International Journal of Cultural and Social Studies (IntJCSS)
June 2023: Volume 9 (Issue 1) / e-ISSN : 2458-9381

Araştırma Makalesi ● Research Article

Optimization of Factors Affecting the Degree of Sagging in Pilisoley Technique*

Banu Yeşim Büyükakıncı[a], Ayşegül İlkentapar[b], Nilay Bıçak[c]

[a] Halic University, Faculty of Fine Art, Istanbul, Turkiye.
banuyesimbuyukakinci@halic.edu.tr
ORCID: 0000-0001-7597-4406
[b]Vakko, Esenyurt Design Center, Istanbul, Turkiye.
aysegule@vakko.com.tr
ORCID: 0000-0003-1182-0840
[b] Vakko, Esenyurt Design Center, Istanbul, Turkiye.
nilay.bicak@vakko.com.tr

ARTICLE INFO

Article history:
Received: 18. 06. 2022
Received in revised form: 10.08.2022
Accepted: 12.09.2022

Keywords:
Pleat, Pleating, Pilisoley, Clothing, Sagging.

ABSTRACT

The use of clothing, starting from prehistoric times with the instinct of covering and protecting from natural events and attacks, is a lively fashion item that reflects the characteristics of individuals and society. Designers keep the fashion cycle alive by ensuring the continuity of innovations. Techniques such as drape, pleat and crease are the techniques that emerged as a result of the search for innovation and have been used in clothing for centuries. Pleat is the process of folding, patterning and shaping natural and synthetic-based fabrics passed between molds or rollers under high heat.

In this study, pleating methods used in clothing were researched and examples of the Pilisoley technique, which is predominantly used within Vakko, were discussed. Pilisoley is formed by ironing pleats in accordion-like appearance on fabric cut from a slant. Pilisoley clothing often have a "sagging problem". Through this study, it is aimed to reach the correct cut values at once, to prevent sagging and unnecessary fabric consumption, and to save time accordingly.

Reference Information

Büyükakıncı, B.Y., İlkentapar, A., Bıçak, N. (2023). Optimization of Factors Affecting the Degree of Sagging in Pilisoley Technique *Uluslararası Kültürel ve Sosyal Araştırmalar Dergisi (UKSAD),* 9 (1), s. 156- 165.

* DOI: 10.46442/intjcss.1132644
** Corresponding Author: Banu Yeşim Büyükakıncı, banuyesimbuyukakinci@halic.edu.tr

1. Introduction

Fashion encompasses the diversity that arises from people's desire to be unique and different.Pleats and creases are frequently used by designers for freedom of movement, comfort and stylistic reasons.While textural and shape variations such as pleats made on fabric give a different form, aesthetic and appearance to the clothing, they are also of great importance in terms of fashion diversity.
Pleat(Elliott, 2022), which is a kind of folding method applied to create filling and volume in a fabric, is formed by folding or breaking paper and fabrics (leather, polyester, cellulosic mixture) under high heat (https1).Cellulosic and protein-containing fabrics are not suitable for pleating due to their structure.These fabrics must be pre-treated with resin in order to make pleats.These fabrics have low pleat permanence and lose their pleat appearance after a few washes.For this reason, polyester and/or polyester blended fabrics are preferred for the pleating process (https1).

1.1. Use of Pleating in Clothing History

The pleat application method is first encountered in the Egyptian Period (Figures 1 and 2).The abundance and thinness of the pleat number of skirts in the Egyptian Period is an important feature that shows the status of men (Tutal, 2018).It is seen that the Egyptian people applied pressure to the linen fabrics by using the hot stones found on the banks of the Nile river and gave it the pleat feature (Genç, 2012). When we examine the clothing and underwear samples belonging to the Egyptian Period, we can say that the flexible fabric known as lycra fabric today is the fabric applied to the pleat in the Egyptian Period.Examples of clothes designed using pleats during the Hittite Period are given in Figure 3.Iron corsets dominated by pleated collars draw attention in women's clothing of the Renaissance Period (Genç, 2012). The effects of the II. Constitutional Period are seen in the fashion of the Republic Period; In the Süs Magazine of 1923, it is mentioned that pleats are made on the side parts of the dresses with flat front and back (Bukarlı, 2017:55). After the World War II, there is a return to the past in Turkish women's clothing fashion in the Republican Period, which was influenced by Europe; it is seen that pleats are used to design loose-fitting, non-fitting, plain clothes without embroidering (Ağaçvd., 2007).

