

Exploring the Range of Felt Products Used in the Fashion Industry

Tanya Peneva, Margaret Sivova

Abstract — Wool felting is a technique for creating non-woven surface textiles, known for millennia, which fully complies with the strategy of the European Union, regarding the sustainable development of the textile and fashion industry. In this article, various plaiting techniques and their artistic shaping are presented. The range of felt products offered on the world market has been studied. The results of the research will find application in optimizing the assortment of manufacturers, reducing losses from unrealized production and increasing the sustainability of the fashion industry.

Keywords — Felting, sustainable development, fashion industry.

I. INTRODUCTION

The European Union's strategy for the sustainable development of the textiles and fashion industry stipulates that by 2030 all products must be durable, high quality and made from natural or recycled fibers. An important part of sustainable development is the preservation of each country's intangible cultural heritage. In response to globalization, an increasing number of nations are seeking to preserve their identity by preserving their traditional crafts, national dress and customs.

Wool felting is a technique for creating non-woven area textiles known for millennia. The main raw material is sheep's wool. It is used for its ability to be felted by washing, without the aid of sophisticated devices, machinery and technology. Wool meets the concept of sustainable development. It is a natural, renewable resource, biodegradable and fully recyclable. The products have a lifecycle of 15 - 20 years and respond to sustainable development trends in the fashion industry.

Nowadays, this unique technique is experiencing a renaissance. It allows a wide range of people to express their creative abilities, creating a multitude of different products with applications in various fields. Globally, more and more fashion and interior designers are incorporating felt products into their collections.

The aim of this work is to explore the possibilities of applying the traditional technique of felting in contemporary fashion design. In order to achieve it the following tasks are set:

- To study the different techniques of wool felting;
- Investigating the methods of artistic shaping of felts;

- Study the range of contemporary felted products.

II. HISTORICAL DEVELOPMENT OF FELTS

Articles made of felt have occupied an important part of man's life, their main task being to protect him from the weather. According to archaeologists, their emergence dates back to 8000 years ago. No scientifically reliable data have been found on where felting originated. It has been suggested that it began its history simultaneously in several parts of the world, with particularly large traditions found in Asia, Russia, Britain, Finland and Peru.

Many scholars argue that wool felting is the oldest textile technique, but how humans achieved this knowledge has not been scientifically established. One of the ancient legends says that the first felt carpet was created in Noah's Ark [1].

The ancient Greek historian Herodotus in the 5th century BC in his essays on the life of the Scythian tribes described the process of felting wool. For this reason, some researchers believe that it was invented by nomadic peoples. The Scythians were the first to appreciate the unique properties of felts and used them to make a variety of items for their lifestyle - dwellings (yurts), carpets, mats, saddle pads for riding, large bags for carrying goods, clothing, socks, hats, shoes, etc. Felt found application even in medicine, as the lanolin contained in the wool has a beneficial effect on the body in the treatment of bone fractures, rheumatism, arthritis, joint diseases, skin allergies, etc.[2].

For many peoples, especially nomadic ones, they have been the main type of textile for their entire lives. People were born and died on rugs made of felt, dressed themselves in garments made of them and kept their horses. According to folk beliefs, the felt articles protected them not only from the cold and heat, but also from evil spirits.

Wool felting was also known to the ancient Bulgarians. The earliest information about their spread in our lands are from Old Bulgarian written monuments dating back to the 10th - 11th centuries. The preserved examples are from the 17th, 18th, 19th and the first half of the 20th century. By the 1920s-1930s, the making of felt was widespread in rural areas with developed sheep farming. Strandzha is one of the regions where this ancient art is still practised. The Koprivshensky felted karpets are known for their high artistic value [3, 4, 10].

