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**ANALYSIS OF SUSTAINABILITY AND ENVIRONMENTAL
FRIENDLINESS CONCEPTS IN THE MODERN FASHION
INDUSTRY**

***Abstract:** The article considers such concepts as sustainable fashion and eco-fashion since the general aggravation of the world environmental problem caused their appearance. The analysis of the latest achievements in optimization of the clothes lifecycle was made in order to obtain environmental products of high quality which caused minimum damage to the environment. Based on the analysis, possible solutions for ecological problem in the fashion industry were proposed and it was determined that the use of the basic rules of sustainable fashion was not only environmentally friendly, but also cost-effective solution for the development of the companies of the fashion industry.*

***Keywords:** eco-fashion, sustainable fashion, fashion industry, clothes lifecycle.*

Problem statement. Today environmental problems are studied extensively around the world. At all stages of their development people have always been closely linked with the outside world, but since that time highly-developed industrial society has appeared, dangerous human intervention in the nature has increased significantly, its volume has expanded. Man-made impact of human activities is a global threat to the planet. It is well-known that 20-th century has brought to humanity many benefits, related to the rapid development of science and technology, but at the same time has put the life on Earth to the brink of environmental disaster.

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Growth of the population, intensification of mining, increasing emissions of pollutants into the environment, irrational use of natural resources, constant increase of the garbage volume leads to the significant changes in the nature and threaten the safe existence of people. Some of these changes are extremely strong and widespread to such an extent that they are caused the global environmental problems. There are serious threats of pollution (air, water and soil), acid rains, radiation damage of areas, as well as loss of some types of plants and living organisms, depletion of biological resources, areas deforestation and desertification, lack of drinking water etc.

The problems arise as a result of such interaction between nature and man, during which man-made burden on the area exceeds the environmental possibilities of this area, mainly due to its natural resource potential and overall resistance of natural landscapes to man-made impact.

The main factor of environmental pollution and consumption of non-renewable natural resources is a heavy industry, but nevertheless we should not underestimate the negative impact of companies of light industry, the activities of which are also quite harmful to the ecosystem. Every year the products of fashion industry (that includes garment and textile sectors of light industry) become more and more popular. That is why the concepts of sustainable fashion and eco-fashion become more topical in this area, which improves consumers' awareness of social and environmental problems in order to reduce the impact of unfavorable ecological factors on the environment.

The concept of sustainability in the fashion industry has come through the understanding of threats to our planet and its resources. Every stage of the clothes lifecycle includes the processes, which are harmful for the environment. For example, in order to produce one kilogram of cotton that is equivalent to one T-shirt or a pair of jeans, it is necessary to grow the raw materials; this normally accompanied by the use of different pesticides, which are harmful to the ecosystem of the Earth. Further processing of cotton requires the use of more than 20 thousand liters of water, one of the main natural resources. Also, there are about 8 thousand kinds of chemicals, which are used in process of coloration and transformation of raw materials into

textile products [9]. Furthermore, if at the end of their lifecycle some products are not sold or go out of fashion, they end up in landfills that also have a significant negative contribution to the environmental pollution.

The main content of “sustainable fashion” concept is ecological production of clothes, production of environmentally safe and high quality things, which can be used for a long time and then utilized. Fashion industry has many interconnected components, so the main problem of sustainable development in this area is the ethical cooperation of professionals at all stages of the clothes lifecycle:

- production of raw materials;
- transportation;
- production;
- trade;
- exploitation;
- utilization or recycling.

Analysis of the clothes lifecycle allows to show the impact of each stage on the environment and to attract the producers’ attention to eco-safe production, and consumers – to responsible consumption. It is necessary to optimize the product design, reducing the devastating impact on the environment that will lead in turn to the achievement of sustainable business-model of the company.