Figure 1: The long pleated dress attached to the body seen in wall-carved female figures and sculptures (Yıldız, 2022:170)

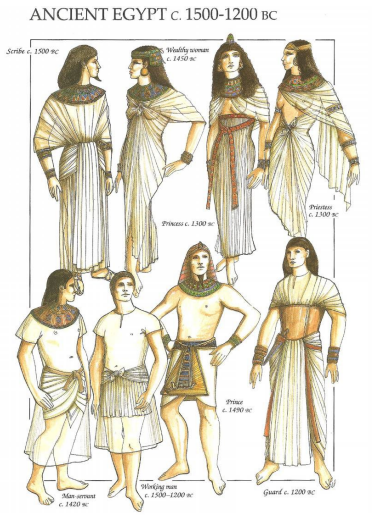


Figure 2: Fine linen pleated dresses from the Egyptian Period (Genç, 2012).

Figure 3: Clothing with vertical pleats on the back and sides, seen on a wall-carved imperial noble figure (Yıldız, 2022:170)

1.2. Examining the Effects of Using Pleating on Design in Artist Collections

In the patent information of Mariano Fortuny's dress named “Delphos” (Figures 4 and 5), one of the 20th century designers included in the book “Fifty Dresses That Changed the World”, the dress form is Ion Chiton belonging to Ancient Greece, it is stated that the fabric is Silk and dyed with metallic colors, and the pleating method is the natural method applied in Ancient Egypt (Genç, 2012).

Figure 4: Mariano Fortuny, Delphos dress, pleated fabric (Genç, 2012).

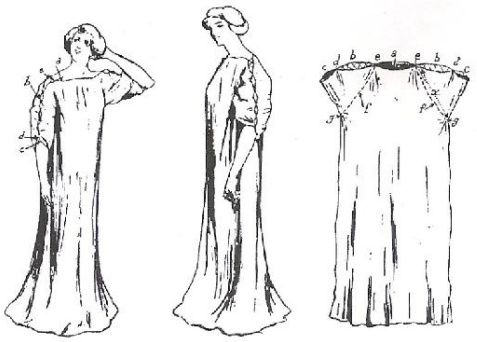


Figure 5: Mariano Fortuny, Delphos dress, drawing declared for patent (Genç, 2012).

Miyake's “Pleats Please” collection consists of geometric and loose-fitting clothing (Figure 6), designed with the draping method without cutting the fabrics and dominated by the use of pleated fabrics (Genç, 2012).Madame Alix Gres has used the pleating technique in her designs to bring fluidity to the fabric and to create a whole with the body and movements of the wearer.In the orange dress designed by Gres (Figure 7) thin pleats are used, and the pleats used in layers from small to large give the design a columnar appearance.In Yohji Yamamoto's designs, the effect of his own developed pili technique and the use of Grease's stepped pile can be seen.In the silk dress designed by Yamamoto (Figure 8), thin pillars and folds reminiscent of sea anemones are used to add volume to the clothing(Bölat, 2020:113).

Figure 6: Issey Miyake, dresses in geometric form applied to pleats (Genç, 2012).

Figure 7: Madame Alix Grease, Orange dress (Bölat, 2020:113)

Figure 8: Yohji Yamamoto, Red dress, silk crepe (Bölat, 2020:113)

1.3. Pleating Methods Used in Clothing Products

- *Hand Pleating Method:*First, the fabric is placed between the two cards, then the fabric placed between the cards is shaped.The fabric between the cards is compressed, and finally, the compressed and tied fabric is placed in the steam cabinet and the mold is fixed (https 2).

