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Research Article

WOMEN'S CLOTHING COLLECTION THAT COMES TO LIFE IN THE VIRTUAL WORLD

♦

SANAL DÜNYADA HAYAT BULAN KADIN GİYİM KOLEKSİYONU

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ABSTRACT: Today, sportswear trends have become an important part of the fashion world. Nowadays, women also attach importance to sportswear trends in order to express their style and combine elegance with comfort in their daily lives. When elegance in sportswear is combined with freedom of movement and comfort, a person's self-confidence increases and his mood is positively affected. The women's sportswear collection prepared in this study aims to make women stylish along with comfort and ergonomics in their daily lives. Elegance and comfort in sportswear have an important place in every aspect of women's lives. Sportswear is considered not only for an activity but also as a lifestyle and form of personal expression. Therefore, various daily sportswear options are offered in this project for women who want to reflect their style by keeping up with sportswear trends. With the developing technology, the textile industry also brings innovations every day. VStitcher (Browzwear) design program, one of the 3D programs developed by software companies, is a 3D CAD software used in the fashion and textile industries. This program offers designers and textile manufacturers opportunities to design products, create prototypes and visualize their collections in a virtual environment. VStitcher (Browzwear) also offers a virtual fitting experience that allows designers to see and improve the models they design in real time. In this study, it is aimed to revive women's sportswear designs on the digital platform by combining traditional design processes with the VStitcher (Browzwear) program, one of the modern technologies. With this digital transformation, the collection is displayed on the website, providing the end consumer with a unique shopping experience. Moreover, this digital transformation represents an important step not only for the design process but also for sustainability and efficiency in the fashion industry. Thanks to the possibilities offered by technology, the textile industry can turn to more environmentally friendly and efficient production methods. This not only supports an environmentally friendly production process but also shapes the future of the fashion industry.
Keywords: Women, Fashion and Textiles, Sportswear, Technology, 3D Design

ÖZ: *Günümüzde spor giyim trendleri moda dünyasının önemli bir parçası haline gelmiştir. Günümüzde kadınlar da günlük hayatlarında tarzlarını ifade etmek ve şıklığı konforla birleştirmek için spor giyim trendlerine önem veriyorlar. Spor giyimde şıklık, hareket özgürlüğü ve rahatlık ile birleştiğinde kişinin kendine olan güveni artar ve ruh hali olumlu yönde etkilenir. Bu çalışmada hazırlanan kadın spor giyim koleksiyonu, kadınların günlük yaşamlarında rahatlık ve ergonomi ile birlikte şık olmalarını amaçlamaktadır. Spor giyimde şıklık ve rahatlık,*

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kadınların hayatının her alanında önemli bir yere sahiptir. Spor giyim sadece bir aktivite için değil, aynı zamanda bir yaşam tarzı ve kişisel ifade biçimi olarak da kabul edilir. Dolayısıyla spor giyim trendlerine ayak uydurarak tarzını yansıtmak isteyen kadınlar için bu projede çeşitli günlük spor giyim seçenekleri sunuluyor. Gelişen teknoloji ile birlikte tekstil sektörü de her geçen gün yenilikleri beraberinde getirmektedir. Yazılım firmaları tarafından geliştirilen 3D programlardan biri olan VStitcher (Browzwear) tasarım programı, moda ve tekstil endüstrilerinde kullanılan bir 3D CAD yazılımıdır. Bu program, tasarımcılara ve tekstil üreticilerine ürün tasarlama, prototip oluşturma ve koleksiyonlarını sanal ortamda görselleştirme fırsatları sunuyor. VStitcher (Browzwear) ayrıca tasarımcıların tasarladıkları modelleri gerçek zamanlı olarak görmelerine ve geliştirmelerine olanak tanıyan sanal bir uygulama deneyimi sunar. Bu çalışmada, geleneksel tasarım süreçleri modern teknolojilerden biri olan VStitcher (Browzwear) programı ile birleştirilerek kadın spor giyim tasarımlarının dijital platformda yeniden canlandırılması amaçlanmıştır. Bu dijital dönüşüm ile koleksiyon web sitesinde sergilenerek son tüketiciye benzersiz bir alışveriş deneyimi yaşatılıyor. Üstelik bu dijital dönüşüm sadece tasarım süreci için değil, moda endüstrisinde sürdürülebilirlik ve verimlilik için de önemli bir adımı temsil ediyor. Teknolojinin sunduğu imkanlar sayesinde tekstil sektörü daha çevreci ve verimli üretim yöntemlerine yönelebilmektedir. Bu sadece çevre dostu bir üretim sürecini desteklemekle kalmıyor, aynı zamanda moda endüstrisinin geleceğini de şekillendiriyor.
Anahtar Kelimeler: *Kadın, Moda ve Tekstil, Spor Giyim, Teknoloji, 3D Tasarım*

