

# **Innovating Transformative Designs with Zero Waste for Adolescent Girls' Evening Wear to Activate Sustainable Practice**

**Prof. Sahar Aly Zaghloul**

**Associate Professor, Department of Fashion Design - College of Designs - Qassim University**

**Professor, Department of Clothing and Textiles - Faculty of Home Economics - Helwan University**

[Sah.ali@edu.sa](mailto:Sah.ali@edu.sa)

**Maha Mansour Rashidi**

**Qassim University, College of Designs, Department of Fashion Design**

[a.maha@qu.edu.sa](mailto:a.maha@qu.edu.sa)

## **The research problem:**

The research problem can be summarized in the following questions:

- 1- What are the principles of designing evening clothes for teenage girls according to the characteristics of growth?
- 2- Who are the most famous international fashion designers who touched on creating transformative clothing?
- 3- What are the criteria for designing transformative clothing with zero waste to activate sustainable practice?
- 4- What is the possibility of creating transformative designs with zero waste for evening wear for teenage girls that achieve both aesthetical and functional aspects?
- 5- What is the possibility of implementing innovative Waste designs that achieve the highest degree of acceptance by professionals and consumers?

## **Importance of the Research:**

- 1- Contribute to the realization of the vision of the Kingdom and the Fashion Authority in supporting sustainable fashion by producing designs that are implemented with zero waste (there is no Waste of fabric during the cutting process) and can be worn in different ways and for more than one occasion.
- 2- To highlight the importance of the effectiveness of sustainable practice in the field of fashion design.
- 3- Contribute to the creation of transformative designs for evening wear for teenage girls in the market, to suit their ages and growth characteristics.
- 4- Shed light on one of the modern and future global environmental trends by employing them in the design of sustainable clothing.
- 5- Attempting to benefit the students in the field of clothing design and production within the various educational institutions, especially the field of fashion design and drawing models with design ideas to activate sustainable practice.
- 6- Contribute to the addition of innovative solutions to solve one of the problems of the ready-made garments industry with the Waste of fabric in production.
- 7- It contributes to enriching the Arab library with references that benefit the Arab researcher in the field of sustainable fashion design.

8- Shed light on the comparison between the methods of transforming fashion design with zero Waste.

#### **Purpose of research:**

- 1- Studying the basics of designing evening clothes for teenage girls according to the characteristics of growth.
- 2- Analysis of the most important works of international fashion designers who touched on creating transformative clothes.
- 3- Determining the criteria for designing transformative clothing with zero Waste to activate sustainable practice.
- 4- Creating transformative designs with zero Waste for evening wear for teenage girls that achieve both the aesthetic aspect and the functional aspect.
- 6- Implementation of some innovative designs that achieved the highest degree of acceptance by professionals and consumers.

#### **The research terms:**

**Innovation:** The process that the individual goes through to improve something, it could be a work, production or an idea to be useful and of value, depending on the talents of the student or artist, provided that he brings something new that is not preceded by any other mechanism and unique in its distinctive characteristics to express his/her facts and aspirations.

**Transformable clothing design:** It means that one piece of clothing is able to provide many options for the wearer, resulting in fewer clothing purchases and thus less fabric waste.

**Zero-Waste :**The process of eliminating fabric waste in the cutting stage by creating a pattern counted by models combined into a single marker, using the entire width and length of the fabric pre-determined.

#### **Research hypotheses:**

- There are statistically significant differences between the innovative designs of evening wear for teenage girls, according to the opinions of specialists.
- There are statistically significant differences between the innovative designs of evening wear for teenage girls according to the opinions of consumers.
- There are no statistically significant differences between transformative designs with zero Waste of evening wear for teenage girls to activate sustainable practice according to the opinions of specialists.

#### **Research Methodology and Procedures:**

This research follows the descriptive analytical method with application, and the experimental method.

#### **Definitions of the research:**

- Designs for transformative evening wear with zero Waste.
- Teenage girls age (17:15) years.