- *"Pleats Please" Method:* It is a method developed by IsseyMikaye, in which fabrics sandwiched between layers of paper are transformed into an origami by applying heat and pressure, and it is a method for using pleats in clothes by putting the fabrics in a pleated form (Yıldızvd., 2019:560).
- *Aslope Pleat Methods:* Aslope pleats have two important measurement parameters: "folding depth" and "upper measure-distance".
- *Straight-Knife Pleat:* It consists of two folds of equal width, an outer fold, all facing the same direction, and an inner fold hidden behind it (Figure 9-10) (https5).One side is longer than the other; pleats normally face to the left so that the zipper can be hidden under a pleat in women's skirts [11, 12].
- *Inverted Pleat (Box Pleat, Law Pleat):* A left flat pillar followed by a right flat pile was folded from both sides to create a box effect (Figure 11-12) [11, 12].A flat, rectangular fabric is used for the pleat, the edges and seams should be straight.It is not recommended that the fabric to be used should be striped (https5).
- *Jacquard Pleat (Zig-Zag Pleat, Spike Pleat, Bamboo Pleat, Chain Pleat):* The fold is zig zag to the right and left.In flat and inverted pleat, the machine moves vertically back and forth, whereas in this the machine moves horizontally to the right and left.There is a structure called comb in the machine setup, depending on the shape of the comb, the pleat appearance also changes (Figure 13) (https4).

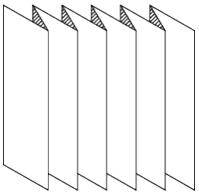


Figure 9: Straight Pleat (https3)

Figure 10: Straight Pleat, Fabric(https4)

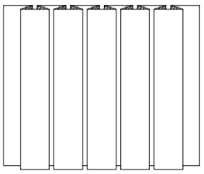


Figure 11: Inverted pleat(https3)

Figure 12: Inverted pleat, Fabric(https4)

Figure 13: Jacquard Pleat(https4)

- *Straight Pleat(GraduatedPleat):*It is one of the Vertical Pleat methods.Same as regular straight pleat, but bottom pleat changes from hip to hem, creating a gradient in the visible fabric (Figure14).The fabric to be used should be 3 times the hip size (https3).
- *Shirring Pleat:* It is similar to the vertical pleat, but there are more than 200 wires on the machine used in its production, which increases the variety of images on the fabric after the process (Figure 15) (https4).
- *Accordion pleat:*It is one of the vertical pleat methods. It has 2 sides, both of the same length (Figure 16).The fabric to be used should be 3 times the hip size (https3).

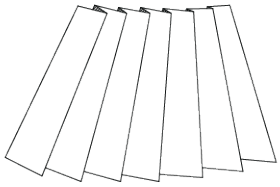


Figure 14: Straight Pleat (https3)

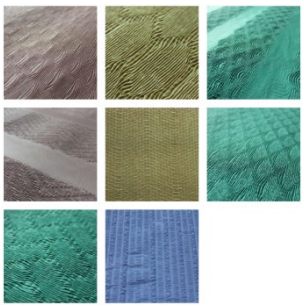


Figure 15: Shirring Pleat (https6)

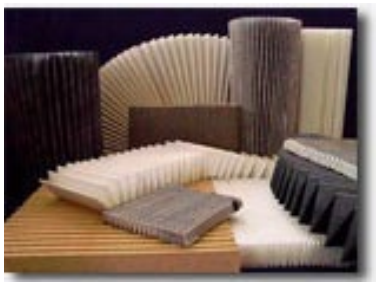


Figure 16: Accordion pleat (https4)

- *Pilisoley (Sunburst Pleat):*It is one of the vertical pleatmethods.A cardboard mold is placed between the fabrics cut in half A shape, folded at equal intervals (Figure 17) and exposed to high heat, so that a pleat appearance that expands from the top to the bottom is obtained (Figure 18) (https7).It is also called "Solar *Pleat* " because of the appearance of the sun rays starting from a point and expanding and dispersing (https8). It is convenient to make it in a machine, but it can also be done by hand due to reasons such as high cost and the low number of products obtained in a single operation (https7).When made by hand, masculine and feminine cardboards are used (https8).As the radius length at the waist increases, the skirt fullness also increases (https5)

Figure 17. PilisoleyFabric(https4)

Figure 18. 180ºPilisoley Application (https 6)