Analysis of the recent researches. A lot of attention is paid to the environmental problems in the fashion industry abroad [1, 2]. The researchers are concerned about harmful influence of the production of products of fashion industry on the environment [3]. The question of export-oriented development of companies of light industry is highlighted in these papers [4, 5]. Also the researches on the quality and safety of textile materials, as well as on their certification, were held and described in papers [6, 7]. Directions of harmonization of environmental requirements for garments and textile materials to the EU standards are outlined in paper [8].

Article purposes. The main purpose of article is the analysis of sustainability and environmental friendliness concepts in the modern fashion industry.

The main part. There are many reasons for the formation of sustainable fashion and the phenomenon of fast fashion is one of the main ones. Cheap clothes, designed as an alternative to the brand clothes, belong to the products of fast fashion. In order to produce the clothes of fast fashion, fast supply chain works to deliver such clothes to the market within a week, as against the usual method of delivery of goods, when the delivery time is six months on average [9]. Companies of fast fashion category receive their income as a result of rapid cycles, which include rapid prototyping, using of materials of low quality, rapid transportation and delivery. The main purpose of these companies is profit. They made their clothes so available that consumers buy a lot of unnecessary clothes, and the result is over-consumption of unsustainable clothes. Low consumers' awareness in turn leads to the fact that they, comparing the prices of clothes in several shops, choose the cheapest one without considering the harm caused to the environment.

In order to develop sustainable fashion in the fashion industry it is necessary to change the consumers' psychological behavior, they should stop to be thoughtless when buying clothes. Producers should change their approach to the process of making clothes and provide accurate information about the environmental safety of their product and about the possibilities for its proper utilization.

It is high time for the fashion industry to concentrate on the principles of sustainable fashion and work on their improvement and extension. Some leading brands are already working under the rules of sustainable fashion and trying to reduce the harmful impact on the environment; although their budgets exceed the limits of the average at the market, but they prove that the rules of sustainability can be used at all stages of the clothes lifecycle, starting from fiber production and ending with utilization of readymade garments. The number of such companies is growing. Among the leaders in the implementation of eco-directed reforms aimed at environmentally friendly production are the following companies: Patagonia, Levi's, H&M, Nike, Puma, Monki, Adidas, ECOALF, G-Star RAW, Zara, Gap, Marks&Spencer, Topshop, Banana Republic. These companies on their own example demonstrate how the rules of sustainable fashion and responsible economy embedded in their corporate

structure. They try to use the latest environmental technologies, organic textiles and non-toxic colorants and materials in their work, as well as work on the development of new opportunities in order to save non-renewable natural resources and recycle existing products of manufacturing into recycling materials. Most of these companies refused to use natural leather and fur because of the large amount of water wasted in processing and because of the various chemical solutions used. Instead, those materials were replaced by synthetic materials that were subject to recycling. They participate in the donation for the activities of environmental protection organizations, collect unnecessary clothes for its further processing into raw materials, and thus carry out active promotion of “responsible consumption” among their clients. Also such companies follow the rules of fair trade in their activities and aimed at creation of decent working conditions in their companies [10, 11, 12].

Erik Joule, senior vice president of Levi’s Men’s Merchandising & Design, believes that not only individuals should behave consciously in respect to the environment, but also large companies [14].

Among the latest achievements in eco-fashion development we can distinguish the projects of Adidas that together with the non-profit organization Parley for the Oceans, which deals with the problem of ocean pollution, created the prototype of running shoes, the top of which was made of fabric and fibers from recycled oceanic garbage and illegal deep water nets [12]. In 2001 the company Patagonia founded non-profit corporation called “1 % for the Planet” and about 400 companies have already joined it, each of which contribute 1 % of total annual sales to grassroots environmental groups. Also Patagonia recently launched a large-scale project of fabric processing in the framework of Eco Circle program with the support of Teijin Fibers Limited [10]. Spanish brand ECOALF produces sportswear from recycled materials: plastic bottles, tires, fishing nets and even remnants of coffee grounds. The brand defines its concept as “tras(h)umanity”, which means humane and rational waste management. For example, the clothes made from fabric, which is composed of recycled coffee grounds, protects against UV rays and dries quickly.