**The research sample:**

The research sample consists of (56) items distributed among (specialists and consumers) to get to know their opinions towards innovative designs as follows:

- 1- Specialists: their number (15) means the professors specialized in the design and production of clothing.
- 2- Consumers: their number is (41) and they mean the female adolescents in the community whose ages range from (17:15) years.

**The search tools:**

- A questionnaire to measure the opinions of specialists in the field of fashion design for innovative designs.
- A questionnaire to measure consumers' opinions of innovative designs.

**Research results and answers to questions:****The first question: The first question states: What are the foundations of designing evening clothes for teenage girls according to the characteristics of growth?**

A number of principles have been reached for designing evening clothes for teenage girls, the most important of which are taking into account the psychological and technical foundations on which teenage girls choose their clothes, which are summarized in the following:

- The design lines of evening wear suit the age of the girl in the middle adolescence stage.
- It is characterized by a youthful spirit and gives it freedom of movement.
- Design lines and materials keep pace with fashion to satisfy her desire for exclusivity, distinction and love of showing off.
- That her clothes be characterized by joy with vibrant colors and achieve an elegant appearance.
- To have large quantities of clothes to satisfy her desire to love possession and obtain a renewed appearance.
- That the design lines fit and match the shape of the girl's body.
- When choosing the color of the fabric and its graphics, consideration should be given to its suitability with the shape and size of the girl's body and with the appropriate color for the teenage skin and hair to reflect on her skin and highlight her.
- That the design helps to highlight the beauty and advantages of the teenage body and hide its flaws to make her feel happy and satisfied and increase her self-confidence.

Taking into account the aesthetic and decorative aspects in designing teenage clothes, and the use of connected or separate complements.

- That the parts of the basic design be consistent with the added complements in terms of lines, materials and colors.

**The second question: The second question states:****Who are the most famous international fashion designers who touched on creating transformative clothing?**

The work of international designers was reviewed through fashion shows, fashion magazines and the World Wide Web (Internet), to identify the most famous international fashion designers who touched on creating transformative clothes and their works were analyzed to identify the transformative methods they followed in their designs, and a selection of fashion designers was

reached. International people who have touched on the creation of transformative clothing, and the most famous of them are: Ximena Valero, Sveta Planman, Flavia La Rocca, Hussein Chalayan.

**Here is a table summarizing the methods of designing convertible clothes that have been used by the most famous international fashion designers:**

Table (1) the most popular convertible clothing design methods		
(modular designs)	reversible and folded/tying)(	
 <p>A piece (skirt and blouse) is convertible modular designs Flavia Larocca</p>	 <p>Designer dress (reversible) Sveta Planman</p>	 <p>Convertible pleat and tie dress</p>

**The third question: The third question states:**

**What are the criteria for designing transformative clothing with zero Waste to activate sustainable practice?**

A number of transformative clothing design standards with zero Waste were reached to activate sustainable practice, through reviewing many foreign studies and research that dealt with the design of transformative clothing and sustainable clothing, and by analyzing the work of fashion designers to discover the methods and techniques used in designing transformative clothing, and identifying ways and methods of designing transformative clothing. The patterns have zero Waste, and the following is a summary of those criteria:

- **Aesthetic needs:** that the clothing achieve an elegant appearance to make her feel happy and satisfied and increase her self-confidence. Through design elements such as silhouette, texture, color and shape to meet the specific requirements of the customer where the design lines, materials and colors must match the shape of the body.
- **Functional needs:** include the relationship between clothing and the body, related to utility such as protection, fit, comfort, and ease of movement.
- **- EASY TO USE AND CARE:** Easy to try and use (put on, take off) requires little time or effort to transform and put the design on, easy care (wash, dry, store and repair uncomplicated garments).
- **Social needs:** including modesty and flexibility where convertible clothing controls the level of modesty, with flexibility to change areas of body coverage (such as separate sleeves, jacket, shawl), where clothing pieces can be worn differently on different occasions.
- **Expressionism:** requires the designer to be aware of the message conveyed by the garment when used; Such as: Sustainability, including: (zero Waste, extending life, protecting the environment, convertibility, reducing consumption).