In 1984, the International Feltmakers Association (IFA), an international association of felt makers, was established with the main aim of developing and preserving this ancient craft. At present, the IFA is spread all over the world. In 2005, Hungarian ethnographer and artist István Vjajak and textile expert Marie Nagy founded the International Felt Academy in Germany. Since 2009,

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following the official launch of the International Year of Natural Fibers by the Food and Agriculture Organization of the United Nations in Rome, the global community has celebrated International Fiber Day [5].

III. MATERIALS AND METHODS FOR FELTING

The main material for making felts is mostly sheep's wool. Wool fibers have the unique property of tightness due to their surface flaky layer. In the presence of moisture, heat and mechanical impact, especially in an alkaline environment, felting occurs, tightening and producing a felt. The cause of this phenomenon is the swelling of the fibers as well as the difference in the coefficient of friction at their base and tip.

Modern felt making is based on centuries of experience gained by our ancestors. There are two main techniques: wet and dry.

Wet felting is the oldest, traditional manual method, in which under mechanical influence in a water, soap and suitable temperature the wool shows its ability to become felt. This technique makes it possible to produce flat decorative details and voluminous products. It can be said that there is not a single people in the world who have not used wet felting to satisfy their textile needs.

Dry felting dates back to the Roman Empire. The Romans used this technique to make warm, waterproof garments and various artistic ornaments on woven surfaces. Nowadays, this method continues to be used mostly for decorating and for making complex spatial figures.

In addition to the techniques for making the flat textile material felt, a variety of artistic shaping techniques are used, depending on the culture of the various peoples and the development of the historical traditions of this ancient art. There are three traditional techniques for decorating felt, which are defined as the main ones to this day.



Fig.1. Iranian traditional technique [7]

Iranian Traditional Technique - The figures of the pattern are made by arranging different colors of wool according to a pattern on a mat, then rolling it up and directly starting the felting process - Fig.1. In some literature this technique is defined as decorating by felting. The main colors are white, red and black, and the most common ornament is stylized ram's horns. The adopters of this technique are various peoples, the Turkic, Turkmen, etc. **Central Asian**, also called Pazirikskaya, after the world's most famous felted carpets found in the cemetery

mounds of Upper Altai. This technique refers to the so-called "Scythian Circle". The most famous Pazirik carpet was found in the Fifth Cemetery Mound and is preserved in the Hermitage National History Museum, St. Petersburg - Fig. 2. In this technique the decorative elements are made by thin and fine felts being applied one on top of the other and forming different figures. A characteristic feature is that many and bright colors are used. At present, this technique is widespread is used mostly in Kazakhstan.



Fig.2. Central Asian traditional technique [7]

The traditional Shun technique is named after the tribes of the same name, who did not know any other type of textile other than felt. The first specimens were found on the burial mound of Noin-Ula, located in Inner Mongolia. Genghis Khan's yurt is covered with felt carpets using this technique, which confirms that its creators were Mongolian tribes. Subsequently, this technique was used by many peoples of Central Asia: Tibetans, Altaians, Cossacks, etc., and it was preserved in its ancient form on the territory of the Republic of Buryatia [6].



Fig. 3. Shun traditional technique [7]

A characteristic feature of felted products is that they are predominantly one-color, but are completely decorated with decorative stitches made from threads or animal tendons. The stitches used in ancient times were believed to have magical powers and are still used today.

Our ancestors made wet felt by repeatedly pouring hot water over the spread wool and applying mechanical pressure through a series of strokes with hands and sticks until the felt was an inch or two thick. It then turned over and worked in the same manner, or rolled up tight and beaten again with hands, feet, sticks, etc. The decorating technique used is Iranian. In most areas the color scheme is predominantly white and beige wool. Pleats with complex and multi-colored ornaments are also made, the most

famous and beautiful being those from Koprivshitsa.[9]

Modern felting techniques are based on the traditional ones, but new trends have emerged, mostly in combining wool with different types of fabrics. The technique of felting wool and fabric is called nuno felting. The word nuno is derived from Japanese and means fabric. Nuno felting can be done by wet and dry technique. The fabrics used are of natural origin, silk being the most widely used. This technique enables the production of products with high artistic value, good physical and mechanical properties and hypoallergenic qualities.