Dutch brand G-Star together with Pharrell Williams, the owner of the ocean waste treatment plants Bionic Yarn, created a collection of ecofriendly-denim from recycled plastic bottles. The aim of this collection is to move to the new level in clothes consumption – dress up and fight with pollution, in this case – with plastic bottles [11]. Levi's company has launched the Water Less program, designed to use less water at all stages of jeans production, as well as to popularize water saving in everyday life. In autumn 2015 they presented their Wellthread collection, models of which were made of 100 % recycled material [14].

An important contribution into the sustainable fashion and eco-fashion made new technologies, such as Air Dye – the technology of waterless coloration. In contrast to the traditional method of coloration, which needs a large volume of water used and pollutes the environment by heavy metal emissions, Air Dye technology provides the implantation of colorants into the fibers of fabric under the air pressure. At first fabric is heated carefully and then exposed to a gas attack of the colorant. The molecules of reactant do not remain at the surface of the clothes; they get directly into the fibers [13].

There are a lot of examples of materials recycling, but as a complete technology, used in the fashion industry, the term “recycling” is known just recently. The essence of recycling is processing of existing products into the fabrics [15]. Also the term “reincarnation” of fabrics has come recently into sight, when fabrics remained unused for various reasons or were useless for further use. Armani Jeans was one of the first companies that organized the experiment with processing of denim, which resulted in the creation of the first recycled-denim jeans.

Indian technologist S. Upadhyaya, who works for August Fashion brand, has proposed the solution to the problem of waste – DPOL technology (Direct Panel on Loom). The working machine, connected to the computer, waves on the templates, set by the designer, the product details, which are then stitched by hand. Thus, the finished textile product is made without wastes, saving yarn, colorants and chemicals, reducing the execution time by about 50 % (fig.1) [13].



Fig.1. Jacket, made with DPOL technology

A student of St. Martin's School. Lee initiated the Bio Couture project that analyzed the possibility of growing the fabrics for clothes (fig.2). Placing bacteria into a bowl with green tea, after a while she got a textile material from which she created a jacket that looked and felt like vegetable peel. The process of growing the leaves for jacket lasted about three weeks and after that they were dried. Now the researcher is trying to adjust the properties of this material, making it more durable and hydrophobic [13].



Fig.2. Clothes, made with Bio Couture technology

Having analyzed the current state of the clothes production, the main components of sustainable fashion (fig. 3) and several already existing ways of its implementation at every stage of the product lifecycle can be identified.

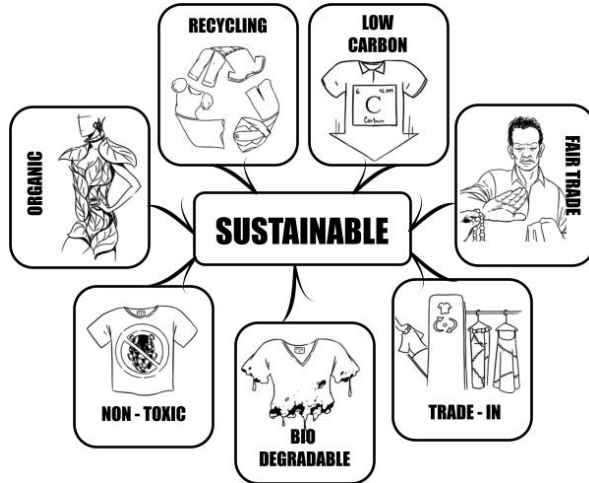


Fig.3. Components of sustainable fashion

At the stage of production of raw materials there are three main directions. The first one is organic, which means the growing of raw materials without the use of harmful pesticides that speed up its growth and destroy the ecosystem of the upper layer of the Earth. The second direction includes the production of synthetic materials, which later would be suitable for recycling. The third one is the production of the material by recycling already existing one. Also at this stage the requirements for the use of water and energy should be taken into consideration; the emissions during the production, as well as the use of renewable and non-renewable resources, needed for production and processing of raw materials, should be controlled; the use of harmful chemicals, which are used for processing and coloring, should be reduced.

