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Appearance Performance of Commercial Hijab Fabrics

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ABSTRACT

Muslim women are required to wear hijab as a religious obligation which symbolizes women's faith to the creator (Quran 24:21). Many types of hijab are available in the market, with ready-to-wear (RTW) hijab being the most popular choice of hijab in Malaysia. Limited knowledge of fabric characteristics among consumers has created dissatisfaction in many aspects of hijab performance associated with appearance and comfort. This paper presented the study of hijab appearance performances. Ten commercial fabrics (cotton, tetron cotton, silk, rayon, crepe back satin, Valentino dull satin, chiffon crepe, French voile, and koshibo) which are commonly used in hijab making, were investigated. Stiffness, drape, wrinkle aspect, pilling, and snagging of fabric, which is associated with hijab appearance, were examined. A fabric ranking index was then developed to support the analysis further. In order to validate the result, a wear test was conducted where the tested fabrics were developed into hijabs and wear assessment was conducted. Feedback from the respondents was obtained and compared with the fabric ranking index. The results of this study concluded that koshibo, Valentino dull satin, chiffon crepe and French voile exhibited the highest performance ranking among all the fabric tested. The study

provides the reference to hijab manufacturers and end-users in selecting the most suitable fabric for hijab in terms of the respective appearance properties.

Keywords*: hijab, clothing comfort, fabric appearance*

INTRODUCTION

Hijab is an integral part of the everyday appearance and life of most Muslim women all over the world [1]. In Islam, wearing a hijab is an obligation that had been stated in Al Quran (Quran 24:21) and Muslim women need to wear it properly according to the guideline provided. It symbolizes the Muslim's women commitment to Islamic principles. In recent years, hijab has been studied in many different aspects [2]-[7]. However, less has been reported on the appearance performance of hijab.

Nowadays, the rise of trend and fashion are highly accelerating due to the demand of the women nature itself who love something that is beautiful and suits them well. This situation also involves hijab trend development. Islam preaches that one should refrain from waste, luxury and overindulgence in material possessions. But there are still many women who are willing to spend a high amount of money to buy their favourite brand scarves. The enthusiasm for headscarves, however, does not necessarily connote materialism and waste to them [8].

The trend in fashion changes at a fast pace, so as hijab fashion. In hijab making, the selection of fabric is of crucial importance. The fabric chosen by manufacturers is either requested by the consumer or dictated by the manufacturer itself. Commonly, fabric selection for hijab making is being made based on its physical look and aesthetic value, which also include the appealing aspect of the printed design. Even though the level of the comfort properties of the fabric is determined as the main reason of choosing the hijab, the physical aesthetic properties of fabric such as stiffness, drape, wrinkle recovery, pilling and dimensional stability are also taken into consideration when choosing the right hijab.

It is crucial for the manufacturers to understand women perceptions towards fashion, including hijab. Often, hijab users complain about hijab being easily wrinkled or creased, too stiff, having poor drape, easy to pill after several usage, and snagging problem when pin or brooch is used as accessories. Instead of the design aspect of hijab, these physical properties are also essential to ensure consumer satisfaction. Today's hijab consumers are easily influenced by media advertisement and are always attracted to the brand, physical look, and design of the hijab. However, the aspects of material performances have often been neglected. To gain consumers satisfaction, it is of utmost importance that hijab manufacturers and consumers possess knowledge in the aspects of hijab fabric performance before production and purchasing are made. In this study, commercial fabrics commonly used in hijab making were examined for their mechanical performances which will eventually affect hijab appearance during use.

MATERIALS AND METHOD

Nine commercial fabrics that were identified as the most commonly used for hijab-making were obtained from retail fabric stores within Shah Alam. The fabrics are the 100% cotton, cotton (C), tetron cotton (TC), rayon (R), jacquard silk (JS), French voile (FV), Valentino dull satin (VDS), crepe back satin (CBS), chiffon crepe (CC), and koshibo (K). For this study, the fabrics are indicated with its commercial market names for easy identification.

