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**A Preliminary Study of
Sustainable Fashion Design Curriculum**

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Abstract

The development of fast fashion offered apparel products with a quick cycle. However, this process impacted low-quality products and raised sustainability issues. The two main focuses of this study were to examine the current fashion design curriculum among alumni and examine students' knowledge of sustainability in fashion design. This study employed a mix-method orientation—this alumni data was collected of undergraduates in fashion design education. The paper reported some preliminary empirical findings derived from questionnaires and structured interviews conducted with alumni. The discussion and conclusions of this paper were to recommend a conceptual framework of sustainable fashion design curriculum.

Keywords: Sustainable; Entrepreneur; Technopreneur; Fashion Design Curriculum

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1.0 Introduction

The fast-fashion phenomenon has become a global trend of world globalization in the apparel industry (Buzzo & Abreu, 2019). Indonesia occupies the fourth position as a worldwide brand exporter to various countries (during January-April 2020 (Centre of Education Data and Statistic, 2018). In 2016, the United Nations sustainable development agenda for 2030 initiated 17 sustainable development goals (SDG, 2019). Thus, the apparel industry can implement green supply chains for today's business operations (Geissdoerfer et al., 2018). As with the development of the apparel industry towards industry 5.0, the personalized era where technology and digitalization become an integral part of the apparel industry with the collaboration between humans and robots/machines (Longo et al., 2020).

The problem is that most fashion design education in Indonesia is still lagging behind other countries in terms of mastery of technology and digitalization. Most fashion design education in Indonesia has not integrated sustainability through technology in the fashion design curriculum (Fitriansyah, 2019). Furthermore, Indonesia lacks and needs fashion design technopreneurs who instill sustainability to capture future opportunities in the apparel industry (Putri, 2019). From the data obtained, 80% of the population stated that the fashion education curriculum does not follow the demands of the current apparel industry (Suhartini 2018). The paper aims to discuss how a sustainable fashion design curriculum can be developed. The objectives of this study are: To examine the current fashion design curriculum among alumni, examine students' knowledge of sustainability in fashion design, and recommend a conceptual framework of sustainable fashion design curriculum.

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2.0 Sustainable Development Goals

17 Sustainable Development Goals (SDGs) are part of the 2030 agenda for sustainable development adopted by all Member States of the United Nations in 2015. By providing a standard blueprint for creating peace and prosperity for people and the planet.

2.1 Sustainability Development Growth Concerning Fashion

The SDGs categorize into several levels of awareness related to fashion; Eco-materials, Recycling, up-cycling & repairing, Green energy Life cycle assessment, Eco-labeling, Manufacturing waste, Ethical manufacturing, Ethical consumption, Clothing distribution & packages, Control of hazardous substances, Consumer care & washing, Clothing disposal, Cradle to cradle design, Socio-cultural human well-being (Hur & Cassidy, 2019).

2.2 The Apparel Industry's Current Position

Problems in the fashion industry start from the procurement of resources and swift supply chain cycles in both consumption and production (Hur & Cassidy, 2019). Environmental impacts of the fashion industry such as; Fast Fashion Cycle, Cheap Clothes, and Low Production Costs (Haug & Busch, 2016). According to Indonesia's Central Statistic Agency Period Jan-Dec 2019, the Export value of Textiles and Apparel in Indonesia has increased. However, it causes problems like Textile and Apparel Industry wastewater contributes to 349,000 tons per day (2018).

2.3 Future Technology In Apparel Industry

There are main challenges from smart factories in the apparel industry 4.0, namely: Initial investment costs for investing in applications, software, and other supporting tools, privacy and security that are guaranteed confidentiality. Technical challenges, such as technology-savvy human resources, require standardization models, and social difficulties, complex work is done intensively with new technology to result in unemployment (Gökalp et al., 2018). The Industry 5.0 elements are smart tools-machines, intelligent systematization, and the sophistication of automation. It fully merges with the physical world collaboration between robots and human intelligence for work efficiency and waste minimization, thereby bringing more people back to the workplace (Longo et al., 2020).

2.4 Integration of Sustainability Concepts in Fashion Technology

The use of technology can maximize material productivity and energy efficiency to minimize the volume of use of resource consumption (Stahel 2007). Technology and digitalization are concepts that can apply to support sustainability (Kozłowski, Searcy, and Bardecki 2018). Designers are adopted zero waste using various environmentally friendly techniques and materials (Rissanen and McQuillan 2016). Technology and digital processes making the process in the 3D design provide good and significant advantages. These advantages such as; 1) Speed, 2) Flexibility, 3) Minimizing risk, 4) Trust, 5) Efficiency, and 6) Environmental Sustainability, this is an expected goal that technology and digitization play a role in reducing waste, both paper waste, material waste in making samples by eliminating physical samples with 3D simulation design (Todeschini et al. 2017).