Transportation is an integral part of all stages of clothes production that provides the connection between the suppliers of raw materials, production entities, warehouses and retailers. The cost of labor in developed countries is higher, so the manufacturers of the clothes often work with companies from developing countries that increase the cost of transportation. It is necessary to choose among all possible variants of logistics the most optimal routes, using the least environmentally harmful kinds of transport despite the fact that

it leads to the increase in delivery time. The smaller distance of transportation, the less impact on the environment, so the best variant is to place all production units at the minimum distance from each other.

At the stage of design and production it is necessary to control all production processes from supply of fabrics to export of clothes and control the use of water and electricity. Another important condition for the integration of sustainable practice at the production stage is the cooperation within the supply chain with partners with reliable environmental and social certificates, suitable for their monitoring by the third party. The development of sustainable design at this stage will help to create durable products, which can be used for a long period of time. The use of the latest computer technologies will ensure accuracy and quality of these works, as well as reduce the amount of wastes during the experimental production of clothes. For packing the clothes, it is necessary to use materials suitable for recycling or already recycled.

At the retail stage sufficient information should be provided to consumers about the possibility of safe utilization of clothes or the possibility to give back useless clothes for further processing. The organization of clothes pickup sections and established cooperation with consumers will lead to the encircled lifecycle of the clothes without wastes (fig.4).

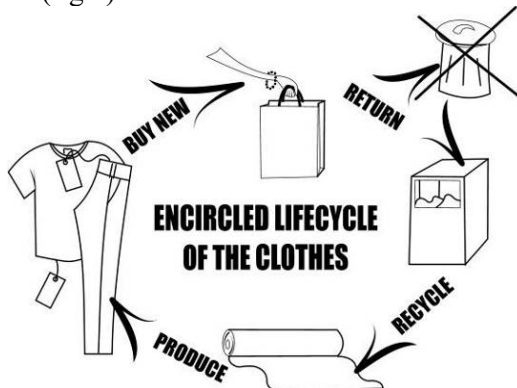


Fig.4. Encircled lifecycle of the clothes

Once the product gets to its owner, the responsibility for the product lifecycle relies on him. It is necessary to promote “responsible consumption” among the buyers of the clothes in order to make them to reduce the number of buying things, to buy environmentally friendly clothes and to give away used clothes for processing.

The final stage of the product lifecycle is its safe *utilization* or *recycling*.

Thus, fashion industry can exist and develop with the minimum damage to the environment. Making the lifecycle of the clothes as a circle under the condition of producers` and consumers` responsibility, an important contribution can be made to the preservation of our planet to future generations in its best form. The use of basic rules of sustainable fashion will help the producers to create not only environmentally, but also economically profitable business. Fashion industry, which significantly affects consumers, can become an effective tool in the promotion of such concepts as “responsible consumption” and “life without the harm to environment”.

Conclusions. Such concepts as sustainable fashion and eco-fashion were considered since the general aggravation of the world ecological problem caused their appearance. The experience of the world-known manufacturers of the clothes was reviewed and analysis of the latest achievements on optimization of the clothes lifecycle was made in order to obtain environmental products of high quality which caused minimum damage to the environment. Based on the analysis, possible solutions for existing problem in the fashion industry were proposed and it was determined that the use of the basic rules of sustainable fashion was not only environmentally friendly, but also cost-effective solution for the development of the companies of the fashion industry.

Research perspectives. It is found that ecological problems of nowadays is being actively studied in the world both in economic and technical aspects, but in Ukrainian fashion industry these problems are overlooked, that’s why we need to popularize the principles of sustainable fashion and eco-fashion among the domestic manufacturers and consumers of the clothes.

References

1. Scaturro S. Eco-tech fashion: rationalizing technology in sustainable fashion. *Fashion Theory*. 2008. Vol. 12. Iss. 4. P. 469–488.

2. Ting-yan Chan, Christina W. Y. Wong The consumption side of sustainable fashion supply chain. *Journal of Fashion Marketing and Management : An International Journal*. 2012. Vol. 16. Iss.2. P. 193–215.

