

## Conference Paper

# Sustainable Practices in Pattern-Making at Local Fashion Institutions: A Qualitative Study

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**Abstract.**

Pattern making is one of the most important skill-based courses in fashion education, where students learn clothing construction through drafting, draping, and creating basic patterns for garment productions. Issues in fashion sustainability, such as textile waste and fast fashion, lead to this research. However, practices of sustainable innovation in local higher education institutions are still low compared to other countries. The objective of this research paper is to explore the current sustainable practices in teaching and learning pattern-making skills. A qualitative approach has been adopted to explore the current practices of teaching and learning in some local fashion institutions, and 21 fashion educators participated in semi-structured interview sessions. The results from the thematic analyses show six elements of sustainable innovation which currently being practised: minimization technique, pattern manipulation, upcycling, draping, digital learning, and innovative tools are part of the sustainable innovation practices.

**Keywords:** Higher Education Research, Education for Sustainable Development, Innovation

## 1. Introduction

Sustainable innovation is the process of incorporating elements of sustainable development such as environmental, social, and financial considerations into a business system through research and development and commercialization (1–2). Aside from that, sustainable innovation is a method of accepting and implementing innovation that takes into account social equity and environmental integrity. Growing concern and demand for sustainability has pushed this topic to the forefront of academic research (3).

The fashion industry is one of those that is struggling with sustainability (4). According to a landfill study conducted in 2018 by Southern Waste Corp Malaysia, there is a growing

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trend of fabric waste that is concerning, as the amount or volume has doubled since 2012, from 2.8% to 6.3% last year. Even though over 60% of waste generated in Malaysia can be recycled (5, 6), 95% of it is disposed of in landfills (7). Every year, dangerously high levels of chemical waste, toxic gases, and weed and pest control poisons pollute landfills (8).

Sustainable innovation can be implemented in fashion production through garment manufacturing. Sustainable fashion can be achieved by building incrementally from an initial focus on product-level innovation through to more complex system-oriented levels of innovation (9).

Production and manufacturing are terms used in fashion education to describe a variety of subjects such as pattern making and design. Fashion sustainability in Malaysian higher education is not being addressed in depth throughout the fashion programme. In Malaysia, very few fashion institutions put theoretical knowledge of sustainability in fashion design into practise. The vision of making Malaysia one of the sustainable countries would not be realised without the concrete adaptation and application of sustainable innovation knowledge. This critical knowledge must be properly practised by students in the early stages of their tertiary education so that they can apply it not only in pattern making skills, but also holistically.

## 1.1. Concept of Sustainable Innovation

Sustainable innovation is a system approach with new ideas that considers the global challenges of sustainable development: economic, ecological, and social. Sustainable innovations can be implemented in any field, such as education, where such improvements go beyond technological changes, such as changes in business thinking, business models and systems, operational practises and processes (10). Web 2.0 (11), seamless learning (12), education programme (13), upcycling design process in fashion education (14), zero- waste design (15) and (16), pedagogy (17), and 3D printing (18) are examples of sustainable innovation in education. In terms of pedagogy, sustainable education is also important in fashion education. The need for a pedagogical shift in the field of fashion education has been emphasised by (17). To lessen carbon footprints on the planet, more modern knowledge sources and materials must be created. The programme needs to promote more "Free Thinking" orientation and interaction. Information about new materials and industrial techniques that use less energy and produce less waste after production is crucial.

## 1.2. Sustainable Innovation in the World of Fashion

The Fashion Industry which comprises of the textile and apparel industries are well known for their high utilization of resources and impact on the environment (28). It is the second most harmful and polluting industry in the world after the oil industry, (19) and UN Conference Trade and Development (20). Fashion is a complicated business involving long and varied supply chains of production from the beginning until the disposal of the garment eventually. From raw material extraction, textile manufacturing, clothing construction, shipping, retail, and usage.

In the past few years, more fashion industry player has made some changes in developing more sustainable designs. More eco-friendly designs have finally been confirmed. Global and local fashion councils have come to agreement to create the first ever sustainability community. For example, ZARA and H&M (among the notable fashion industry players in Malaysia) for instance have announced a number of events showcasing sustainable creative designs, in tandem with the current demand for clothing which highlights ethics and sustainability. Apart from aiding towards a pollution free environment, these initiatives and inclination actually bring into existence an entirely new employment opportunity favouring those with sustainable education background an advantage in the industry.

## 1.3. Current Practices of Sustainable Innovation in Pattern Making Skills

### a) Knitting method

There are two sub-division of knitting: Pattern Piece Knitting and Seamless Knitting. Domestic hand knitting is the best and most common Zero Waste Fashion (ZWF) design around (21). Sewing together knitted individual garment pieces is known as Pattern Piece Knitting. Reduction of waste from knitted garments has a considerable impact on the sustainability issue of textile waste on the environment, with regards to raw material pollutants in landfills (22).