2.5 Sustainable Fashion Design Curriculum

According to Fitrihana, fashion design education in Indonesia is still lagging behind other countries. The curriculum needs to prepare with a technology perspective. In developing a competency-based curriculum for the Fashion Design study program, it is crucial to prepare a technology-oriented curriculum (Noor Fitrihana 2020).

New technologies will fill new technology used in today's clothing industry and serve with technology-based devices and digitization. Fashion design education should prepare future graduates who practice sustainability with technological skills through a curriculum in fashion design (Palomo-Lovinski & Hahn, 2014).

2.6 Entrepreneur and Technopreneur Orientation

2.6.1 Entrepreneur Orientation

An entrepreneur is someone with the ability to take risks and monitor and control business activities (Alias et al., 2020). The dimensions of the entrepreneurial orientation (EO), according to Lumpkin and Dess, are autonomy, risk-taking, innovation, proactive and competitive aggressiveness, facilitating the pursuit of opportunities (Lumpkin and Dess, 1996; Murad 2014) (Wongmuek, 2018). There is a positive relationship and recognizing business opportunities (Sung & Park, 2018). However, the competitive aggressiveness dimension is not significant. This study decided not to include these dimensions (Bolton & Lane, 2012; Gawel, 2012; Sung & Park, 2018; Wongmuek, 2018)

2.6.2 Technopreneur Orientation Through Fashion Design Curriculum

A technology-based entrepreneur is a new business process that involves technology, and these "Technopreneurs" use technological innovations and translate such technology into successful products or services (Fowosire & Idris, 2017). Technopreneurs are technology leaders who have tremendous capacity in innovation, creativity, dynamics, and a different mindset that companies and industries need in the future (Adeoti, 2019). Integrating technological renovations from Industry 4.0 to Industry 5.0 is a presumption to eliminate threats from the anticipation of future problems with the presence of robots so that it can trigger good collaborative complementary between workers/humans and robots (Olesia Martynova 2019). The problem is that there are still some learning outcomes that do not meet the

Indonesian National Work Competency Standards; a curriculum alignment is needed that aims to make the competence of graduates according to the needs of today's industry related to technology (Suhartini, 2018).

3.0 Methodology

3.1 Research design

This research paper employs quantitative and qualitative research methods to fulfill the research objectives. The study is primarily exploratory, and the following tools use for data collection with surveys through online questionnaires and structured interviews. Exploratory research is one of the research approaches used to examine something (that attracts attention) that is not yet known, not understood, or not well recognized. The explorative study is research by assessing or introducing a particular symptom (Harris & Schlenker, 2018).

3.2 Sample selection

The respondents were selected from the fashion design class 2011-2015 in East Jakarta. The batch selection on the time of year of graduation and the average has had a job for 2-6 years, chosen because it is a state fashion design college that produces fashion design graduates. However, even though in the capital city of Jakarta, the survey results showed that this fashion education had not met the advanced technology equipment in the fashion sector. In addition, this fashion education is the only public fashion design university-level college in the capital. Its position among private fashion institutions is equipped with more advanced technological equipment.

3.3 Sample size

There were 60 questionnaires and structured interviews distributed, and both questionnaires and structured interviews as many as 55 questionnaires, the response rate was ninety-two percent and completed. In summary, 96% of 55 questionnaires and structured interviews were received and analyzed.

3.4 Research instrument

The preliminary study was conducted through a questionnaire survey and a series of online structured interviews. This preliminary study aims to know widely and variously. All of the questionnaires and structured interviews were on 23 September 2020. A total of 55 questionnaires and structured interviews yielded exciting and valuable material, instrumental in informing the approach and conclusions—the process selection by the desire to gain perspective from graduates' knowledge of sustainability.

3.5 Data collection

Survey questionnaires and structured interviews were distributed online to graduates via google forms and columns to share their opinions and suggestions. These are efforts to extract more information about responses to the existing curriculum and the extent of their knowledge about sustainability.