1.4. Factors Affecting Pleat Quality

It is very important that the fabric to be pleated should contain at least 30% polyester blend, the temperature given in the pleating machine, the given steam minutes, the opening time of the pleat and its durability.Although pleating can be made on natural fibers (wool, linen, cotton, silk, etc.), the low permanence of pleats in fabrics is considered as a disadvantage and is not often preferred.It is known that the pleats applied to these fabrics are not resistant to washing.Since the pleats are subjected to shorter heat treatment in silk fabrics due to their delicate structure, the pleat life of these fabrics is also short (https5).ŞenelGenç studies examining fabric decline in the relationship between drape and pleat on different fabric types,it shows that the cottony structure of voile fabrics allows to form net pleats that drape downwards, more voluminous pleats with no downward drape are obtained in denim fabrics, and satin fabric is the fabric type that gives the best results in the formation of pile (Genç, 2012).The fabric that will go into the pleat should be seamless, usually cut in a semicircle and without borders.In Pilisoley, the pleats are sewn flat to the waist, and the fabrics should be left hanging for a few days after the process so that the pleats do not fall off.When it is not desired to be grooved, the pleats are sharpened by curling the edges of the fabric by dry ironing (https5).

2. Material and Method

In the presented article, tables were created by calculating the "relationship of fabric type and fabric weight with sagging in pleated clothes" and the data obtained were supported by study visuals.

2.1. Material

In this study, 100% Polyester and Polyester-Cotton blend fabrics are used. 100% Polyester fabrics, 75-95 gr, 95-115 gr and 115-135 gr; Polyester/Cotton blended fabrics are divided into 3 groups as 70-100 gr, 100-130 gr and 130 < gr.
Multi chiffon (80 and 82 g/m2), silk crepe (108 g/m2), Magnolia/Escada (125 g/m2) and Jasper (84 g/m2) were used for 100% Polyester fabrics in the study.For polyester-cotton blends, 3 different blend ratios were used and 35% Cotton-65% Polyester (75 g/m2), 55% Cotton-45% Polyester (116 g/m2) and 65% Cotton-35% Polyester (215 g/m^2) ratios were used.

2.2. Method

Two different pleating methods are used in Vakko.In the Straight Pleat method, the hem ends of the models are folded cleanly and sent for the pleating process.In the Pilisoley method, which is also the subject of this article, the pleat pattern was studied first, and then this pattern was sent to the pleating process.The patterns from the pleating process are in voluminous form, the pattern is fixed after bonding with interlining. Pilisoley patterns were created by cutting 90º (Figure19-21) and 180º (Figure20-22) pieces from fabrics.The patterns were prepared between 0.3 – 3 cm, and the pilisoley process was applied under steam for an average of 15-20 minutes.

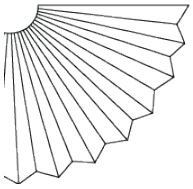


Figure19: 90° PilisoleyPattern

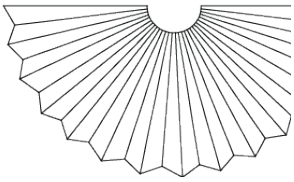


Figure20: 180° PilisoleyPattern

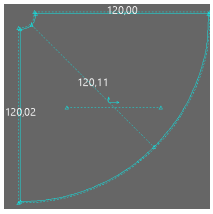


Figure21: Outgoing 90° Pattern for pleating

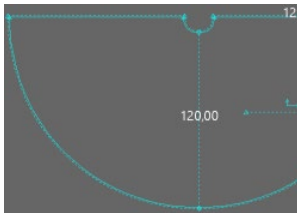


Figure 22: Outgoing 180°Pattern for pleating

100% Polyester fabrics, 75-95 gr, 95-115 gr and 115-135 gr; Polyester/Cotton blended fabrics are divided into 3 groups as 70-100 gr, 100-130 gr and 130 < gr. The following formula was used in order to calculate and optimize the amount of sagging in the fabrics after the pilisoley process.