3. Niinimäki K., Hassi L. Emerging design strategies in sustainable production and consumption of textiles and clothing. *Journal of Cleaner Production*. 2011. №19. P. 1876–1883.

4. Грищенко І. М., Данилкович А. Г., Тарасенко І. О. Методологічні положення екоорієнтованого розвитку підприємств легкої промисловості. *Актуальні проблеми економіки*. 2012. №8 (134). С. 238–252.

5. Слізков А. М., Унірова Н. І. Проблеми екологічної сертифікації продукції текстильної та легкої промисловості і шляхи їх вирішення. *Вісник КНУТД*. 2015. №2 (84). С. 221–226.

6. Сукач Г. І., Ніколайчук Л. Г. Проблема дослідження якості та безпечності текстильних матеріалів. *Вісник Львівської комерційної академії*. 2014. № 14. С. 97–101.

7. Семак Б. Б. Ринок екотекстилю України: механізми управління якістю. *Вісник ХНУ. Економічні науки*. 2013. Том 1. №6. С.148–153.

8. Ярощук О. В., Бохонько О. П., Кочмар А. А. Напрямки гармонізації екологічних вимог до швейних виробів та текстильних матеріалів до стандартів країн ЄС. *Вісник ХНУ. Технічні науки*. 2012. №2. С. 77–80.

9. SivaSakthi A. Sustainable Fashion: Welcome Revolution. URL : <http://www.fibre2fashion.com/industry-article/7718/sustainable-fashion-welcome-revolution>.

10. Шуинар И. Patagonia – бизнес в стиле серфинг. Как альпинист создал крупнейшую компанию спортивной одежды и снаряжения. М. : Манн, Иванов и Фебер, 2014. 256 с.

11. Кто делает экологичные и технологичные вещи будущего уже сейчас [Електронний ресурс]. URL : <http://www.wonderzine.com/wonderzine/style/style/200187-new-brands-pitti-immagine>.

12. Eco-fashion: что делают для природы большие бренды [Электронный ресурс]. URL : <http://www.lookatme.ru/flow/posts/fashion-radar/122167-10-big-brands-going-green>.

13. Eco-fashion: 5 sustainability технологий [Электронный ресурс]. URL : <http://www.lookatme.ru/flow/posts/fashion-radar/122203-5-sustainability-technologies>.

14. Прямая речь: Эрик Джоул, старший вице-президент Levi's по мужской одежде [Электронный ресурс]. URL : <http://www.lookatme.ru/mag/archive/industry-interview/124733-levis-waterless>.

15. Eco-fashion: 10 терминов экологичной моды [Электронный ресурс]. URL : <http://www.lookatme.ru/flow/posts/fashion-radar/123695-10-terms>

Transliteration

1. *Scaturro S.* Eco-tech fashion: rationalizing technology in sustainable fashion. *Fashion Theory*. 2008. Vol.12. Iss.4. P. 469–488.

2. *Ting-yan Chan, Christina W.Y. Wong.* The consumption side of sustainable fashion supply chain. *Journal of Fashion Marketing and Management : An International Journal*. 2012. Vol.16. Iss.2. P. 193–215.

3. *Niinimäki K., Hassi L.* Emerging design strategies in sustainable production and consumption of textiles and clothing. *Journal of Cleaner Production*. 2011. №19. P. 1876–1883.

4. *Grishhenko I. M., Danilkovich A. G., Tarasenko I. O.* Metodologichni polozhennja ekoorientovanogo rozvitku pidpriemstv legkoj promislovosti. *Aktual'ni problemi ekonomiki*. 2012. №8 (134). S. 238–252.

5. *Slizkov A. M., Upirova N. I.* Problemi ekologichnoi sertifikacii produkcii tekstil'noi ta legkoj promislovosti i shljahi ih virishennja. *Visnik KNUVD*. 2015. №2 (84). S. 221–226.

