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Creating Attire for Dry Goods Workers by Incorporating the Characteristics of Pistachio Skin, such as its Form, Color, and Structural Elements

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Abstract

The researchers utilized electrospinning techniques to transform cellulose from pistachio skin into fine nanofibers, which were subsequently combined with silver nanomaterials. These fibers are later incorporated into the garments worn by individuals in the dry goods industry. The clothing for dry goods workers has been designed using color theory and the principles of formal design. Additionally, the attire is inspired by the shape, color, and structural components of the pistachio shell. The result of this clothing design for dry goods workers is a diverse range of appealing designs and colors. In addition to enhancing the identity and uniqueness of dry goods workers, these garments also possess functional properties that contribute to their health protection.

Keywords: fabric design, pistachio, cellulose, dried fruit.

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1. Introduction

Currently, a multitude of human resources are employed in various roles across industries, factories, and workshops. Each workplace imposes a set of regulations and obligations for its workers and employees. Among these requirements, the significance and necessity of appropriate work attire should be emphasized. The apparel for dry goods workers should possess not only aesthetic appeal and practicality, but also beneficial characteristics such as antimicrobial, anti-pollution, waterproof, and UV protection. These qualities can be incorporated into garment textiles by utilizing diverse nanomaterials like silver, titanium dioxide, and carbon nanotubes. In contrast, pistachio skin contains cellulose, a renewable material that can be converted into textile fiber. Various techniques such as electrospinning and electro blowing can be employed to transform pistachio skin cellulose into delicate nanofibers. The mentioned nanomaterials can be blended with these fibers and woven into the clothing worn by workers in the dry goods industry. This will not only enhance the functional qualities of the clothing but also provide appealing designs and colors inspired by the appearance and structure of pistachio skins. These designs and colors can be created following principles and guidelines for form and color design, contributing to the individuality and uniqueness of dry goods employees.

Whether work clothing should be chosen based on the job type, workplace environment, and weather conditions, along with the requirements for employee attire. Work attire provides significant benefits, both in terms of style and functionality. The production of work clothing is crucial and holds great importance. One can easily recognize this job as part of the service production sector when considering its community role. The designer, in efforts to craft a new image, presents various concepts for design and tailoring, among other areas, in this context.

When the designer shares his expertise and the garments he creates are made available for purchase, it signifies that he has effectively fulfilled his responsibilities within the service industry.

Employees must wear suitable work attire, as it is considered a type of personal protective equipment. The work clothing has specific characteristics and is allocated to employees according to set guidelines.

Each year, a considerable amount of pistachio waste is produced, including perishable waste, debris from gardening and green spaces, and waste from agricultural processing industries. Consequently, this leads to significant environmental harm, making the efficient management of agricultural waste essential.

The yearly amount of pistachio waste is approximately 1/35x10 to 5 tons, and the majority of this waste is attributed to the peeling process. Consequently, this often gives rise to significant environmental problems. According to data from the FAO, Iran, with its 58% share in pistachio production, holds a position as a leading global producer of pistachios. The by-products derived from processing raw pistachios consist of pistachio soft skin, leaf clusters, a small quantity of pistachio kernel, and wooden shells. The primary component of these by-products is pistachio green skin, which constitutes more than 60% of the total.

The skin of green pistachios contains a significant amount of phenolic and antioxidant compounds, making it a valuable source. The fruit's skin is also rich in flavonoid compounds. Moreover, the skin of pistachios protects against UV rays and pests, highlighting its beneficial properties.

Pistachio orchards become contaminated with Aspergillus fungus, and the environment is polluted when pistachio waste is discarded, resulting in the unpleasant release of odors and the proliferation of flies. Additionally, farmers often bury pistachio shells in orchards, causing harm to the roots and inhibiting plant growth due to the unstable organic matter present in the shells.

Rapid spoilage of pistachio skin causes environmental pollution, health problems, and economic losses, necessitating hygienic and cost-effective disposal methods.

Recycling organic waste, such as household and agricultural waste, can be accomplished through the utilization of aerobic or anaerobic microorganisms. This process results in the creation of compost, a beneficial organic material rich in humus. Compost serves multiple purposes, including disease prevention within society and environmental beautification. Moreover, compost can prevent pollution from seeping into underground sediment and enhance agricultural soil quality by providing humus. The common pistachio, scientifically known as Pistacia vera, is a type of dark plant in the Anacardiaceae genus. Various species within the pistachio genus are typically found as wild trees, able to withstand conditions such as car emissions and drought. Amongst pistachios, the Iranian variety stands out due to its numerous variations in shape, color, appearance, size, and dimensions. Moreover, its unique characteristics make it unparalleled in terms of quality, taste, and variety of shapes, distinguishing it from other pistachios worldwide.

Global pistachio production reached approximately 450,000 tons. Iran's 380,000-hectare pistachio farms, primarily located in Kerman province (55%), have produced 307,000 tons. Kelly et al., (2005) demonstrated that pistachio green skin possesses noteworthy levels of phenolic compounds, distinguishing it from other sources.

Given that the outer green shell of the pistachio accounts for approximately 40% of the fruit's weight, the production of pistachios in the country results in a significant quantity of skin. Moreover, this skin contains natural antioxidant compounds. A clothing designer's main role is to elevate social taste. Designers can achieve this by understanding and applying visual arts principles, incorporating balance, proportion, and coordination in design, color, and cut to create visually appealing and aesthetically enhanced clothing.