Fabric physical tests, together with selected fabric appearance tests were conducted which include i) stiffness, ii) drapability, iii) wrinkle recovery angle (WRA), iv) snagging, and v) pilling. In this study, the laboratory tests were conducted in regards to the expected problem of hijab wearer Wear assessment test was also conducted to support the laboratory assessment.

Fabric physical test

The physical fabric tests performed include weight, thickness, and fabric density. Methods and sample dimensions of the respective analysis

were in accordance with the international standards: ASTM D751 – 06 – Standard Test Methods for Fabrics. Solubility test for fibre identification was conducted in accordance with ASTM D276-12 Standard Test Methods for Identification of Textile Fibres.

Fabric appearance test

Table 1 presented the standard test methods used to assess the appearance performance of the hijab fabrics.

Table 1: Standard Method and Equipment for Appearance Tests

Appearance Test	Standard Method	Equipment
Stiffness	ASTM D 1388 – 2008	SDL Stiffness Tester
Drapability	BS 5058 : 73/2007	Cusick Drape Tester
Wrinkle recovery	AATCC 66- 2008	SDL Wrinkle Recovery Angle Tester
Snagging	ASTM D3939 – 2009	SDL Mace Snag Tester
Pilling	ASTM D 3512 - 2007	ICI Pilling Boxes

Wear assessment test

To obtain feedback from users on the stiffness, drape and snag aspects of the hijab fabrics, the wear assessment test was conducted. For this purpose, nine prototypes hijabs measuring 43 x 43 inches were constructed using the nine hijab fabrics. Ten human subjects were randomly selected among hijab-wearing women in the age range between 20-30 years old. Each subject was asked to wear the nine hijabs and rate the hijabs according to the respective properties (scale 1-poor, to scale 5-excellent).

Analysis method

Data obtained from the laboratory and wear assessment were using Microsoft Excel. Results of each respective test, together with the wear assessment results, were and later converted to a ranking scale to serve as guidelines for the development of Fabric Ranking Index (FRI). The

FRI was then developed to provide guidance as to which fabric performs better in terms of the tested appearance properties. The FRI was evaluated by calculating the frequency of the total rating. The quality evaluation of fabrics was also interpreted in the form of a 'Spider Chart' of sided polygon.

RESULTS AND DISCUSSION

Fabric physical properties

The physical properties of the hijab fabrics are presented in Table 2. Out of all nine fabrics examined, five are of polyester fibre while the others are of cotton, silk, rayon and polyester-cotton blend.

Table 2: Fabric Physical Properties

Fabric (commercial name)	Thickness (mm)	Weight (g/m²)	Density (weft x warp/ in²)	Composition
Cotton	0.27	134.6	72 x 115	100%Cotton
Tetron cotton	0.23	110.0	73 x 120	65% Polyester, 35% Cotton
Jacquard silk	0.20	97.6	111 x 214	100% Silk
Rayon	0.22	127.7	43 x 93	100% Rayon
Crepe back satin	0.24	132.5	85 x 180	100% Polyester
Valentino dull satin	0.37	110.6	102 x 191	100% Polyester
French voile	0.16	66.3	52 x 80	100% Polyester
Chiffon crepe	0.19	63.10	96 x 102	100% Polyester
Koshibo	0.34	164.5	65 x 155	100% Polyester

Stiffness

In this study, the stiffness of the fabric was determined by the mean of the fabric bending length, following the ASTM D1388-96/2002-Standard Method for Stiffness of Fabrics. Figure 1 presented the stiffness performance of all samples.