Introduction

In addition to the basic needs such as shelter and nutrition that people need throughout their lives, the need for clothing is also very important. Although the concept of dressing initially emerged for the purpose of protection from natural conditions, it has changed with the concepts of aesthetics and socialization until today. Clothing is a vital concept that meets the physical, mental, and societal needs of individuals.

Today, the fashion industry is undergoing a major transformation, not only in terms of aesthetics and style, but also in terms of user experience. One of the most obvious examples of this transformation is that sportswear trends are increasingly at the center of the fashion world. Now, women are turning to sportswear collections that offer elegance together in their daily lives. Sportswear is recognized not only as an activity, but also as a lifestyle and form of personal expression.

Along with the developing technology, the fashion industry is also bringing innovations to itself day by day. 3D design programs developed by software companies offer designers the opportunity to design products and visualize their collections in a virtual environment. In particular, programs such as 3D VStitcher (Browzwear) offer designers a virtual proofing experience that allows them to see and develop the models they design in real time.

The equivalent of developing technologies in the business and industrial world in the 21st century is called the "Fourth Industrial Revolution" or "Industry 4.0". In the new industrial period we are in, also known as the "Digital Revolution"; Thanks to the rapid development of computer and communication technology, innovative technologies such as cyber-physical systems, internet of things, big data, augmented reality,

virtual reality, artificial intelligence, robot automation have emerged. This period is called the "Information Technology Era" (Dengiz, 2017: 38-39). This digital transformation also ensures that the collection is displayed on the website and a unique shopping experience is provided to the end consumer. When we look at the digital transformation in terms of the fashion industry, it is seen that important issues are covered in terms of sustainability and efficiency as well as the design process.

The Relationship between Sustainability and 3D Design

• Sustainability: Digital fashion minimizes environmental damage by reducing the need for physical production, transportation, and disposal of clothing. This leads to a reduction in resource consumption, waste production and pollution.

• Economic Efficiency: Digital fashion offers designers the opportunity to create prototypes faster and more cost-effectively, where they can create and test new designs without the need for physical production. By facilitating the design process, it enables faster response to trends and consumer demands. Since it does not require physical materials or production costs, it is more affordable and allows consumers to reach a wider variety of styles and designs in lower price ranges.

• Limitless Creativity: Digital fashion provides designers with the freedom to experiment with innovative materials, textures, and shapes without the constraints of physical production. This allows for unique and creative designs that may be difficult or impossible to make.

• Customization and Personalization: Digital fashion allows for greater personalization and customization of clothing and accessories, allowing consumers to change colors, patterns, and fit to suit their specific preferences and express their completely different styles.

• Inclusion and Diversity: Digital fashion promotes inclusivity by catering to a variety of body shapes, sizes, and abilities. It enables the creation of adaptable and customizable garments that can break down traditional barriers in the fashion industry.

• Accessibility: Digital fashion offers designers and artists a platform to showcase their work without the need for significant financial investments or resources associated with traditional fashion production.

• Marketing and Promotion: Digital fashion has become an important marketing tool, with brands leveraging virtual influencers, augmented reality, and social media to promote their physical products (Dündar, 2023: 319).

Digital Transformation in the Fashion Industry

In today's world, technological advances such as the use of computers and automation allow for the rapid exchange and flow of information all over the world. This rapid change in technology has become a necessity for manufacturing industries. The fashion industry also keeps up with these technological developments and is constantly changing. New materials, techniques, tools, and production methods are constantly innovating fashion product design, production, and presentation.

