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Use of Digital Technologies in the Textile Industry

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Abstract: This article focuses on modern advances in the field of textiles and clothing. Modern trends in the use of digital technology in the textile industry can be roughly divided into three categories: improving textiles using nanomaterials and nanocoatings; introduction of electronic components and microelectromechanical systems into common materials; hybridization of textiles and biomimetic systems.

Keywords: digital technology, textile industry, ineffective costs, competition, accreditation.

Introduction. There are several positive aspects in the practice of using digital technologies in the textile industry. By unifying technology and providing economies based on the growth of production scale, they increase labor efficiency, reduce energy and material costs. In addition, they support competition, simplify production processes, improve product quality, and promote safety, health and the environment.

Other benefits of using digital technology in the textile industry are:

- providing end-users with confidence that the product is safe, reliable and works in accordance with its functions;
- creating a unified system of terms so that manufacturers and users could discuss issues such as quality and security;
- ensuring product compatibility;
- reducing trade restrictions and ensuring the openness of world markets;
- promoting the diffusion and assimilation of new technologies.

This system involves regulating production through numerous state standards and other mandatory requirements for product safety and quality.

The new system provides that the state will now obligatorily regulate only that which concerns exclusively the safety of products for the consumer. The rest of the parameters of product quality and its consumer properties will be regulated by competition. The main advantage in this concept is that with strengthening control over the fulfillment of mandatory requirements for the safety of production of products, the life of the business is greatly facilitated, ineffective costs arising from the need to coordinate excessive requirements with the authorities are reduced. [1]

Literature analysis

As the recent experience of successful digital technologies in the textile industry shows, it is more profitable to publish the so-called "leading" standards, which precede the appearance of products and processes, the parameters of which they prescribe. Such proactive standards are a kind of manufacturers, users and the general public to the new technology, creating favorable conditions for its early implementation. [2] In particular, in the United States, the implementation of a strategy of leading-edge standards has accelerated the development of a new generation of wireless communication devices and expanded their market for them. Such a strategy can also accelerate the adoption of digital products.

A large number of organizations, including the IEEE (Institute of Electrical and Electronic Engineers, USA), ASME (American Society of Mechanical Engineers), and the European Committee for Standardization (ECS), are attempting to develop standards aimed at solving problems associated with digital technologies. In China, the National Laboratory Accreditation Authority has reportedly established a committee to accredit digital research laboratories and regulatory bodies.

In Germany, the Hohenstein Institutional Association is established, which is an international center for research and services in the field of textile products. One of the activities of the Hohenstein institutes is the development of scientific and technical documentation for determining the quality of textile products. There are many forecasts regarding the use of digital technologies in the textile industry in the near future, but we will not dwell on them in this article, its main goal is a brief overview of modern achievements in the field of textiles and clothing. Modern trends in the use of digital technologies in the field of textiles can be roughly divided into three categories: improving textiles using nanomaterials and nanocoatings; introduction of electronic components and microelectro - mechanical systems (MEMS) into common materials; hybridization of textiles and biomimetic systems.

In the message of Shavkat Mirziyoyev, President of the Republic of Uzbekistan, to Oliy Majlis dated December 28, 2018 it is highly emphasized that: "... we should start developing the National Concept of the Digital Economy in 2019, which provides for updating all areas of the economy based on digital technologies, and relying on that platform, implement the program «Digital Uzbekistan-2030» [3]". In order to further improve the public administration system, create conditions for the introduction and development of the digital economy, improve the investment environment, as well as implement the Strategy of Action in five priority areas of the development of the Republic of Uzbekistan for 2017 - 2021 [4], followings should be considered as the most important tasks for the further development of the digital economy [5]:

- implementation and development of activities in the field of crypto-asset turnover, including mining (activities to maintain the distribution platform and create new blocks with the ability to receive remuneration in the form of new units and commission fees in various cryptocurrencies), smart contracts (electronic agreement, exercise of rights and responsibilities for which is carried out by automatically making digital transactions), consulting, issue, exchange, storage, distribution, management, insurance, crowdfunding (to effective financing), as well as technology "blokchain" diversification of various forms of investment and entrepreneurial activity;