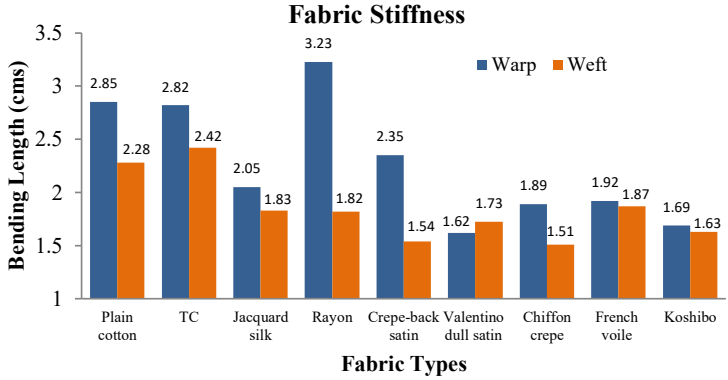


Figure 1: Stiffness Performance of Hijab Fabrics

Results show that the bending length of mostly all samples are higher in warp direction compared to the weft direction, except for VDS. This is due to the higher density of warp thread as compared to weft in all samples that predominant the effect of bending stiffness values. Fabrics of plain cotton gave out the highest value of total bending length while the Koshibo fabric the lowest. It indicates that the plain cotton fabric was the stiffest and Koshibo tend to be least stiff among all tested fabrics.

Drape

The drape coefficient of all samples was determined in accordance to BS 5058 – 1997: British Standard Method for the Assessment of Drape of Fabrics. For hijab making purpose, it is crucial to measure the drape of the fabric as it will affect the final appearance of hijab when worn, which is one of the vital element of hijab appearance. The test involved hanging fabric sample of 15 cm radius over supporting disc of 9 cm radius. The unsupported area was let down under its own weight and was measured as the drape coefficient (%) which varies from 0 to 100. Figure 2 presented the drape coefficient of all samples.

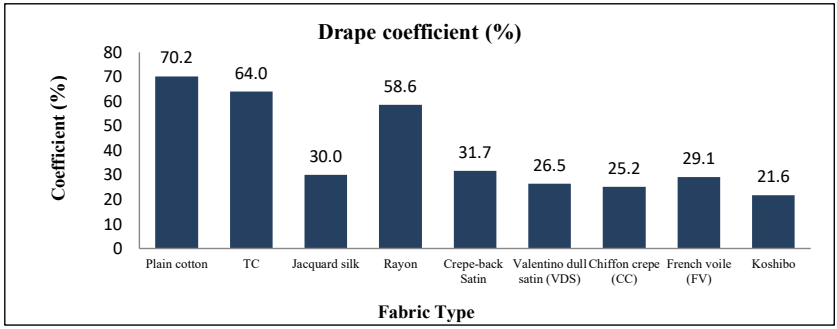


Figure 2: Drape Performance of Hijab Fabrics

A measure of 100% indicates a total rigidity (stiff) fabric, while 0% value represents soft and well-drape fabric [9]. Koshibo fabric showed the lowest drape coefficient, while plain cotton fabric showed the highest drape coefficient. Drape coefficient of crepe back satin, jacquard silk, French voile, koshibo, chiffon crepe, and Valentino dull satin are in the range of 20% - 30%. At the same time, plain cotton, tetron cotton and rayon showed higher range value of coefficient percentage indicating poorer drape.

Wrinkle recovery

The WRA test is used to determine the wrinkle recovery of woven fabrics. A test specimen is folded and compressed under controlled conditions of time and force to create a folded wrinkle. The test specimen is then suspended in a test instrument for a controlled recovery period, after which the recovery angle is recorded. The average values of WRA are presented in Figure 3.

