan, Perspect. Psychol. Sci., 5(1), 2010, pp. 89–92. DOI: 10.1177/1745691609357016.

[3] J. J. Arnett, Emerging adulthood: The winding road from the late teens through the twenties, New York, NY, US: Oxford University Press, 2004.

[4] I. K. Ahmadi, S. Amri, and T. Elisah, Mengembangkan pendidikan berbasis keunggulan lokal dalam KTSP, Jakarta: Prestasi Pustaka, 2012.

[5] C. E. Henninger, P. J. Alevizou, and C. J. Oates, What is sustainable fashion?, J. Fash. Mark. Manag., 20(4), 2016, pp. 400–416. DOI: 10.1108/JFMM-07-2015-0052.

[6] B. V. Todeschini, M. N. Cortimiglia, D. Callegaro-de-Menezes, and A. Ghezzi, Innovative and sustainable business models in the fashion industry: Entrepreneurial drivers, opportunities, and challenges, Bus. Horiz., 60(6), 2017, pp. 759–770. DOI: 10.1016/j.bushor.2017.07.003.

[7] Paryanto, E. Kwartiningsih, W. A. W, S. H. Pranolo, R. Hidayat, and I. R. S, Spesies Rhizophora Mucronata Untuk Pewarna Batik Ramah Lingkungan, J. Purifikasi, 15(1), 2015, pp. 33–40.

[8] N. Irianingsih, Yuk Membuat ECO PRINT motif kain dari daun dan bunga, Jakarta: Gramedia Pustaka Utama, 2018.

[9] B. Salsabila and M. S. Ramadhan, Eksplorasi Teknik Ecoprint dengan Menggunakan Kain Linen untuk Produk Fashion, e-Proceeding Art Des., 5(3), 2018, pp. 2277–2292.

[10] A. A. Riyanto, Teori Busana, Bandung: Yapemdo, 2003.

[1] I. Flint, Eco Colour, Australia: Murdoch Books, 2008.

[2] J. J. Arnett, Oh, grow up! generational grumbling and the new life stage of emerging adulthood-commentary on trzesniewski & donnellan, Perspect. Psychol. Sci., 5(1), 2010, pp. 89–92. DOI: 10.1177/1745691609357016.

[3] J. J. Arnett, Emerging adulthood: The winding road from the late teens through the twenties, New York, NY, US: Oxford University Press, 2004.

[4] I. K. Ahmadi, S. Amri, and T. Elisah, Mengembangkan pendidikan berbasis keunggulan lokal dalam KTSP, Jakarta: Prestasi Pustaka, 2012.

[5] C. E. Henninger, P. J. Alevizou, and C. J. Oates, What is sustainable fashion?, J. Fash. Mark. Manag., 20(4), 2016, pp. 400–416. DOI: 10.1108/JFMM-07-2015-0052.

[6] B. V. Todeschini, M. N. Cortimiglia, D. Callegaro-de-Menezes, and A. Ghezzi, Innovative and sustainable business models in the fashion industry: Entrepreneurial drivers, opportunities, and challenges, Bus. Horiz., 60(6), 2017, pp. 759–770. DOI: 10.1016/j.bushor.2017.07.003.

[7] Paryanto, E. Kwartiningsih, W. A. W, S. H. Pranolo, R. Hidayat, and I. R. S, Spesies Rhizophora Mucronata Untuk Pewarna Batik Ramah Lingkungan, J. Purifikasi, 15(1), 2015, pp. 33–40.

[8] N. Irianingsih, Yuk Membuat ECO PRINT motif kain dari daun dan bunga, Jakarta: Gramedia Pustaka Utama, 2018.

[9] B. Salsabila and M. S. Ramadhan, Eksplorasi Teknik Ecoprint dengan Menggunakan Kain Linen untuk Produk Fashion, e-Proceeding Art Des., 5(3), 2018, pp. 2277–2292.

[10] A. A. Riyanto, Teori Busana, Bandung: Yapemdo, 2003.

[11] H. Rui, An analysis on Commercial and Cultural Functions of Fashion Show Spread, Proceedings of the 2015 International Conference on Arts, Design and Contemporary Education, 2015, pp. 512–514. DOI: https://doi.org/10.2991/icadce-15.2015.120.

[12] S. Kim, Virtual exhibitions and communication factors, Museum Manag. Curatorsh., 33(3), 2018, pp. 243–260. DOI: 10.1080/09647775.2018.1466190.

[13] W. R. Borg, M. D. Gall, and J. P. Gall, Educational research : an introduction, 7th ed. Boston: Allyn and Bacon, 2003.

[14] Sugiyono, Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif dan R&D. Bandung: Alfabeta, 2012.

[15] M. Rachman, Metode Penelitian Pendidikan Moral dalam Pendekatan Kuantitatif, Kualitatif, Campuran, Tindakan, dan Pengembangan. Semarang: UNNES Press, 2011.

[16] G. Dissanayake and P. Sinha, An examination of the product development process for fashion remanufacturing, Resour. Conserv. Recycl., 104(A), 2015, pp. 94–102. DOI: 10.1016/j.resconrec.2015.09.008.

[17] R. Mongkholrattanasit et al., Eco-Dyeing of Silk Fabric with Garcinia Dulcis (Roxb.) Kurz Bark as a Source of Natural Dye by using The Padding Technique, J. Nat. Fibers, 13(1), 2016, pp. 65–76. DOI: 10.1080/15440478.2014.984056.

[18] E. S. Murwati, Teknik pewarnaan sutera dengan zat warna alam dari daun puring, Prosiding Seminar Nasional 4th UNS SME's Summit & Awards 2015, 2015, pp. 86–94.

[19] R.B. Kembaren, Ekstraksi Dan Karakterisasi Serbuk Nano Pigmen Dari Daun Tanaman Jati (Tectona Grandis Linn. F), J. Kim. dan Kemasan, 36(1), 2014, pp. 1–6. DOI: 10.24817/jkk.v36i1.1904.

[20] Saraswati, M. H. D. Susilowati, R. C. Restuti, and F. D. Pamungkas, Pemanfaatan Daun untuk Ecoprint dalam Menunjang Pariwisata, 2019, Depok: Departemen Geografi FMIPA Universitas Indonesia.

[21] A. Maharani, Motif dan Pewarnaan Tekstil di Home Industri Kaine Art Fabric 'Ecoprint Natural Dye,' Journal.Student UNY, 7(4), 2018, pp. 383–394.

[22] A. Agrawal and S. Chopra, Sustainable dyeing of selected natural and synthetic fabrics using waste teak leaves (Tectona Grandis L.), Res. J. Text. Appar., 24(4), 2020, pp. 357–374. DOI: 10.1108/RJTA-05-2020-0046.

[23] H. F. Mansour and S. Heffernan, Environmental aspects on dyeing silk fabric with sticta coronata lichen using ultrasonic energy and mild mordants, Clean Technol. Environ. Policy, 13(1), 2011, pp. 207–213. DOI: 10.1007/s10098-010-0296-2.