Nowadays, thanks to their unique properties, felt products are experiencing a renaissance. There has been a significant increase in interest in them and a widening of their fields of application. Wool and felting techniques are fully in line with current trends in the fashion industry for sustainable development. They have great potential for application in small and medium-sized businesses and would contribute to the preservation of the natural environment and cultural identity of any people. The great variety of the range of felted products makes it necessary to study it in depth in order to analyze the possibilities of their application in the fashion industry.

IV. STUDY OF THE RANGE OF ARTICLES OF FELT

The assortment of 90 online stores offering felt products was subjected to a survey [8]. 1692 items were analyzed. In the course of the study it was found that they can be classified into four main groups, depending on their intended use:

- Clothing - skirts, blouses, dresses, waistcoats, coats and jackets;
- Accessories - scarves, hats, bags and jewels;
- Footwear - house slippers, slippers and boots;
- Toys and souvenirs.

A fifth group, called 'Other', is also defined, which includes items which differ from the above and which are one-off cases. The results of the overall analysis of the groups is presented in Table 1 and the graph in Figure 4.

TABLE 1
STUDY OF THE MAIN GROUPS

Groups	Number of products	Percent [%]
Clothing	275	16,24%
Accessories	683	40,32%
Shoes	413	24,41%
Toys and souvenirs	244	14,42%
Others	77	4,55%
TOTAL	1692	99,94%

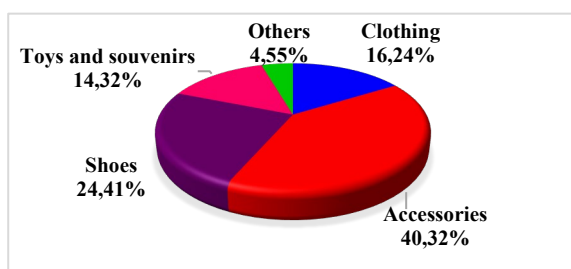


Fig. 4. Relative shares of the groups

The analysis of the chart allows to conclude that the largest application of the felting technique is for the manufacture of various types of accessories - 40.32%, followed by the group "Footwear" - 24.41% and the group "Clothing" - 16.24%.

In order to investigate the possibilities of application of felt products in the fashion industry, the groups "Clothing" and "Accessories" were studied separately.

The 'Clothing' group includes the following products: skirts; blouses; dresses; jackets and vest; waistcoats. The results are presented in Figure 5 and Table 2. It was found that the greatest application of the technique of felting is found in the manufacture of blouses - 37.7%, followed by dresses - 24, 4%, jackets - 16.98% and waistcoats - 15.09%.

TABLE 2
STUDY OF TYPES OF CLOTHING

Type of clothing	Number of products	Percent [%]
Skirts	18	6,79
Blouses	97	36,60
Dresses	65	24,53
Jackets and vests	45	16,98
Waistcoats	40	15,09
TOTAL	265	100

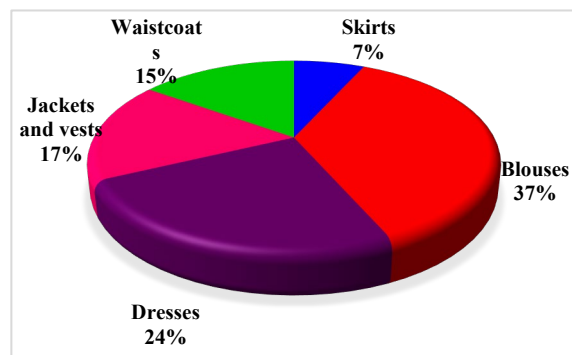


Fig.5. Relative shares of clothing types

The group "Accessories" includes the following items: scarves, hats, gloves, bags and jewelry. 683 articles were analyzed. The results are presented in Table 3 and Figure 6. It was found that the highest percentage share of articles: scarves - 37,48%, hats - 32, 21%.