3.6 Data Analysis

The data gained from the questionnaire survey and structured interviews were analyzed using descriptive analysis, aiming to change a set of raw data into a more accessible form and in a more concise information format (Lawless & Heymann, 2010). Descriptive analysis was conducted on the results of the respondent's data, namely the graduates of fashion education. The descriptive method describes the data collected without intending to make conclusions that apply to the general public or generalizations (Sugiyono, 2010).

4.0 Findings and Discussions

The questionnaire survey results conducted found the following findings. The majority of the respondent's age is between 23-28 years old. The data indicated that 80% of graduates understand the concept of sustainability, while 18% of graduates indicated they did not understand the concept of sustainability. Fifty percent of the population stated that on-campus learning materials could help current their work. At the same time, 50% said that the material provided followed their current work needs—furthermore, 80% of graduates' work implemented the idea of sustainable SDGs.

Moreover, 75% of the latest applications help reduce waste in companies where graduates work. Subsequent data showed that 80% of graduates need technology skills to work in the apparel industry and think that a fashion entrepreneur must have technical skills to be competitive. Meanwhile, 20% indicated that technopreneurs are not necessarily easy to get jobs according to their qualifications. The data also shows, 80% of the population stated that the apparel industry would require technological competence in the future; meanwhile, 13% said that technopreneurs are not needed at this time. However, from the data obtained, 70% of the population does not yet have qualified technological capabilities, especially those that meet the qualifications for the apparel industry. Subsequent data showed 80% of the population stated that the current curriculum had not been proven through control. At the same time, a small percentage of 20% said that the current curriculum applies the concept.

The questionnaire results show the rating follows the answers chosen by the graduates, indicating that most graduates already know about sustainability. In contrast, only a small proportion of graduates state that their technological abilities are still very minimal. Furthermore, it was not clear that there was a lack of understanding about sustainability, and they also suggested embedding suggest

sustainability in the curriculum fashion design. Based on these reasons, it is necessary to find more in-depth answers from graduates; it is essential to conduct structured interviews.

The results of questions and answers were classification from similar statements further categorized in each table to support the results of the previous questionnaire survey. In a structured interview, these questions are to learn more about sustainability in the fashion design curriculum, technology implementation, entrepreneurs in fashion design, and technopreneur orientation in the fashion design curriculum. The answers obtained are arranged based on these categories and presented in the form of a table as follows;

Table 1. Sustainability in Fashion Design Curriculum

| Alumni Statement on Sustainability | |
|------------------------------------|---|
| 1. | Sustainable in fashion needs to be considered by studying eco-friendly materials and durable fashion |
| 2. | Making clothes that are sustainable or making a recycling, upcycling workshop program is needed. |
| 3. | Sustainable will have a good impact on our earth and future generations |
| 4. | The concept of zero waste is essential to learn to help students practice sustainability in fashion design |
| 5. | Sustainable needs to be studied in the curriculum to make the initial character in making more eco-friendly works can also apply in the production process. |
| 6. | Sustainability issues support the development of learning in the fashion study program; it is necessary to have a sustainable concept in it. |

Table 2. Technology Implementation

| Alumni Statement on Technology Implementation | |
|---|---|
| 1. | I need the latest technology skills such as Adobe Illustrator, Clo, Marvelous applications. |
| 2. | Technology makes work more effective, efficient and saves time |
| 3. | I use technology to protect material usage |
| 4. | I feel I can minimize mistakes by using technology |
| 5. | I need proficiency in applications such as Adobe Illustrator, fashion marketing, and business and fashion photography |

Table 3. Entrepreneur in Fashion Design

| Alumni Statement on Entrepreneurship | |
|--------------------------------------|--|
| 1. | Being a fashion entrepreneur must be more creative and innovative, and creating fashion products implementing sustainability can be a business opportunity |
| 2. | I have a fashion business, but because I don't use technology, my business is not progressing well |
| 3. | Entrepreneurial knowledge is essential to start my business idea, and I know how to solve problems from the risks that may occur |
| 4. | I see business opportunities in the future will be easier if I master technology, and I believe the fashion products I sell will sell faster |

Table 4. Technopreneur Orientation in Fashion Design Curriculum

| Alumni Statement on Technopreneurship | |
|---------------------------------------|--|
| 1. | Technopreneur fashion design in the future will be essential considering that now everything is digitalized |
| 2. | The development of the fashion industry towards digitalization is very needed. Of course, it will require a technopreneur, so I have to master technology |
| 3. | In my opinion, being an entrepreneur is not enough because the industry of the future will all be digital |
| 4. | I will be able to compete in the fashion industry with a technopreneur orientation. |
| 5. | The company where I work and other companies have used Adobe Illustration, Computer-Aided Design. I think mastering technology in fashion design or other applications makes it easier for us to work. |
| 6. | I think the current curriculum should lead to sustainability, and having good technical skills is an asset for students to practice sustainability |