### b) Layer method

Layer method basically employs the line, surface, and figure principle. Many pieces of strands / strips are cut out from a piece of fabric or cloth which are then laid or arrange together in layers to form a surface. A figure is then created when these surfaces are bound together. This figure can be a garment or a part of a garment. Nothing is subtracted or discarded by adding layers, thus no waste is generated.

#### c) Minimal cutting method

This method literally explained itself. A design is cut using very minimal cutting or no cutting at all. Thus, it comprises two methods, but in both methods, there is only one pattern. The No-cut method design does not involve any cutting at all as in traditional costumes like the Indian Sari. In Minimal Cutting method, draping is used to minimize the number of cuttings and subsequently it designed the shape of the garment, depending on the measurement of the fabric (23).

#### d) Jigsaw Puzzle method

In this method, patterns are designed to precisely locked-fit into each other on fabrics, thus there is no waste at all. It is applicable on a flat pattern or draping. Traditional zero waste garment designed using Jigsaw puzzle method usually involved geometrically shaped patterns like squares, rectangles, triangles and patterns with intricate non-straight-line features (21), (16), (24) and (25).

#### e) Subtraction Cutting method

This method basically uses a technique called the Tunnel technique (26) where a whole cloth is creased-fold into halves and stitched together so that a tunnel is formed. Openings or holes are precisely cut out to allow body parts to enter through. It is a case or barrel-like technique applicable in pants, skirts, and sleeves. This method is fabric consuming but a creative alternative in fashion designing (26).

### 1.4. Objective Of The Study

The objectives of this study are as follows:

1. To explore on the current practices of sustainable innovation in pattern making skill
2. To identify the suitable approaches of sustainable innovation practices in pattern making skill for higher education

## 2. Method

The research employed a qualitative research design. All the data was collected through interview sessions with 21 fashion educators. Semi- structured interviews had been conducted to further explore on the current practices of teaching and learning of pattern making skill. Fashion educators were selected to contribute on the data collection because they are the expertise in teaching and learning of pattern making, which

able to share all the practices of sustainable innovation in the current curriculum. The collected data was then analysed by using thematic analysis and coded into themes according to element of sustainable innovation practices.

### 3. Result and Discussion

Based on the interview, there are six elements of sustainable innovation which have been implemented in the current pattern making skill. The results below discussed in details:

#### 3.1. Application of Minimization Technique

The first element of sustainable innovation is the practice of minimization technique in pattern making. Some of the lecturers mentioned that they had encouraged the students to be wise in the materials use. The minimization technique is applicable in the pattern layout process, fabric cutting and also in finishing process.

Pattern arrangement process demonstrated by the educators for instance, have sustainable innovation elements is also known as 'jigsaw puzzle cut' where all the pattern pieces were arranged accordingly to their sizes aesthetically, so that there would be no fabric waste. Jigsaw Puzzle method usually involved geometrically shaped patterns like squares, rectangles, triangles and patterns with curved, intricate lines which appear frequently. Students also need to know the exact measurement of fabric to be cut in the first process.

Minimization technique is also applicable in the finishing process. For example, the folded part of the cuff. Tessellation and subtraction can also be applied in minimization technique in pattern making skills. These techniques are applicable to create free designs, which develop the element of aesthetic and expressionist of the designer. From the fabric waste, students can create another garment with the 'jigsaw' technique. The tessellation is produced from the same size and shape of the waste fabric, and made into another garment. This technique is quite a challenge for the students, but it is practicable in the fashion institutions, as students can develop their creative skills by using 100% waste fabric.

*"..students learnt how to minimize the use of fabric through pattern arrangement".*  
(Fashion educator 10)

*"..we will ask the students not to fold too much on the sleeve part, this is also sustainable".* (Fashion educator 3)

*“..the students were encouraged to cut the fabric by themselves”.* (Fashion educator 5)

Apart from that, for traditional garment such as baju kurung, no paper is needed. This is because the geometric shape of the baju kurung itself has the sustainable elements, and can be straight away draft on the actual fabric.

*“..for traditional costume like Kurung, no need pattern”.* (Fashion educator 6)

### 3.2. Application of Pattern Manipulation

The next practice of sustainable innovation is the application of pattern manipulation, the process of applying various techniques which give another look for the garment. Pattern manipulation technique has been recognized as sustainable (27) because it is an innovative technique where a designer creatively transfer darts to create another style and design from the pattern through slash and pivot techniques. Students do not have to draft another pattern to get other type of designs. By using the master pattern, lots of experimentation on dart manipulation can be practice, leads to sustainable practice.

Slash of a flat-pattern method technique in which the sloper is manipulated by slashing and spreading to achieve a desired style. This technique is most often used to add or reduce fullness of a design. Pleats, gathers and style lines are results of dart manipulation. When manipulating a dart, positioning of the dart is significantly important. It creates size, shape and 3D fitting, and alters the styling and designing of the clothes. For example, from the basic dart of the front bodice, another style line can be produced, which is known as Princess Line. This is considered as sustainable because the dart is no longer folded, but being transferred into functional line and upgrade the appearance of the garment.