Many factors such as computer technology, light, sound, heat play an important role in the work of designers, and technology offers the designer the opportunity to create new and original products. In this context, the fashion industry is constantly adapting to changing technological developments and using these technologies to create creative and innovative products.

Technology is used in almost every stage of production in the fashion industry. Companies take advantage of the conveniences provided by developing technology in order to increase their production speed and flexibility and respond to the demands of customers faster. It is also seen that a different sector called "Digital Fashion", where people buy 3D digital clothes that do not exist in reality, has started to emerge through Computer Aided Design applications (Metlioğlu, 2021: 1747).

Today, it is seen that digital technology is more widely adopted and the desire to integrate into Industry 4.0 in all sectors, including the fashion industry. With the change in consumer expectations in this direction, it is seen that designs that will meet the clothing expectations of consumers and technologies that will provide clothing production methods that will realize these designs have started to be offered.

In sample production, it is important to use resources at a minimum level and to maximize efficiency. Especially in samples made in low quantities and different variations, the fabrics and accessories used are often reproduced, which increases the cost for businesses. In addition, it may be necessary to produce more than the order quantity in order to account for possible waste and loss of fabrics and by-products specific to the sample. This situation negatively affects the efficiency, sustainability and time management of businesses. With technological advancements, an alternative such as a digital sample has emerged. In this method, 2D molds are combined in 3D fashion design programs and digital samples are created on avatars (virtual mannequins). After the virtual sewing and cladding works, simulation and rendering processes are carried out and presented to the buyers (Makryniotis, 2015: 8).

3D design programs are used in three-dimensional clothing designs and offer many features such as clothing simulation and pattern proofing to their users. In addition, virtual fashion shows can be created with the designer clothes. Artificial intelligence; It provides significant advantages in the dissemination of fashion images, which play a critical role in the marketing of clothes, and in being noticed by people. Thanks to artificial intelligence applications, product photos, fashion photos, catalogs, social media posts; it can perform operations such as color, form features, filtering, extracting and classifying clothing features in large-volume visual data pools (Yıldıran, 2022: 562-564).

Today, CAD (Computer Aided Design) systems are used in ready-to-wear enterprises, which are similar in terms of their functions but differ in terms of the way they are used and the ancillary equipment they use. CAD programs that are frequently used in the fashion industry include:

• General purpose two-dimensional graphics programs such as (Adobe) Illustrator, (Adobe) Photoshop and CorelDraw,

• 2D programs specific to the clothing industry such as Kaledo, Fashion Studio, Audaces IDEA, NedGraphics,

• Mold software such as Assyst, Lectra CAD, Audaces, Accumark Gerber,

• It can be grouped as 3D garment design programs such as 3D VStitcher (Browzwear), CLO 3D, Style 3D, Optitex, Vidya, Audaces 3D.

The general features of 3D programs used in the fashion industry are listed below.

• The use of realistic 3D mannequins that can be customized in great detail in line with various parameters,

• Preparation of 2D molds that become 3D garments in accordance with all CAD systems in industry standards,

• Fabric draping simulation opportunities based on fabric physical conditions and giving extremely realistic results,

• Visual model fit control by visualizing the pressure of the fabric on the body with colored areas and fit guides,

• With its quality texture matching feature, it ensures that the visual presentations of fabrics, stitches and accessories are of high quality.

The Role of 3D Design in Women's Sportswear

3D design enables faster and more efficient operation than traditional design processes, and can reduce the cost and time in design and prototype processes. Clothing brands using 3D design programs; they are able to design, test, and manufacture their products quickly. Through these programs, products can be presented to the relevant market more quickly. Through 3D design, it is also helped to reduce the waste generated in the traditional production process. Designs made in the digital environment can contribute to sustainability efforts by minimizing the use of excess materials.

In recent years, with the increase in the level of awareness of individuals about healthy living, their interest in and participation in sports activities has increased significantly. This situation has led consumers to buy more sportswear products and ready-to-wear manufacturers to include sportswear product groups in their collections. (Goodrum, 2016: 145-161). 3D design has been an ideal tool in keeping up with the rapid change of trends in the sportswear industry. Sportswear brands can take advantage of 3D design to offer more diverse and technically advanced products to their customers.