- **Innovation:** includes (originality, diversity in wearing, used for several occasions, multiple use by choosing sizes, of one size suitable for body changes and for several people, such as size (xs -m), so that it can be easily modified and worn in several ways, which provides an opportunity to share or exchange it with several People.
- **Extending the life cycle of clothing:** The longevity of a garment is increased through design in two ways:
  - High quality (fabric, knitting joints, cutting), so that it will continue to look good for a longer period of time.
  - Sustainable design: includes (zero fabric waste or minimal fabric waste, local resources (environmentally friendly), safe raw materials, natural fibers that can be recycled, one type of material that is easy to disassemble and recycle).
- **Cost (cost of clothing):** ensuring the appropriate retail price, as the transformational design achieves the desire for renewal and change by using one piece of clothing, which reduces the cost.
- **Manufacturability:** Ensure that garments can be manufactured.

#### **Fourth question: The fourth question states:**

#### **What is the potential for transformative, Zero-Waste evening wear designs for teenage girls that achieve both aesthetics and functionality?**

Transformative design proposals have been developed for zero Waste evening wear for teenage girls in free size that fits chest (94:86) cm and waist size (74:68) cm. Using the adobe illustrator/CLO Standalone programs, a number of design experiments were conducted to achieve a ZWPC Zero waste pattern cutting design, taking into account the proposed cloth width for each design, checking its suitability, and setting the good model on the mannequin's body. The program has a view of the interlock and the possibility of re-arranging the pieces easily to obtain a pattern with zero Waste according to the width of the entered cloth, and preliminary samples have been implemented to ensure that the sample is adjusted and the final finishes are taken into account to achieve aesthetical and functional aspects of the transformative designs with zero Waste. The following is an explanation of this through the description and technical analysis of the proposed designs:

#### **- Checking the hypotheses of the search:**

The research hypotheses were verified after constructing the questionnaires and ensuring their validity and reliability, then the presentation and arbitration of the proposed designs. Where the LSD test application test was conducted for multiple comparisons.

#### **First hypothesis: The first hypothesis states that there are statistically significant differences between the innovative designs of evening wear for teenage girls according to the opinions of specialists:**

Analysis of variance was calculated for the average scores of the six innovative evening wear designs for teenage girls according to expert opinions, it was found that the value of (P) was (33.258), which is a statistically significant value at the level (0.01), to find out the direction of significance, the LSD multiple comparison test was applied.

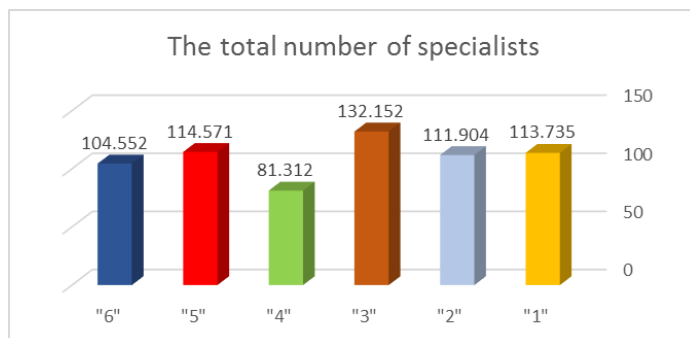


Figure (1) shows the average scores of the six innovative designs Evening wear for teenage girls according to the opinions of specialists.

**It turns out that:**

- 1- There are statistically significant differences between the six innovative designs of evening wear for teenage girls at the significance level of 0.01. We find that design “3” was the best design according to the opinions of specialists, followed by design “5”, then design “1”, then design “2”, then the design "6", and finally the design "4".
- 2- There are also differences at the significance level of 0.05 between design “2” and design “5” in favor of design “5”.
- 3- While there are no differences between design “1” and design “2”, while there are no differences between design “1” and design “5”.

