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Ege University, Textile and Apparel Research-Application Center, 35100, Bornova, İzmir, Turkey
Tel: +90 232 374 28 68 / Fax: +90 232 388 78 59
(Ege Üni. Tekstil ve Konfeksiyon Araştırma-Uygulama Merkezi 35100 Bornova – İzmir)

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(REFEREED RESEARCH)

DETERMINATION OF THE IDEAL FABRIC WIDTH OF THE CLASSICAL WOMEN'S BLOUSE MODELS MADE FROM BULDAN CLOTH

BULDAN BEZİNDEN ÜRETİLEN KLASİK BAYAN BLUZU MODELLERİNİN İDEAL KUMAŞ ENİNİN SAPTANMASI

Emine UTKUN [1], Ziynet ÖNDOĞAN[2]

[1]Pamukkale University, Buldan Vocation School, Denizli, Turkey
[2]Ege University, Textile Engineering Department, İzmir, Turkey

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ABSTRACT

In this study, the objective is to determine the ideal fabric width for the cut of the ladies' classical blouse models that are made from Buldan cloth in Buldan country. The intended use of a fabric affects its width and the economical production of the items to be made from it. So, it is useful to work on the fabric in different widths in accordance with the intended use. According to the results of the study, the ideal fabric widths determined for the classical models were recommended to the Buldan cloth manufacturers.

Key Words: Buldan cloth, CAD system, Women's blouse, Fabric utilization ratio.

ÖZET

Bu araştırmada, Buldan ilçesinde Buldan bezinden üretilmekte olan klasik bayan bluzu modellerinin kesimi için ideal kumaş enlerinin saptanması amaçlanmaktadır. Bir kumaşın kullanım amacı, onun enini ve ondan yapılacak olan ürünlerin en ekonomik biçimde ortaya çıkmasını etkilemektedir. Bu nedenle kullanım amacına bağlı olarak bir kumaşı farklı enlerde çalışmakta fayda vardır. Araştırmanın sonuçlarına göre Buldan bezi üreticilerine klasik modeller için belirlenen ideal kumaş enleri önerilmiştir.

Anahtar Kelimeler: Buldan bezi, CAD sistemi, Bayan bluzu, Kumaştan faydalanma oranı.

[*] **Corresponding Author:** Emine Utkun, eutkun@pau.edu.tr, Tel:+90 258 431 86 20 Fax:+90 258 431 86 21

1. INTRODUCTION

All the researches on the costs of the clothing production show that the fabric constitutes 50-60% of the clothing cost (1).

Considering that the fabric has a very large amount of the clothing cost, it is understood that the savings obtained from the fabric are very important for the organization. The place of the savings obtained from the fabric is the pattern and marker preparation department in the model section.

The factors that affect the fabric quantity that will be used per unit clothes are the size of the garment, the width of the fabric, the direction of texture and pile of the fabric, the pattern direction of the fabric, the pattern size of the garment, the cut size assortment and the size of the table in the establishment. As the garment size varies according to the fashion trends (tight-large, long-short), it may be thought that it is not correct to consider the fabric utilization amount as standard. However, this value must be available for at least the standard size apparel (1).

When the center of Denizli, its countries and Buldan villages are observed, Buldan immediately comes into prominence with the prevalence of weaving, the varieties of the types and famousness throughout the country. The archaeological studies in the area give information that weaving dates back to BC in Denizli and its surroundings. The development of textile industry is possible with researching, detecting, analyzing and improving some traditional woven products (2).

Buldan country is an important local weaving center in Anatolia. One of the weaving types manufactured in this center is "Buldan cloth" which is called in its own name. The unique characteristics of Buldan cloth should be improved by equipping with technical knowledge and the product development works in Buldan cloth should be focused on. Especially that it is natural and healthy shows that it will be preferred in the future, too. The objective of this study is to research

and revive a traditional fabric like Buldan cloth. When a literature research was done regarding the subject, no study was found except the studies that focus on the technical properties of Buldan cloth in our country. It is thought that the ready-made clothing works of Buldan cloth should be increased. In this study, the objective is to determine the ideal fabric width for the cut of the ladies' classical blouse models that are made from Buldan cloth in Buldan country.

According to the inventory counting in Buldan country in 2009, total 313 looms (31 handlooms, 198 jacquard looms, 59 dobby looms and 25 seated looms) are working in the houses and workshops in the county town. In the industrial zone, there are 102 motor looms, 65 dobby looms, 52 jacquard looms and 10 seated looms. The best explanation why Buldan country is called the land of service industry is that the looms are continuously working in the country and meters of fabric is produced everyday (3).