The harmony of sportswear trends and 3D design leads to faster, more efficient, more innovative and more sustainable products in the sportswear industry. This alignment helps brands gain competitive advantage and increase customer satisfaction.

3D design; It also allows designers to visualize their ideas more realistically. During the concept development phase, 3D modeling and rendering techniques help designers bring their ideas to life digitally and better understand the details.

3D design plays an important role in the prototype manufacturing process. Traditionally, prototyping can be time-consuming and costly, while with 3D design, digital prototypes can be created quickly. These prototypes can be used to better understand the physical properties of the product and revise them as needed. 3D design is a powerful tool for communicating design to stakeholders and customers. Visually stunning 3D renderings can be used to clearly communicate design ideas and get feedback from stakeholders. This facilitates communication in the design process and ensures that the design moves in the right direction.

3D design is also important in that it can be used in preparation for the production process. After the technical details required for production are integrated into 3D modeling, potential problems in the production process can be detected in advance. The integration of 3D design into the design process consists of a set of techniques used at every stage of design. This integration allows design to be carried out more efficiently, faster and more effectively.

The Study

Elegance and comfort in sportswear have an important place in all aspects of women's lives. In this context, it is important to offer a variety of casual sportswear options for women who want to reflect their style by adapting to sportswear trends. The aim of this study, in which today's trends and sustainability elements are blended together; it is to prepare the sportswear collection, which aims to make women stylish with comfort and ergonomics in their daily lives, in a virtual environment.

Collection Preparation Process

It is explained as the idea phase in which the need for design is defined and a design concept is determined in line with these needs. It is at this stage that the designer defines the problem and the goal of the design project and collects data accordingly. The designer starts this process by identifying the sources from which he will be inspired. Ilhan sources; It includes various elements such as works of art, nature, cultural items, history, technology or any part of daily life. The designer researches the topics he will be inspired by in depth and determines the ideas that will form the basis of his own collection based on these sources.

Figure 1: Logo image.

The sources of inspiration for this collection are elements that reflect the strong and elegant spirit of women in today's rapidly changing world. In the streets of big cities full of energy and speed, it is necessary to understand the value of every moment and to keep up with the rhythm of time. For this reason, it is important for us that our designs are practical and versatile. The labyrinth metaphor, which also inspires our logo, symbolizes women to find

their own style among the endless options offered. Each piece is carefully designed to support and inspire strong and confident women. The use of quality materials and sustainable production is to encourage conscious consumption and take steps for a better future. This collection is designed to make women feel beautiful and powerful in every moment. As we move towards the future together with the target audience, we will continue to leave a mark on each woman's own journey and take steps for a stronger future.

Design Process

It is the stage where the designer uses all his creative resources to come up with the concept by making pre-sketch drawings of the different possible forms that the project can take. It is the stage of formal three-dimensional presentation of the selected solutions.

The color palette of a collection; It reflects the overall spirit, theme and even story of the collection. Colors are one of the most basic and expressive elements in fashion design. The choice of color determines the emotional impact that the collection wants to leave on the audience. Patterns are another important element that makes up the characteristic signature of a collection. When the pattern is used on the clothing, it increases the dynamism and originality of the design. The harmony and balance of the patterns in a collection contribute to increasing the visual appeal of the design. The colors used in the collection are selected from Pantone's color palette. The colors of the collection, which consists of 3 colors, are referred to as Summer Sand, Candy Pink and Red Plum in the Pantone catalog.

Fabrics are key elements that determine the look and feel of a collection. Properties of the fabric; while shaping the posture, details and decorations of the garment and affecting the sitting on the mannequin (Şenuyar, 2009: 28-37). The choice of fabric determines the functionality and comfort of the design as well as the aesthetic side. Features such as texture, thickness, softness and flexibility of the fabrics to be used in the collection should be suitable for the purposes and concept of the design.