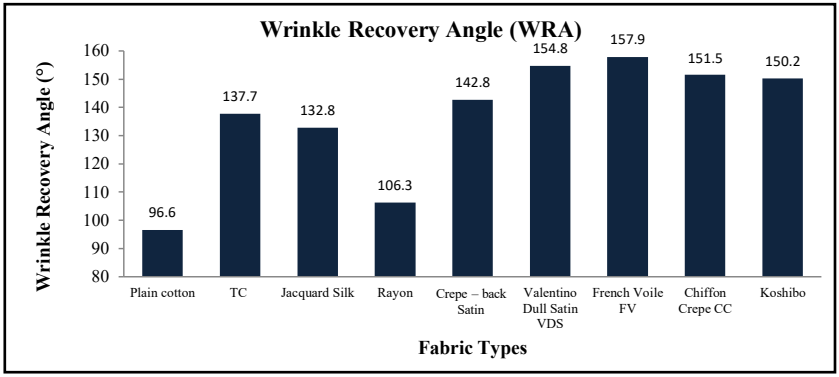
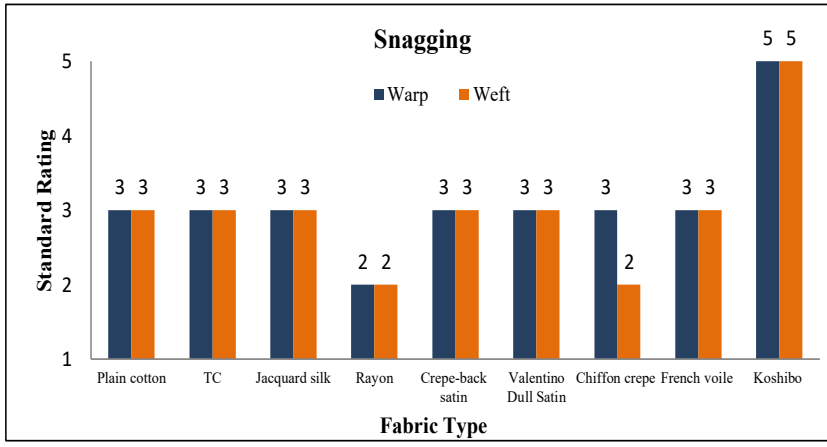


Figure 3: Wrinkle Recovery Performance of Hijab Fabrics

Plain cotton showed the lowest WRA reading, which means the cotton fabric can become easily creased and wrinkled and takes longer time to recover back and reform. This is due to the cellulosic nature of the cotton fibre. In contrast, French voile (100% polyester) exhibited the highest value in WRA. Voile is a lightweight sheer plain weave with crisp airy feel made from yarns having considerably more than usual twist [10]. Due to the molecular structure of the synthetic fibre, French voile is highly resistant to wrinkle. Only slight differences were noticed between French voile and the following five fabrics that are Valentino dull satin – polyester, chiffon crepe polyester, koshibo polyester, crepe-back satin polyester and TC, which are all made of polyester and polyester blended (with angle values of 154.75o, 151.50 o, 150.23 o, 142.75 o, 137.68 o, respectively).

Snagging

Snagging test was conducted to determine the snagging resistance of the fabrics. ASTM D 1388 – 2008 was used as this test method is suitable for a range of woven and knitted fabrics made from textured or untextured yarns containing staple or continuous filaments The degree of resistance to snagging is reported on a scale ranging from 5 (no snagging) to 1 (severe snagging). The rating was evaluated by two persons. Figure 4 presented the snagging performance of all fabrics.



Rayon fabric showed the rating of 2, which indicates reduced snagging rate while Koshibo - polyester fabric did not show any snagging (rank 5). The rest of the fabrics showed the rating of 3, indicating medium rate of being snagged. These fabrics are categorised under the lightweight fabric and therefore tend to snag easily.

Pilling

Pilling test indicates the propensity of a fabric to form pills and other related surface changes on textiles using the random tumble pilling tester. The pilling test was conducted, and the average values of pilling standard rating are presented in Figure 5.

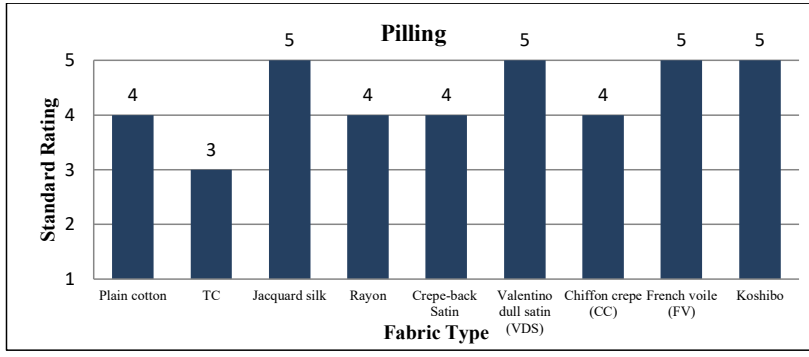


Figure 5: Pilling Performance of Hijab Fabrics

Results indicated that most of the fabrics exhibited reasonable pilling rate. Valentino dull satin, crepe back satin, chiffon crepe, French voile and Jacquard silk showed the rate of 5, while koshibo, plain cotton, and rayon showed the rate of 4. The rate of 3 showed only by TC.