This is due to the suitability and distinctiveness of the innovative designs, as the arbitrators saw that the innovative designs achieved the elements and foundations of the design (material, color, design lines), and the application of the zero Waste strategy played a key role in building and developing the pattern, and the transferable design criteria (wearing the design with several designs) were also achieved. Methods, ease of use, flexibility in changing areas of body coverage such as separate sleeves), the possibility of implementing and marketing the design.

**The second hypothesis: The second hypothesis states that "there are statistically significant differences between the innovative designs of evening wear for teenage girls according to the opinions of consumers":**

Analysis of variance was computed for the average scores of the six innovative evening wear designs for teenage girls according to consumer opinions.

It was found that the value of (P) was (45.382), which is a statistically significant value at the level (0.01), which indicates that there are differences between the designs, to find out the direction of significance, the LSD multiple comparison test was applied.

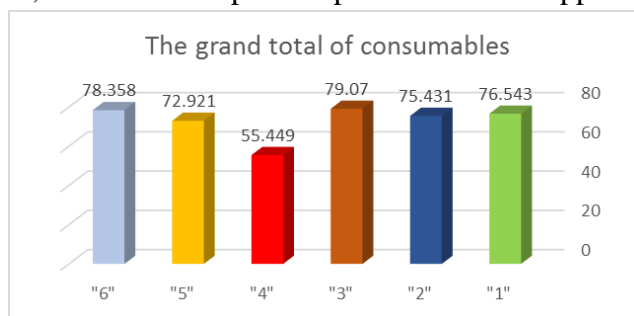


Figure (2) shows the average scores of the six innovative designs Evening wear for teenage girls according to consumer reviews

**t turns out that:**

1- There are statistically significant differences between the six innovative designs of evening wear for teenage girls at the significance level of 0.01. We find that design "3" was the best design according to the opinions of consumers, followed by design "6", then design "1", then design "2". Then the design "5", and finally the design "4".

2- There are also differences at significance level of 0.05 between design "1" and design "3" in favor of design "3", and there are differences at significance level of 0.05 between design "2" and design "5" in favor of design "2". Significance level of 0.05 between design "2" and "6" design in favor of design "6".

3- While there are no differences between design "1" and design "2", while there are no differences between design "1" and design "6", while there are no differences between design "3" and design "6".

This is due to the suitability and distinctiveness of the proposed designs, as consumers saw that the proposed transformational designs are characterized by innovation in their design lines, and their colors fit with the age group and with the evening time, and they are in line with their personal tastes, in many ways and for different occasions, it is also easy to wear and has the flexibility to change areas of body coverage such as separate sleeves.

**The third hypothesis: There are no statistically significant differences between transformative designs with zero Waste of evening wear for teenage girls to activate sustainable practice according to the opinions of specialists:**

To verify this hypothesis, analysis of variance was calculated for the average scores of innovative designs.

**The results were as follows:**

1- The first design: it was found that the values of (P) were (1.710) for the aesthetic side, (1.830) for the functional side, which are not statistically significant values, which indicates that there are no differences between the average degrees of transformational designs with zero Waste.

2- The second design: the values of (P) were (0.485) for the aesthetic side, (0.506) for the functional side, which are not statistically significant values, which indicates that there are no differences between the average degrees of designs.

3- The third design: The values of (P) were (1.286) for the aesthetic side, (1.336) for the functional side, which are not statistically significant values, which indicates that there are no differences between the average degrees of designs.

4- Fourth design: The values of (P) were (0.500) for the aesthetic side, (0.633) for the functional side, which are not statistically significant values, which indicates that there are no differences between the average degrees of designs.

5- Fifth design: The values of (P) were (0.238) for the aesthetic side, (0.337) for the functional side, which are not statistically significant values, which indicates that there are no differences between the average degrees of designs.