5.0 Conclusion & Recommendations

The initial nature of this preliminary study is to examine student understanding of sustainability and how the current fashion design curriculum responds to sustainability in the clothing industry of the future. This study limits research to fashion design courses because, from the preliminary study results, 80% of graduates need renewable technology for fashion design to support their current performance. Therefore, the scope of study focuses specifically on fashion design courses because of their high feasibility based on the needs of

graduates. Furthermore, the technopreneur dimension refers to the entrepreneur dimension. The dimensions of the entrepreneur are autonomy, innovation, proactiveness, and risk-taking (Lumpkin and Dess 1996). Thus, the limitation approach affects the measurement in influencing the generalizability of the findings and conclusions. More exploratory studies in the future should consider concrete ways based on the main themes found in this study. Lecturers must be surveyed to examine their understanding and attitudes towards continuing education and the future implementation of sustainability in the industry through the relevant curriculum. In addition, it is also necessary to sustainable curriculum initiatives that match the future needs of the industry and address the barriers.

Furthermore, the data shows 95% of alumni stated that the current fashion curriculum had not initiated sustainability. The structured interviews said that graduates need technical skills to pursue business opportunities and innovations and deal with technological skills. However, the survey results also showed that the current curriculum does not meet their ability to master technology. While most of the graduates elaborated in their statement that embedding sustainability is essential, their technology skills have not met the needs of the apparel industry. For this reason, this preliminary study becomes one of the bases for researchers to recommend a conceptual framework through a technopreneur orientation to encourage technology-based. Based on the need to improve sustainability through technology, this study suggests a conceptual framework for a sustainable fashion design curriculum:

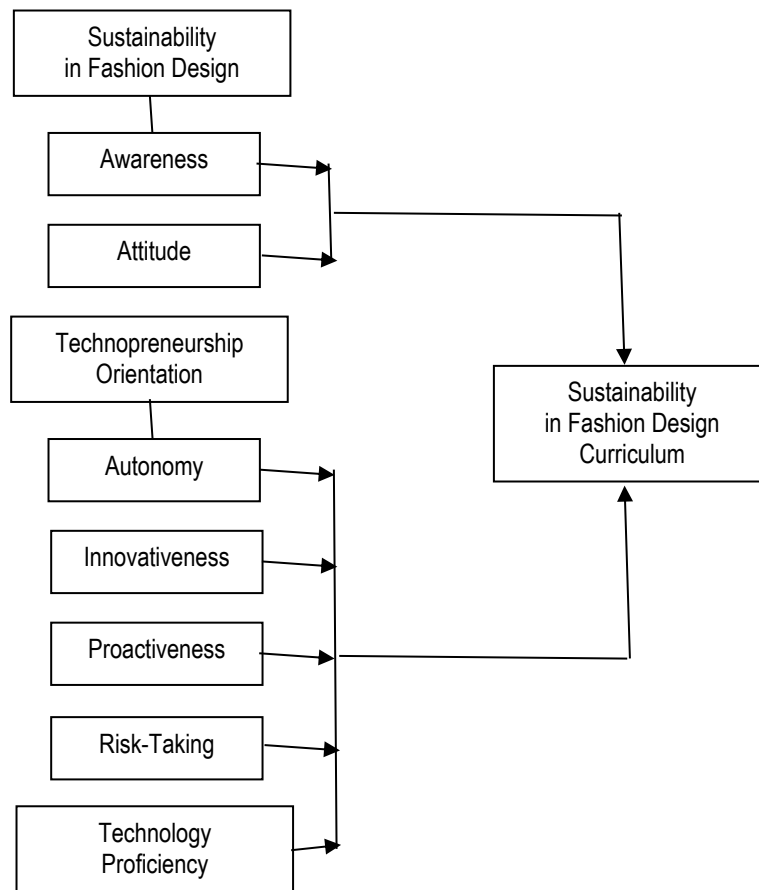


Fig.1. A Conceptual Framework of Sustainable Fashion Design Curriculum

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Paper Contribution to Related Field of Study

This research paper contributes to the study of fashion design related to the fashion design curriculum.

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