*“...they learnt pattern manipulation through experimentation of pattern making”.* (Fashion educator 1)

*“..I am now currently in the process of creating a module of pattern manipulation”.* (Fashion educator 3)

### 3.3. Application of Upcycling

Some of the institutions had already practice sustainable innovation as part of the fashion curriculum. Sustainable innovation is the objective of the learning process to enhance the awareness of sustainable fashion for long life learning. This is a good

approach to promote sustainable innovation in pattern making skill, because it is considered as active experimentation as students can put their knowledge of sustainable innovation into practice, not only for assignment purpose but also for future endeavour.

Upcycling in fashion has been the most favourite practice of sustainable innovation because it is the easiest and most applicable in the current situation. Some of the fashion institutions has their own recycle bin, therefore they can upcycle any used and unwanted garment. Students had created new garment from the current fabric through mixing the fabrics and embellishment.

*“..we made beanbags out of the fabric swatches”.* (Fashion educator 9)

*“..students were able to ‘experiment’ with different types of fabric by mixing denims and plaid design from kain pelikat”.* (Fashion educator 13)

*“..extra fabrics can also be used for embellishments”.* (Fashion educator 3)

*“..recyclable materials will be used a lot for costume making”.* (Fashion educator 4)

### 3.4. Application of Draping technique

Draping technique is considered as sustainable practice because the ideation process starts by using fabric; muslin or calico fabric. Designers delivered and experiment their design idea by using the fabric. The sustainability part of draping can also be seen in the process, where the final draping can just be laid out on the drawing paper, without having to use bodice block. Draping is a zero- waste pattern making (ZWPM), which consumed one fabric for total design without generating any waste. Draping is included in Transformational Cutting (TC), which is also part of ZWPM. Draping is perfect for 2D to 3D and 4D fabric transform technique, without complicating the pattern making process.

*“..we can transform 2D to 3D and even 4D”.* (Fashion educator 10)

*“The challenges part in designing is to transform 2D to 3D, more on the experimentation, lot of fitting session need to be done”.* (Fashion educator 3)

### 3.5. Application of Digital Learning

Digital learning is also applicable in pattern making skill. The tool is by using software, Tukatech and CAD. The software helps to create new design, show design components, create a prototype and amend on the design. CAD is greatly useful in fashion industry.

This tool is considered as sustainable innovation practice because students can learn pattern drafting and grading by using computer.

Digital 2D and 3D technology assisted sampling technique is another form of element put into practice by the sampling production units in the mass-production segments. This technique eliminated the garment sampling process of using the actual fabric, thus saving precious fabric materials with more presentable usage of software enable all measurements to be computerised which allowed the pattern makers to reprogram the software for any changes and amendments. This technique is widely used in fashion industry because they have to produce garment is mass quantity. This tool is very efficient and not waste on paper materials. However, not all institutions practice on this tool because lack of expertise and facilities.

*"..we do have the pattern making software such as TukaCAD, and also plotter for digital pattern, but we are still lack of expertise". (Fashion educator 9)*

*"..they do not use the software in pattern making, but they acknowledge about the software". (Fashion educator 5)*

Apart from the pattern making software, slideshow and tutorial from online videos (e.g Youtube) and other sources of video had been shared with the students. This is to show the students about the sustainable issues, to make them more interesting and understand visually. Videos, the easiest way to share about sustainable innovation elements with the students. It shows that educators incorporated visualization learning through videos where the educators could share and explain the importance of sustainable innovation in life, through fashion design, and students would be able to develop their knowledge in sustainable innovation in a very structured ambience.

### 3.6. Innovative Tools

In pattern making, there are also tools which have been used for body measurement, cutting and drafting. Innovative tools for pattern making have been produced and introduced, for example the Smart Seam Ruler, measuring gauge, fashion design ruler, pattern drills, draping tapes, awls, pattern notches and tracing wheels to name a few. These were some tools which the educators and the students have experienced hands-on throughout the interview. These innovative tools were invented so that students will no longer have to bring different or multiple set of rulers at any assignments all the time.

*"..Smart Seam Ruler is one of the innovative tools in pattern making that we are currently use, but the price is quite expensive". (Fashion educator 3)*

## 4. Conclusion

Sustainable innovation is a good practice to be enhanced in education, especially pattern making skill. It is a lifelong learning where fashion students will be aware of the current issues in fashion sustainability. The findings are the evident of the integration of Sustainable Innovation practices. Application of minimization technique, pattern manipulation, upcycling, draping technique, digital learning and innovation tools are the effort taken by the fashion educators in the selected education institutions to integrate Sustainable innovation in learning and teaching.

Through the integration, students are able to practice the suitable approaches to reduce the negative impacts of fashion sustainability to the environment, economy and social. By regularly practicing and applying sustainable innovation in the daily process of pattern making, students would be able to recognize and solve issues related to textile waste and fast fashion. Apart from that, they will be able to apply in the future career, be it in industry based or individual based. As currently, fashion industry is using advance technology in garment production, so by having the digital learning skill in pattern making, it is a bonus for the students. Sustainable innovation needs to be enhanced in the current teaching and learning because education is one of the medium to deliver new knowledge to the learners.

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