In this collection, woven garni fabric was used as well as interlock, single jersey, three-thread and Thessaloniki fabrics. These fabrics have been selected to ensure that women are comfortable and stylish in their daily lives, as well as to comply with the principles of sustainable production. Each piece is designed as a demonstration of quality materials and meticulous craftsmanship.

Figure 2: Single jersey fabric image.

Figure 3: Image of woven garni fabric.

Figure 4: Image of fabrics in 3D program.

The fabrics used in this collection have polyester, cotton, polyamide and lycra contents. These materials provide both durability and comfort and aim to make women comfortable to use in their daily lives.

• Polyester fabrics; It is known for its durability and easy maintenance. The polyester fabrics used in this collection have long-lasting properties that preserve their colors for a long time.

• Cotton fabrics; It is known for its softness and breathability. Cotton fiber fabrics, which are the most preferred among natural fibers, have been preferred in this collection due to their comfortable and skin-friendly properties.

• Polyamide fabrics; they attract attention with their flexibility and lightness. The polyamide fabrics used in this collection support an active lifestyle by providing freedom of movement.

Realization Process

In the realization process, which is the stage where the designer works on realizing a prototype for the project, 3D modeling starts from the early stages of the design. Designers digitize their design ideas by using computer-aided design (CAD) software instead of traditional drawing tools. At this stage, the basic building blocks of the design are created and the design details are determined.

Until this stage, it is necessary to prepare the molds of the designs. Using 2D programs such as Assyst, Gerber, Audaces, the patterns of the clothes belonging to the collection are prepared digitally. In this study, the patterns of the designs in the collection were prepared by using the PolyPattern design program, which is the 2D program in cooperation with V-Stitcher Browzwear.

The rehearsal of the molds at the stage of turning them into products is carried out in three-dimensional cladding systems. Commonly used 3D virtual prototyping software includes programs such as CLO 3D, Optitex, Vidya, Marvelous Design, and V-Stitcher.

Once the basic framework of the design is created, designers use 3D modeling software to add details and refine the design. Colors, patterns, stitch details and other features are determined. Every aspect of the design is examined and edited in detail in the digital environment.

The molds prepared in 2D programs are dressed on the virtual mannequin in these programs and an image close to real life is obtained. The completed model is rendered from the 3D program and presented. Through the programs, the posture, balancing, sewing lines and differences in various fabric properties of the garment are controlled. In this way, it becomes easier to decide on fabric differences or the condition of the patterns. Error rates and production losses in molds are minimized and efficient use of fabric and material is ensured by these programs (Ural, 2019: 296).

Findings

Within the scope of this study, a literature search was conducted on the digitalization of the fashion industry in the context of technological developments, researches on 3D programs and the effect of 3D programs on

sportswear. Mold designs of this collection, which was prepared in line with a story about women's sportswear, were prepared with the 2D PolyPattern program, and the design was dressed on the avatar with the 3D VStitcher (Browzwear) program and the collection was presented in a virtual environment.

In the modeling process, the realism of fabric simulation is one of the most critical factors that determine the appearance of the garment. In addition to the material samples in the technical libraries of the software, the properties of the materials used in the collection were also entered into the program.

This collection consists of 3 models with a total of 6 pieces. Care has been taken to ensure that the prepared pieces are compatible with each other in a way that does not disturb the integrity of the collection by creating different combinations with different matches.

Model 1: Designed to provide sports elegance, this model consists of a t-shirt with garni sleeve detail and sports-stylish trousers with garni belt detail. The garni details used contribute to obtaining a modern look while moving the model away from the classical image. With these details, comfort and freedom of movement are also offered to the user. By combining elegance and practicality in sportswear, a stylish look is offered in daily life and convenience is provided to the consumer.

Model 2: Designed as jacket and rib stitched trousers, this model has been removed from the single-color combination with knitwear strips of different colors on the sides, while gaining a difference within itself. While a dynamic style is offered to the consumer, at the same time, elegance and functionality are combined in sportswear. While the knitwear strip details attract attention by adding a modern and sporty atmosphere to the combination, the zippered jacket offers freedom of movement and comfort.