Fibres such as wool, cotton, polyester, nylon and acrylic tend to pill the most [11]. In a blended fabric which is made from more than one fibre type, one fibre usually is stronger than the other one. Pilling will be more noticeable, because the weaker fibre wears and breaks, while the more durable fibre holds the pills to the fabric. Plain weave fabrics are generally the least prone to pilling, while pilling increases when the density of yarn cross-over points decrease and the yarn float increase. This explains why TC polyester exhibited the lowest rating and pills more.

Fabric appearance

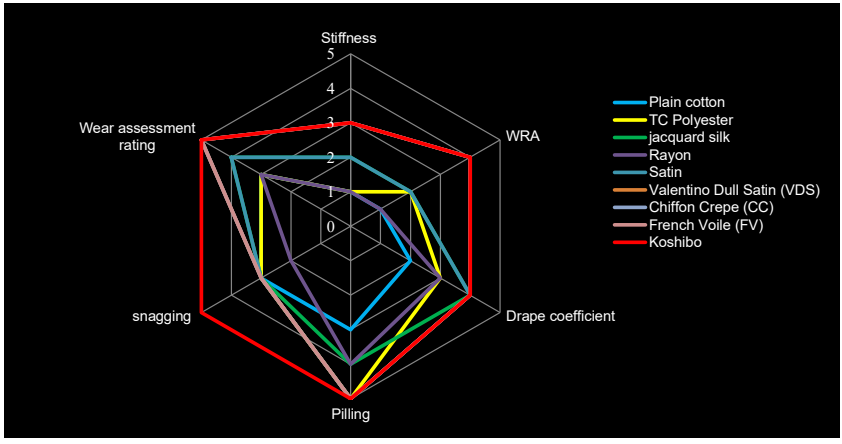


Figure 6: Fabric Appearance Performance (Source by author)

The results of the tested properties for all fabrics were plotted against the required standard specifications or comparable values in the form of a spider chart (Figure 6). These values form the points on the eleven-sided polygon. Any value nearer to the outer part of the polygon is assessed as having better performance than value nearer to the centre of the polygon, therefore, possessing lower appearance quality required in commercial hijab performance.

From the spider chart, it can be clearly seen that koshibo fabric exhibits the largest area compared to other fabrics and 100% cotton fabric showed to the lowest area among all, followed by VDS and CC with both exhibited similar appearance performance. FV shows nearly similar performance as koshibo, however, exhibited moderate snagging behaviour. It can be generally said that koshibo is the best fabric for the hijab based on those five physical properties and 100% cotton fabric may not be suitable for hijab.

Fabric ranking index

As the outcome from all the tested results, the data of the respective test was converted into a fabric ranking scale, and presented in Table 3. Prior to that, a ranking guideline (Table 4) was developed to be used as a reference in the establishment of the fabric ranking index.

Table 3: Fabric Ranking Scale

Fabric	Stiffness	WRA	Drape	Pilling	Snagging	Wear Assessment Rating
Cotton	1	1	2	4	3	3
TC	1	2	2	3	3	3
Jacquard silk	2	2	4	5	3	4
Rayon	1	1	3	4	2	3
Satin	2	2	4	5	3	4
Valentino dull satin	3	4	4	5	3	5
Chiffon crepe	3	4	4	5	3	5
French voile	2	4	4	5	3	5
Koshibo	3	4	4	5	5	5

5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor

Table 4 was developed by segmenting the range of results into a number scale (scale 1-poor, to scale 5-excellent). After analysing all the results outcome, a final ranking of fabric was obtained. The classification of the fabric was then finalised from the fabric index tabulated in Table 3. The fabric ranking is tabulated in Table 5. The result considering all properties that had been tested including the result from the wear assessment. This ranking used the technique of rating that had been developed carefully within the specific value range.