% Sagging rate = (sagging / first hemline) x 100 (1)

3. Results and Discussion

In the presented article, tables (Tables 1 – 3) were created by calculating "the relationship of fabric type and fabric weight with sagging in pleated clothing" and the data obtained were supported by working visuals.90° and 180° pieces were cut from 100% Polyester and Polyester/Cotton blended fabrics in three different weights, and pilisoley works were carried out for "quarter-circle" and "semi-circle" pieces (Tables 1-2).

Table1: Sagging of the Fabric After Pilisoley Application, 100% Polyester Fabrics

%100 Polyester Fabrics						
Fabric	Multi Chiffon	Silk Crepe	Magnolia /Escada	Multi Chiffon	Silk Crepe	Magnolia /Escada
Weight (g/m^2)	75-95	95-115	115-135	75-95	95-115	115-135
Angle	90° fabric (Quarter Circle)			180° fabric (Quarter Circle)		

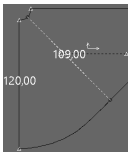
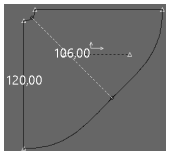
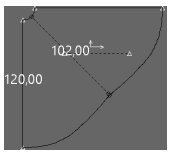
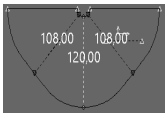
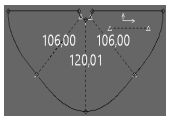
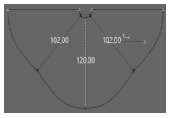
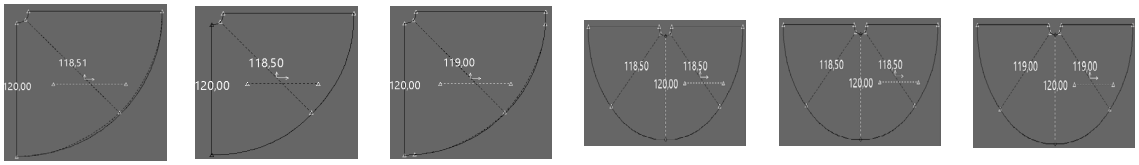
Pleat Visual						
Sagging(cm)	11	14	18	12	14	18
Pattern Process for the Amount of Sagging						

Table2: Sagging of the Fabric After Pilisoley Application, Polyester-Cotton Blended Fabrics

Polyester Cotton Mixed Fabrics						
Fabric	%35 Cotton %65 Polyester	%55 Cotton %45 Polyester	%65 Cotton %35 Polyester	%35 Cotton %65 Polyester	%55 Cotton %45 Polyester	%65 Cotton %35 Polyester
Weight (g/m^2)	70-100	100-130	130<	70-100	100-130	130<
Angle	90° fabric (Quarter Circle)			180° fabric (Semi-circle)		
Pleat Visual						
Sagging (cm)	1.5	1.5	1	1.5	1	1
Pattern Process for the Amount of Sagging						

90° and 180° pieces were cut from 100% Polyester and Polyester/Cotton blended fabrics in three different weights and pilisoley works were carried out for "quarter-circle" and "semi-circle" pieces (Tables 1-2).

By measuring the amount of sagging that occurs in Pilisoley fabrics, the sagging ratios (%) were calculated (Table 3), and the effects of fabrics of different weights and different piece sizes on sagging were investigated.

Table3. Sagging Amount Optimization

%100 Polyester Fabrics			
Weight (g/m^2)	75 -95	95 -115	115 -135
% Sagging 90° Fabric	9.1	11.7	15
% Sagging 180° Fabric	10	11.7	15

Polyester Cotton Companion Fabrics			
Weight (g/m^2)	70 -100	100 -130	130 <
% Sagging 90° Fabric	1.2	1.2	0.8
% Sagging 180° Fabric	1.2	0.8	0.8

It has been determined that sagging rates increase as the fabric weight increases in 100% polyester fabrics. In polyester-cotton blends, on the other hand, it was observed that the fabric weights did not have a significant effect on sagging and this ratio remained within the very low limits (%0.8-%1.2).

It was determined that fabric sizes (90˚-180˚) did not affect sagging in both fabric types with Pilisoley fabric (Table 3).