Model 3: Designed as an oversized sweatshirt and jogger model trousers, this model is based on comfort. It provides a unique adaptation to daily life. While making you feel comfortable while doing sports, it is also aimed to achieve a stylish look in street fashion. While the oversized sweat offers freedom of movement, the trousers offer a modern and stylish style.

Figure 5: View of the Model 1 study from 6 different angles.

Figure 6: View of the Model 2 study from 6 different angles.

Figure 7: View of the Model 3 study from 6 different angles.

These designs, which are realized in the digital environment, have also significantly reduced the shooting cost of the renders to be used on the website. Compared to traditional photography, renderings obtained in digital environment offered a more efficient option in terms of both time and cost, allowing the total costs of the design and production processes to be optimized. Thanks to this study, a competitive advantage has been achieved by easily visualizing the details of the products offered to the consumer at every stage of the design process and minimizing the shooting costs.

In addition, designs made in the digital environment have significant contributions in terms of sustainability. While the consumption of materials and waste generation used in traditional production processes increase the environmental impact, these impacts have been significantly reduced through the use of digital design. By reducing the use of paper, fabric and other materials, it has contributed to the protection of natural resources and the reduction of the amount of waste. This allows for the adoption of a sustainable production process and the fulfillment of environmental responsibilities. Thus, the use of digital design programs represents an important step not only from an economic point of view, but also from an environmental impact point of view.

Conclusions

The fashion industry is going through a significant transformation process with the rapid advancement of technology. Especially in recent years, clothing collections organized in the virtual environment constitute an important part of the digital transformation in the fashion world. These collections offer new and creative possibilities to fashion designers, while also showcasing the power and impact of 3D design. This article discusses the digital transformation in the fashion world and the creative potential of 3D design in the process of preparing collections.

Women's clothing collections organized in a virtual environment go beyond the boundaries of traditional fashion design and bring a new aesthetic understanding and presentation style. In this context, 3D design

software and virtual fashion shows allow designers to carry out their conceptual research and design processes in a digital environment. Recently, the creative potential and advantages of 3D design have been emphasized for companies, designers and consumers.

3D design software offers designers the opportunity to plan and visualize every detail of their collections in a digital environment. In this way, the effects of colors, patterns and fabrics can be evaluated in real time, and the design process can become more flexible and creative.

However, with the use of 3D design, we also face some difficulties. Issues such as the necessity of technical skills, complex software tools, and the lack of physical touch of digital design are areas that challenge designers. To be able to deal with these challenges, the right training and experience are important.

In the digital transformation in the fashion industry, it is expected to increase the creativity of designers and offer new and exciting design opportunities. The use of 3D design software, which is a new technology in fashion design, is becoming widespread with the developing technology.

Thanks to the opportunities offered by technology, the textile industry can turn to more environmentally friendly and effective production methods. This not only supports an environmentally friendly production process, but also shapes the future of the fashion industry.

This study reveals that the use of 3D fashion design programs makes significant contributions to the design and production processes of women's sportswear collections. The design process, which was carried out in a digital environment, offered advantages in terms of both cost and time compared to traditional methods, and at the same time, it reduced the environmental impact and allowed the adoption of a production process in accordance with the principles of sustainability. Therefore, the dissemination and adoption of the use of digital design technologies in the textile industry can contribute to a more sustainable future by reducing environmental impact as well as increasing efficiency in the industry. In particular, it is necessary to make investments and support training programs in order to use digital technologies more in design and production processes and to increase their share in the sector. In this way, the textile industry can achieve a more innovative, efficient and environmentally friendly structure.

In this study, traditional design processes were combined with the 3D VStitcher (Browzwear) program, which is one of the modern technologies, and women's sportswear designs were revived on the digital platform. In the first stage, in line with the determined concepts and trends, the basic collection was created. Then, the details, scales and material properties of the selected models were determined in detail in the digital environment. In the design process, by using the different tools and effects offered by the program, it was ensured that the designs were visualized in the closest way to reality. At this stage, the digital determination of colors, patterns and sewing details has enabled the products to be presented more accurately and impressively. Finally, the completed designs were rendered on the

program, realistic images were obtained and made ready for use on the website. This digital design process has laid the foundation for a sustainable production process, saving both time and resources compared to traditional methods.

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