TABLE 3
STUDY OF TYPES OF ACCESSORIES

Type of accessories	Number of products	Percent [%]
Scarves	256	37,48%
Hats	220	32,21%
Gloves	76	11,13%
Bags	66	9,66%
Jewelry	65	9,52%
TOTAL	683	100

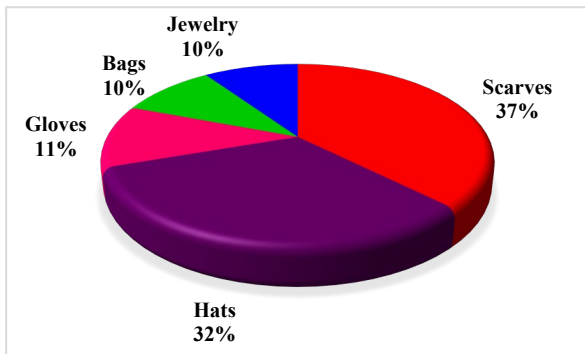


Fig.6. Relative shares of accessories types

The statistical method "Correspondence Analysis" was used to investigate the relationship between the type of articles and the felting technique. Correspondence analysis is a pictorial research technique developed to analyze bivariate and multivariate tables containing information about the relationships between two groups of, investigated, nonparametric quantities. A bivariate or multivariate graph represents the relationships between the individual representatives of the groups under study.

The results of the study were processed using the software product "Statistica 10" and "Excel" 2013.

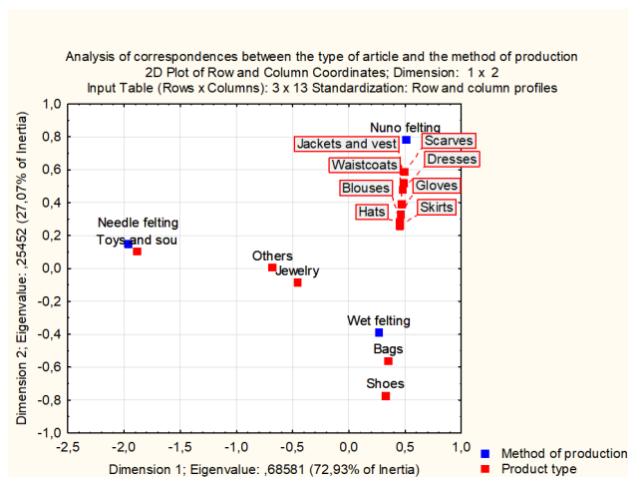


Fig. 7. Analysis of correspondences between the type of article and the method of production

1692 articles were studied. In the process of analyzing the assortment, three methods of making them were found: wet felting, dry felting and nuno felting. The results of the study are presented graphically in Figure 7.

In the data analysis it was found that 58.65% of the total number of articles were made in Wet felting technique, 26.64% - Nuno felting and 14.91% Needle felting. A

strong correlation was found between Nuno felting technique and the articles of the groups "Clothing" and "Accessories". The Wet felting technique is most strongly related to the Bags and Shoes group. Souvenirs and toys have the strongest correlation with the Needle felting technique. Jewellery and the group of so-called "Others" is equally distant from the different types of techniques for making articles.

V. CONCLUSION

In this paper, the different techniques of making felt products and their artistic shaping were presented. A survey of the range of 90 online shops offering felt products was done. 1692 items were analyzed. A classification of the articles is presented. The percentage relationship between the different types of articles is established. The relationship between the type of article and the method of its production is investigated using the methods of mathematical statistics. The results of the study testify to the enormous potential for the application of felt articles in the fashion industry. The analysis of the assortment and the established percentage relationships would optimize the production of felt products and increase its sustainability by reducing losses from unsold production.

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