Table 4: Ranking Guidelines

Properties	Ranking	Properties	Ranking
Stiffness		**Pilling**	
0.0 - 1.1	5	Rating of 5	5
1.2 - 2.3	4	Rating of 4	4
2.4 – 3.5	3	Rating of 3	3
3.6 – 4.7	2	Rating of 2	2
4.8 – 6.0	1	Rating of 1	1
Drape Coefficient (%)		**Snagging**	
81 – 100	5	Rating of 5	5
61 – 80	4	Rating of 4	4
41 – 60	3	Rating of 3	3
21 – 40	2	Rating of 2	2
0 – 20	1	Rating of 1	1
WRA (°angle)		**Wear Assessment**	
325 – 360	5	4.1 – 5.0	5
289 – 324	4	3.1 – 4.0	4
253 – 288	3	2.1 – 3.0	3
217 – 252	2	1.1 – 2.0	2
180 – 216	1	-	-

Table 5: Fabric Ranking Index (FRI)

Fabric	Total Index Number	Fabric Ranking
Koshibo	26	1
Valentino dull satin	24	2
Chiffon crepe	24	3
French voile	24	4
Satin	20	5
Jacquard silk	19	6
TC polyester	17	7
Rayon	14	8
100% Cotton	13	9

From the FRI result (Table 5), Koshibo fabric is in the first rank, followed by the Valentino dull satin, chiffon crepe, French voile, crepe-back satin, Jacquard silk, TC, rayon and the plain cotton fabric was in the last rank. This ranking result agreed with the analysed data obtained from the spider chart for the fabric evaluation quality. Besides that, it also been observed that the fabric that made from 100% polyester such as koshibo, Valentino dull satin, chiffon crepe, French voile and crepe-back satin, were in the top ranking.

Drapability of hijab fabrics: Node analysis

As drape aspect plays a significant role in providing a graceful aesthetic effect to hijab, the number of drape nodes during the test was observed (Figure 7). Koshibo fabric exhibited the highest number of nodes among all fabrics, while Cotton and TC exhibited the least. This indicates that Koshibo fabric will show better flare effect when constructed into hijab.

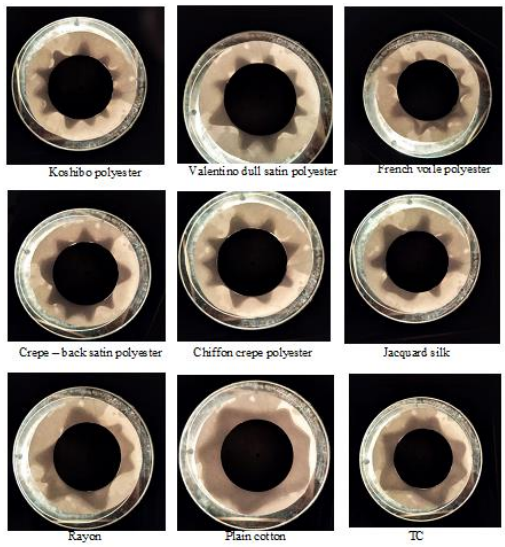


Figure 7: Drape Nodes of Hijab Fabrics (Source by Author)

CONCLUSION

The spider chart for fabric quality evaluation, as well as the Fabric Ranking Index, were constructed and the commercial fabrics available in the market for hijab making were ranked for its appearance properties. Koshibo, Valentino dull satin, chiffon crepe and French voile were found to possess better appearance performance than other tested fabrics. The findings of the wear assessment test were also found to be in agreement with the FRI. The study is useful in providing guidelines for hijab manufacturers and consumers to make a better decision on fabric selection for hijab making and purchasing.

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