2. Practical and artistic work process

2.1. Clothing design process

The primary objective of clothing designers and their contribution to society is to elevate social preferences. Utilizing and implementing the fundamental principles and elements of visual arts in clothing design can greatly enhance its overall impact, as it maintains a sense of balance, proportion, design coordination, color harmony, and proper cut. These factors significantly contribute to the visual appeal and attractiveness of the garments.

Designing work clothes for dry goods businesses involves four steps:

1. When conducting research and gathering information, it is important to note that the approach may vary depending on the nature of the task at hand.

2. Explain the concept: The idea of clothing is analyzed by looking at its various conceptual layers. While the most obvious aspect is its appeal to the wearer and how it reflects in society and the media, there are hidden layers that play a defining role, such as whether the clothing will be worn again in the future. Essentially, understanding the concept means understanding the language of clothing, which can be a cultural language that helps establish social support and build identity.
3. Coming up with ideas or concepts: The presentation of the clothing designer's initial concept is derived from visual summation, scientific and traditional knowledge, and the principles of Islamic aesthetics. Ideation emphasizes the importance of creativity, innovation, and problem-solving skills. It is closely linked with the thought process. (Maghbli and Ghamari, 2012:22).
4. Fundamental studies: The study commences once there is a comprehensive understanding of the work attire and the societal norms. The primary aspect in altering the pattern of work clothes is ensuring their alignment with the culture of the society. When designing work clothes, it is essential to take into account factors such as comfort, functionality, and aesthetics. Additionally, promoting the use of materials sourced domestically and contributing to economic self-sufficiency based on climatic and geographical conditions are among the objectives of national dress design.
5. Changing, modifying, and completing the design process: To create an effective preliminary design, it is necessary to conduct relevant studies that are appropriate for the task at hand and consider the needs of the people involved. Subsequently, the patterns are analyzed and simplified to enhance convenience and adaptability to modern public gatherings. Thus, during the final stages of the study, the initial designs are refined and supplemented with additional or omitted details to ensure coordination between the design and its form. According to Maghbli and Ghamri (1392:19), incorporating the natural color of pistachio into the design and overall aesthetic of business attire can effectively uphold a professional appearance while also reducing costs. Furthermore, this approach ensures comfort during work hours.
6. Detail design: Special clothing and traditional attire from various cultures often inspire imitations. However, societies that value their rich cultural heritage rely on their traditional patterns and customs to evolve and stay current. Otherwise, changes in clothing styles may betray shifts in cultural identity. The key to a successful design lies in skillfully incorporating patterns and elements that harmonize with and enhance the overall aesthetic of the outfit.

3. Materials and equipment used

This study utilizes silver Nano spheres to enhance the desired characteristics of clothing worn by dry goods workers. The chemicals employed and their details are outlined in Table 1.

Table 1. Specifications of chemicals used.

Material name	Manufacturer name	Description
Silver nanophere	Sigma Aldrich	CAS.NO.806986

Table 2 presents a summary of the specifications of the devices and equipment utilized in this study. It is essential to highlight that the laboratory officials insisted on the devices operating correctly before experiment.

Table 2. Specifications of the equipment used

1. Device name	2. Manufacturer company	3. Description
4. Digital scale	5. Sartorius Germany	6. Accuracy of 0.00001 grams
7. Ultrasonic bath	8. Eurosonic 4D Italy	9. Frequency: 50 kHz, power: 350 watts
10. Soxhlet apparatus	11. Germany	12.

Furthermore, this thesis incorporates cotton fibers as the underlying material for the fabric.

4. Fabric preparation and finishing

This article focuses on the utilization of silver nanospheres to enhance the desirable characteristics of garments worn by workers in the dry goods industry. The specific chemical details are provided in the journal article titled Joule 1. The fabric preparation involves initial cleaning with distilled water, followed by placing it in an electrospinning machine. The cellulose from pistachio skins is then extracted using a Soxhlet machine and combined with nanomaterials through electro spinning. The mixture is stabilized on the fabric at 50°C for 30 minutes, then at 80°C for 2 minutes.

5. Artistic process

5.1. Initial studies and before implementation

The initial phase involved design and preliminary design work. Researchers then examined clothing worn by dry goods workers, analyzed approved samples based on the professor feedback, and reviewed related literature. The attire for dry goods workers was created after fabric preparation, using a combination of pistachio and neutral gray to enhance the green's neutrality. Designs incorporated the energy-adjusting Yabs color, calming hyacinth shade, and complementary red and green colors.

Figure 1. Examples of initial studies

6. Analysis and practical work process

6.1. Examination of the first design

This dress has been created with inspiration from the design and color of pistachio. By incorporating the neutral gray color alongside the green hue, its neutrality is diminished. The intention behind this design was to showcase the usage of the green color, which brings forth a sense of energy and cleanliness, evoking a soothing effect similar to that of the hyacinth plant.

Figure 2. Design number one

6.2. Examination of the second plan

The clothing design allows the employees to roll up their sleeves while performing their tasks consistently. To address this, work attire with short sleeves has been designed, which prioritizes both aesthetics and convenience during work.

Figure 3. Design number two

6.3. Examination of the third plan

Inspired by pistachios, this single-piece garment uses breathable natural materials for heat transfer, ideal for wear during hot harvest.

Figure 4. Design number three

6.4. Examination of the fourth plan

This design incorporates shades of gray and green, aiming to enhance both the beauty and comfort of the dress. Furthermore, a unique dress has been chosen to deviate from typical everyday clothing.

Figure 5. Design number four

7. Conclusion

This study utilized cellulose from pistachio skin, electrospun into fabric, to design modern and functional clothing for dry goods workers. The designs, incorporating uniform design principles and color science, aim to enhance worker efficiency, protect their skin, and improve their overall health and working environment.

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