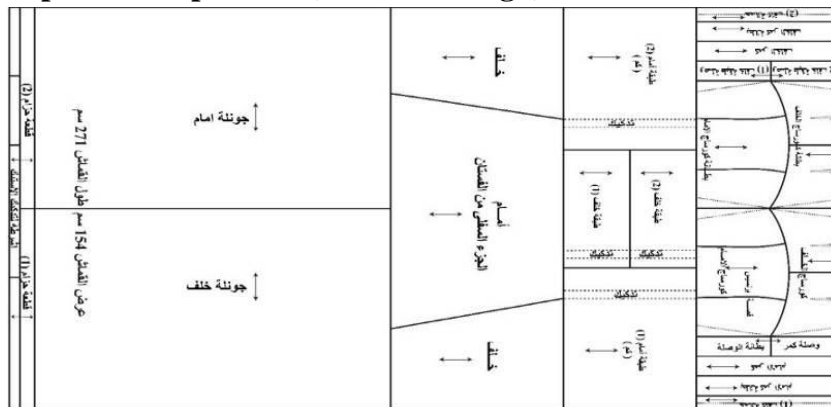
6- Sixth design: The values of (P) were (1.640) for the aesthetic side, (1.737) for the functional side, which are not statistically significant values, which indicates that there are no differences between the average degrees of designs.

**The sixth question: The sixth question states:**

**What is the possibility of implementing innovative designs that achieved the highest agreement among professionals and consumers?**

This question was answered through the implementation of two innovative designs for girls in the middle adolescence stage (17:15) years, which received the highest acceptance rate by professionals and consumers, the third design and the fifth design.

**1- The first implemented product (the third design):**



**Figure (3) The pattern pieces of the third design proposal are embroidered using the Puzzle Jigsaw method.**



**Picture (1) the final form of the first implemented product (the third design) and the transformational proposals**



**Picture (1-a) of the second transformational proposal for the third design, reversing the wearing of the pieces on the other side**





Picture (1-b) of the third transformational proposal for the third design: Wearing the skirt as a dress with the reverse of wearing the pieces.

2- The second implemented product (the fifth design):

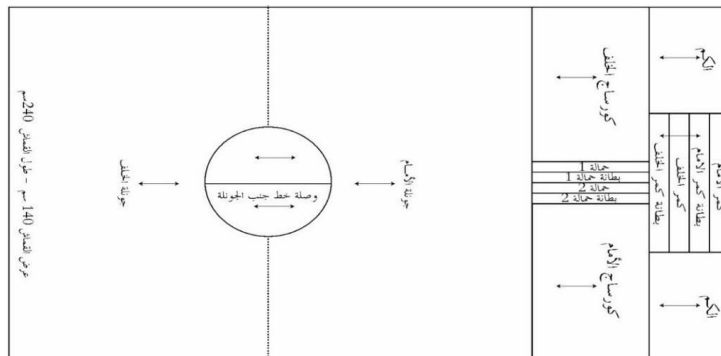


Figure (4) The pattern pieces of the fifth design proposal (dress, skirt) are embroidered using the Puzzle Jigsaw method.



Picture (2) the final form of the second implemented product (the fifth design) and the transformational proposals



Picture (2-a) of the second transformational proposal for the fifth design, to wear the skirt as a dress

### Research recommendations:

- Including the topic of sustainable fashion design in graduate curricula and in graduation projects for female students in specialized colleges to contribute to achieving the vision of the Kingdom and the Fashion Authority in supporting sustainable fashion and preserving the environment.
- Holding community service workshops, lectures and exhibitions with the aim of enriching students' knowledge of sustainable design and its impact on society and the environment.
- Urging more design experiments to contribute to solving waste problems in ready-made garment factories.
- Preparing Arabic references for designs and production of clothing for sustainable fashion and adding them to libraries.