4. Conclusion

It has been determined that in polyester fabrics, sagging rates increase as the fabric weight increases, while the increase in weight does not have a significant effect on sagging in polyester-cotton blended fabrics.It was determined that the use of fabric pieces of different sizes (90º-quarter circle and 180º-half circle) for the pilisoley did not affect the sagging.

As a result of this study; it was also determined that the sagging rates of quarter and semi-circular fabric pieces sent to the pleat were similar and the most important criterion affecting sagging was fabric weight. Companion fabrics, increasing the cotton ratio increases the fabric weight geometrically. Looking at the results, it was seen that the increase in cotton ratios in the blended fabrics did not have a significant effect on sagging.This too; It suggests that sagging will not be seen as a major problem when 100% cotton fabric is used.Although polyester fabrics are mainly used in pleat and pilisoley applications, it is known that cotton fabrics are also used for design purposes. This study was also carried out for 100% natural cotton and wool fabrics. However, it has been observed that the pleats, on wool and cotton fabrics do not have permanence and durability because of the fabric properties.

Acknowledgement

We would like to thank the Vakko management and Bahise Kurt for their support of our work.

References

Elliott, V. (2022). *The world of pleats – explained.* https://byhandlondon.com/blogs/by-hand-london/26070276-the-world-of-pleats-explained.

Tutal T. (2018). *17. ve 18.Yüzyıllarda Osmanlı Giyim Kültürüne Batı Giyim Kültürünün Etkileri*. Beykent Üniversitesi Sosyal Bilimler Enstitüsü Tekstil ve Moda Tasarımı Sanat Dalı. İstanbul.

Genç Ş. (2012). *Giyim Tasarımında Drapajın Kullanımı*. Marmara Üniversitesi Güzel Sanatlar Enstitüsü Tekstil Anadalı. İstanbul.

Bukarlı E. (2017). *Meşrutiyet'ten Cumhuriyet'e Kadın Kıyafetinin Dönüşümü*. International Periodical for the Languages-Literature and History of Turkish or Turkic. 12/1, 55-78.

Ağaç S., Çivitcic Ş., Boğday Sayğılı. B. (2007). *Cumhuriyet'ten Günümüze Kadın Giyim Kültüründeki Değişimler Üzerine Bir Araştırma*. Uluslararası Asya ve Kuzey Afrika Çalışmaları Kongresi - 38.ICANAS, 1-21, 10-15 Eylül 2007. Ankara.

Yıldız D. (2022). *Giysilerin Tarihsel Sürecine Genel Bir Bakış*. TJSS The Journal of Social Science. 6 (11), 170-190.

Bölat S. (2020). *Giysi Tasarımında Drapenin Rolü: Madame Alix Gres Örneği*, Aydın Sanat. 6 (12), 113-121.

Yıldız Ş., Turunç Y. (2019). *Moda Tasarımcısı Issey Miyake'nin Koleksiyonlarının Tasarım Ögeleri Bakımından İncelenmesi.* IBAD Sosyal Bilimler Dergisi. Özel Sayı, 560-577.

Https 1: Pili Nedir. Pileli Ne Demek. Plise Kumaş Nasıl Yapılır. https://tekstilsayfasi.blogspot.com/2017/11/plise-kumas-nedir.html. (Erişim: 03.04.2022)

Https 2: How Pleated Fabric is Made and Common Types of Pleat, 2022.02.24. https://www.thefashionstudenthub.com/blog/the-secrets-to-pleating. (Erişim: 24.02.2022)

Https 3:Pleating Styles. https://www.cimentpleating.com/services. (Erişim: 26.02.2022)

Https 4: Pilise Nedir? https://www.tunaplise.com/plise-nedir.html. (Erişim: 08.04.2022)

Https 5: Pleating Styles. https://www.parispleaters.com.au/pleating-styles. (Erişim: 08.04.2022)

Https 6: Soley. http://www.hakplise.com/portfolio/soley/. (Erişim: 08.04.2022)

Https 7: Plisoley Plise. http://www.ucarplise.com/plisoleyplise.aspx. (Erişim: 03.04.2022)

Https 8: Pilisoley Nedir. https://tekstilsayfasi.blogspot.com/. (Erişim: 03.04.2022)