- training qualified personnel in the development and use of blockchain technologies with practical skills using modern information and communication technologies;
- comprehensive development of cooperation with international and foreign organizations in the field of activities on crypto assets and blockchain technologies, attracting highly qualified foreign experts in the field of developing blockchain technologies for joint implementation of projects in the digital economy;
- creating the necessary legal framework for the implementation of blockchain technologies, taking into account the best practices of foreign countries;
- ensuring close interaction between government bodies and business entities in the field of introducing innovative ideas, technologies and developments for the further development of the digital economy. Based on the analyzed literature, we can conclude that the target indicators for the further development of information and telecommunication systems in a long-term perspective will be the establishment of modern infrastructure in the field of telecommunications and information as well as ensuring the availability of infrastructure in every single region of the Republic of Uzbekistan. There are two ways: one for social adaptation of technologies and the other for developing local technological bases through digital economy [6-10].

Analysis and results

Textiles based on nanomaterials acquire unique in their indicators water resistance, dirt-repellency, thermal conductivity, the ability to conduct electricity and other properties. Nanomaterials can contain nanoparticles, nanofibers, and other additives. For example, Nano-Tex successfully manufactures digitally enhanced fabrics. One of these fabrics provides absolute waterproofness: due to a change in the molecular structure of the fibers, water droplets completely slide off the canvas, which "breathes" at the same time. In addition to the aforementioned Levi Strauss, these fabrics are used in their denim clothing and footwear, in particular, by Dockers.

Digital technologies are also used to improve the properties of traditional textiles and products from them. In this case, coatings are applied to the textile, modifying it in the micron and submicron size ranges. Energy-saving photocatalysis technology cleans the surface of textiles without the use of chemicals and energy, exclusively under the influence of nanocatalysts applied using traditional textile equipment, sunlight and water.

Japan's Toray Industries, for example, has announced a new textile processing technology that has enabled a breakthrough in manufacturing through advances in self-assembly of nanostructures. The Nano matrix technology allows to apply a coating with a thickness of 10 ...30 nanometers directly to the monofilaments of the processed fabric. This, according to the company's management, until now no one could achieve: modern textile technologies have so far made it possible to apply coatings either in the space between monofilaments or in the areas of intersection of fibers. To implement this technology, researchers changed temperature, pressure, electric field and other environmental parameters during nanotechnological self-assembly. When processing textiles using the new technology, individual monofilaments are not damaged, the texture of the processed material does not change. Toray Industries nano-textile products based on polyester and cotton acquire elastic, water-repellent and antistatic properties that are unique in their characteristics.

Scientists in Hong Kong have created a nanoparticle-based coating that prevents fabric contamination and also promotes decontamination. Scientists' research was carried out in the field of developing self-cleaning nanosurfaces at low temperatures. According to Professor John Hin, with the help of new nano-surfaces, self-cleaning of materials, in particular textiles, can take place in normal room conditions, without dangerous high-temperature effects. The fabric, for example, is coated with a chemical

compound of titanium dioxide with a layer of 50 nm. When this layer is exposed to the sun or under the light of traditional artificial light sources in the presence of water, the fabric itself can decompose organic compounds, odors, bacteria and toxic substances (in particular, formaldehyde). The nanolayer adheres best to cotton and synthetic fibers. The self-cleaning effect after application of the nanolayer using conventional textile equipment is inherent in textiles and lasts throughout the entire life cycle of the garment.

Summary and Suggestions

Based on the above tasks and practical results, the following suggestions and recommendations were made:

Organizations and other stakeholders of the Republic of Uzbekistan faced certain problems in the development of standards for digital technologies. Above all, professionals must ensure that the standards development process is conducted by consensus, which ensures transparency, balance and due process. It is necessary to take into account the interests of different parties and take into account the views of not only the majority concerned, but also the minority and end users.

Participation in the development of standards can provide a company with concrete benefits, timely access to information and new technologies. In this way, developers can influence the content of the standard by participating in the development process and proposing options that provide an optimal technical solution. To maximize the level of use of existing digital technology standards in Uzbekistan, it is necessary to carefully select the standards on which time and resources should be spent. Any new standard must have a large market potential, be economically and technologically feasible, not duplicate other standards currently being developed, and provide a single solution. Digital professionals should scrutinize the subject matter in order not to waste limited resources on things that do not meet the above criteria.

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