### List of sources and references

#### First: Arabic references:

- 1- Abu Mousa, Ihab Fadel. Education and apparel tasting. i 2. Riyadh: Dar Al-Zahraa for Publishing and Distribution, (2007). p. 197.
- 2- Idris, Hatem Mohamed, Hassouna, Amr Gamal El Din, and Rodania Mohamed Abdel Rahim. Lateral thinking as an entry point for creativity in fashion design. PhD Thesis, College of Applied Arts, 2018.
- 3- Al-Janabi, Abdul-Zahra Ali. Small industries and their role in sustainable development in the province of Babylon. Babylon Center for Human Studies Journal, (2017): p.7.
- 4- Al-Hawas, Maha Nasser. Creating designs for teenage evening wear inspired by the new art movement in line with aesthetic values. 2016.
- 5- Al-Ghamri, Walid Muhammad, Abu Muslim, Nasreen Youssef, and Omara, Basant Abdel Bari. A comparative study between LEED standards and sustainability principles in Islamic architecture. Architecture and Arts Magazine, Issue 10, (2018): p. 79.
- 6- Al-Farmawi, Mona Hamdi, and Hajjaj, Mohamed Abdel Hamid. "The possibility of benefiting from knot and tie technology to raise the aesthetic value of making multiple designs for the same model." Journal of Specific Education Research, No. 40, 2015.
- 7- Al Yamani, Suhaila Hassan. Creating fashion without knitting to develop projects for productive families in the Kingdom of Saudi Arabia. Architecture and Arts Journal, Volume 4, Issue 2, 2010.
- 8- Boubaa, Abdel Wahab. "The Role of Innovation in Supporting the Competitive Advantage of the Economic Enterprise (Case Study of Algeria Telecom for Mobile Phones - Mobiles)". Faculty of Economics and Management Sciences., (2012): p. 218.
- 9- Hamza, Wiam Muhammad. "Designing innovative clothes for girls inspired by microscopic images of the human body." International Design Journal, Volume 7, No. 2, (2017): p. 157.
- 10- Diab, Walaa Ali, Hegazy, Suzan El-Sayed, and Hegazy, Azhar Muhammad. "Underwear Design Tools Using Ties Without Knitting." Journal of Science and Arts, Volume 4, Issue 2, 2017.
- 11- Rizk, Enas Hamdi, and Ibrahim, Apple of Musa. "Designing evening wear for girls in early adolescence (12:15)." International Design Magazine, Volume 7, Issue 3, 2017.

- 12- Zaghoul, Sahar Ali, and Muhammad, Rabab Hassan. Applied research in the field of fashion design. Volume i 1. Riyadh: Al-Rushd Library, (2016): p. 57.
- 13- Zahran, Hamed Abdel Salam. Developmental Psychology - Childhood and Adolescence. i 6. Cairo: World of Books, (2005): p. 337.
- 14- Salloum, Faryal Saeed. An updated educational unit to develop the creative skills of students in renewing evening clothes used in the style of forming on the mannequin. *International Journal of Innovation and Applied Studies*, Volume 22, (2018): p. 185.
- 15- A plumber, Shahd Amal, Tawfiq, and Wijdan Adnan. "Design proposal for a convertible women's clothing using modular construction." *International Design Journal*, Vol. 12, No. 2, (2022): p. 21.
- 16- Tamiya, Naglaa Muhammad. "Clop innovations to enrich the design of the working woman." *Architecture and Arts Magazine*, Issue 10., 2018.
- 17- Tamiya, Naglaa Muhammad, and Afifi, Ghada Shaker. The plastic dimensions of some schools of modern art and their impact on the design of appropriate clothes for girls. *International Design Journal*, Volume 4, Issue 1, 2014.
- 18- Abdeen, Ali Ahmad. Studies in the psychology of clothing. Volume I 2. Amman: Dar Al-Maysara, (2010): p.29.
- 19- Orabi, Mirahan Faraj. "Lossless design as one of the sustainable fashion applications in the ready-to-wear industry." *International Design Magazine*, The Second Conference on Sustainable Development for Arab Societies, 2017.
- 20- Farghali, Zainab Abdel Hafeez. Clothing trends for young people. i 1. Cairo: Arab Thought House, (2002): p. 21.
- 21- Maadi, Ohoud Rajeh, and Salem, Shadia Salah. "Effectiveness of Using Sustainable Practice (Zero-Waste) in the Readymade Garment Industry." *International Design Journal*, Volume 9, Issue 1, (2019): pp. 121 to 122.
- 22- Melhem, Sami Muhammad. Developmental psychology - the human life cycle. i 2. Amman: Dar Al-Fikr, (2011): pp. 347 to 348.