6. *Sukach G. I., Nikolajchuk L. G.* Problema doslidzhennja jakosti ta bezpechnosti tekstil'nih materialiv. *Visnik L'vivs'koi komercijnoi akademii*. 2014. № 14. S. 97–101.

7. *Semak B. B.* Rinok ekotekstilju Ukraini: mehanizmi upravlinnja jakistju. *Visnik HNU. Ekonomichni nauki*. 2013. Tom 1. №6. S. 148–153.

8. Jaroshhuk O. V., Bohon'ko O. P., Kochmar A. A. Naprjamki garmonizacii ekologichnih vimog do shvejnih virobiv ta tekstil'nih materialiv do standartiv krain ES. *Visnik HNU. Tehnichni nauki*. 2012. №2. S. 77–80.

9. Siva Sakthi A. Sustainable Fashion: Welcome Revolution. [Elektronnij resurs]. URL : [http:// www.fibre2fashion.com/industry-article/7718/sustainable-fashion-welcome-revolution](http://www.fibre2fashion.com/industry-article/7718/sustainable-fashion-welcome-revolution).

10. Shuinar I. Patagonia – biznes v stile serfing. Kak al'pinist sozdal krupnejshuju kompaniju sportivnoj odezhdy i snarjzhenija. M. : Mann, Ivanov i Feber, 2014. 256 s.

11. Kto delaet jekologichnye i tehnologichnye veshhi budushhego uzhe sejchas. [Elektronnij resurs]. URL : <http://www.wonderzine.com/wonderzine/style/style/200187-new-brands-pitti-immagine>.

12. Eco-fashion: chto delajut dlja prirody bol'shie brendy [Elektronnij resurs]. URL : <http://www.lookatme.ru/flow/posts/fashion-radar/122167-10-big-brands-going-green>.

13. Eco-fashion: 5 sustainability tehnologij [Elektronnij resurs]. URL : <http://www.lookatme.ru/flow/posts/fashion-radar/122203-5-sustainability-technologies>.

14. Prjamaja rech': Jerik Dzhoul, starshij vice-prezident Levi's po muzhskoj odezhde [Elektronnij resurs]. URL : <http://www.lookatme.ru/mag/archive/industry-interview/124733-levis-waterless>.

15. Eco-fashion: 10 terminov jekologichnoj mody [Elektronnij resurs]. URL : <http://www.lookatme.ru/flow/posts/fashion-radar/123695-10-terms>

Аннотация:

Вець Т. В., Навольська Л. В., Пашкевич К. Л. Анализ понятия устойчивости и экологичности в современной индустрии моды. В статье рассмотрены такие понятия как устойчивая и эко-мода, причиной появления которых стало общее обострение экологической проблемы в мире. Проведен анализ последних достижений по оптимизации жизненных циклов одежды с целью получения качественного и экологического товара с оказанием минимального вреда

окружающей среде. На основе проведенного анализа предложены возможные пути решения проблемы экологичности в индустрии моды и определено, что использование основных правил устойчивой моды является не только экологически безопасным, но и экономически выгодным для развития предприятий индустрии моды.

Ключевые слова: эко-мода, стойкая мода, индустрия моды, жизненный цикл одежды.

Анотація:

Вець Т. В., Навольська Л. В., Пашкевич К. Л. Аналіз поняття стійкості та екологічності в сучасній індустрії моди. У статті розглянуто такі поняття як стійка та еко-мода, причиною появи яких стало загальне загострення екологічної проблеми у світі. Проведено аналіз останніх досягнень з оптимізації життєвих циклів одягу з метою отримання якісного та екологічного товару з завданням мінімальної шкоди навколишньому середовищу. На основі проведеного аналізу запропоновано можливі шляхи вирішення проблеми екологічності в індустрії моди та визначено, що використання основних правил стійкої моди є не тільки екологічно безпечним, а й економічно вигідними для розвитку підприємств індустрії моди.

Ключові слова: еко-мода, стійка мода, індустрія моди, життєвий цикл одягу.

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