### Second: Foreign references:

- 23- ANTANA VIČIŪTĒ, Agnē; DOBILAITĒ, Vaida. Principles of slow fashion application in clothing collection creation. *Environmental Research, Engineering and Management*, 2015, 71.2: p.57.
- 24- Rissanen, T., & McQuillan, H. (2020). *Zero Waste Fashion Design*. London; New York: Fairchild Books, an imprint of Bloomsbury Publishing, Plc. ISBN PB 978-1-3500-9483-3. 223 pp. (2020): pp.11-78.
- 25- JAMES, A. M.; ROBERTS, Bruce M.; KUZNIA, Anna. Transforming the sequential process of fashion production: Where zero-waste pattern cutting takes the lead in creative design. *International Journal of Fashion Design, Technology and Education*, 2016, 9.2: 142-152
- 25- KOO, Helen Sumin; DUNNE, Lucy; BYE, Elizabeth. Design functions in transformable garments for sustainability. *International Journal of Fashion Design, Technology and Education*, 2014, 7.1: p.18.
- 26- Lambert M. & et al, Ximena Valero [Art Betascript Publishing](#) (2010) - ISBN-13: 978-613-2-15213-8.(2010):p.100.

- 27- LEWIS, Tasha L., et al. Closing the loop: A scalable zero-waste model for apparel reuse and recycling. *International Journal of Fashion Design, Technology and Education*, 2017, 10.3: 353-362.
- 28- MANSOUR, Olfat. Using the Transformation Concept in Creating Safari Multi-Functional Fashion Designs for Women. Apparel Department, Faculty of Applied Arts, Helwan University, Cairo, Egypt, 2019, 4.15: 41-53.
- 29- MOORHOUSE, Debbie; MOORHOUSE, Danielle. Sustainable design: circular economy in fashion and textiles. *The Design Journal*, 2017, 20.sup1: p.1956 VECCHI, Alessandra (ed.). *Handbook of research on global fashion management and merchandising*. IGI global, (2016): p.325.
- 30- SAEIDI, Elahe; WIMBERLEY, Virginia Schreffler. Precious cut: exploring creative pattern cutting and draping for zero-waste design. *International Journal of Fashion Design, Technology and Education*, 2018, 11.2: 243-253.
- 31- TOWNSEND, Katherine; MILLS, Fiona. Mastering zero: how the pursuit of less waste leads to more creative pattern cutting. *International journal of fashion design, technology and education*, 2013, 6.2: 104-111
- 32- WEI, Bing Yue. Sustainable fashion development: Applying transformational design. In: *International Textile and Apparel Association Annual Conference Proceedings*. Iowa State University Digital Press, (2017): p.8.

### Third: Websites:

- 21- <https://katefletcher.com/profile>
- 22- [https://en.wikipedia.org/wiki/Ximena\\_Valero](https://en.wikipedia.org/wiki/Ximena_Valero)
- 23- <https://www.ximenaValero.com/product/makeover-transformable-dress/>
- 24- [https://en.wikipedia.org/wiki/Sveta\\_Planman](https://en.wikipedia.org/wiki/Sveta_Planman)
- 25- <http://www.jolier.com>
- 26- <https://www.vogue.it/en/talents/new-talents/2013/01/flavia-la-rocca>
- 27- <https://flavialarocca.com/about-flavia>
- 28- <https://www.dezeen.com/2013/03/06/rise-by-hussein-chalay>
- 29- [https://en.wikipedia.org/wiki/Hussein\\_Chalayan](https://en.wikipedia.org/wiki/Hussein_Chalayan)
- 30- <https://www.behance.net>
- 31- <http://secondstreet.ru>
- 32- <https://www.arts.ac.uk/colleges/central-saint-martins/about>
- 33- <https://www.emaratalyoum.com>
- 34- <https://www.timpanodirect.com>
- 35- <https://katieinthecorner>.