The woven items in Buldan are divided into two as parts production and meter production. The parts items are loin cloth, robe, halves, towel, sheet, handkerchief and table-top. Meter items are Buldan cloth, tent fabric, flannel, interlining and canvas (4).

The characteristics of Buldan cloth; it is made from 100 % cotton yarn, it is a fabric that has a plain wave texture, the weft yarn has a higher twist value than the warp yarn, it has a curly surface as it is woven with twisting yarn, it is elastic (flexible), it is tight-fitting, the airspace between the twists keeps the body cool, its sweat absorbency is sanitary because of its cotton quality. Buldan cloth has the quality of being a very unique type with its compliance with the market conditions, its traditional value, use opportunities and technical properties (4).

After the Buldan cloth is woven, it does not processed with any chemical substance; it is just subjected to desizing process. Buldan cloth is sold both locally and abroad from Buldan. The periods of the year when it is most consumed are February, March, April and May. The technical properties of Buldan cloth are seen in Table 1, and the different colors of Buldan cloth are seen in Figure 1 and 2.

The classical models produced in Buldan country from past to present are seen in Figure 3, 4 and 5. The first of these models is a V-necked, long-sleeve ladies' blouse with straight attached sleeve and slit from the sleeves and sides. The second model is again a V-necked, short-sleeve ladies' blouse with straight attached sleeve and slit from the sleeves and sides. The third model is a round necked and self-sleeved ladies' dress slit from the sides, which is called "kaftan" in Buldan country.

Table 1. The technical specifications of Buldan cloth

Warp Yarn			Weft Yarn		
Number (Ne)	Density (warp/cm)	Twist (cycle/meter)	Number (Ne)	Density (warp/cm)	Twist (cycle/meter)
20/1	22	600	20/1	17	1200

Figure 1. Buldan cloth

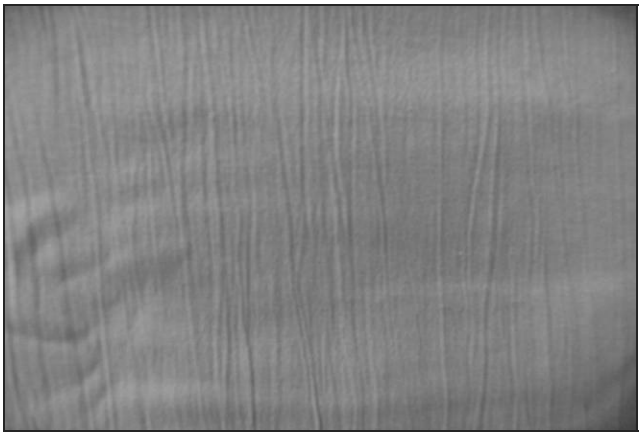

Figure 2. Buldan cloth

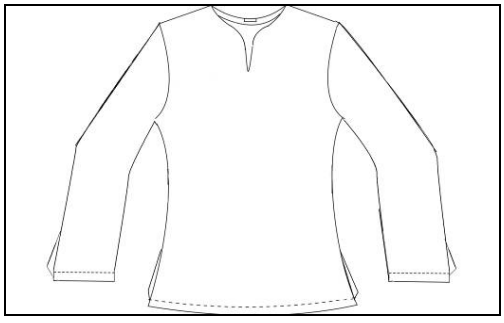

Figure 3. Model 1

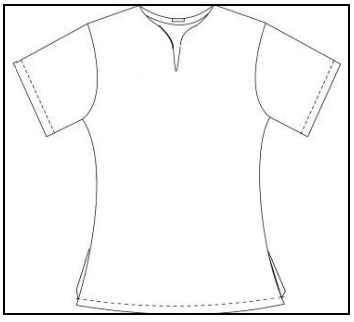

Figure 4. Model 2

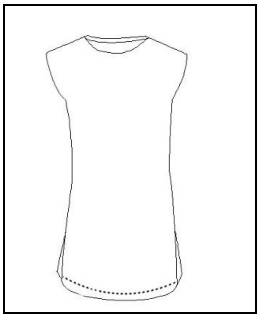

Figure 5. Model 3

Computer technologies started to be used in ready-made clothing manufacturing in the mid-1970s. Today, computer technologies are used in every area of ready-made clothing industry from management to logistics, from design to production. The benefits of these technologies for the manufacturers are: the raise of the quality, the increase on the efficiency, flexible production opportunity, control of the production steps and establishing a bond between the customers and production (5).

CAD/CAM constitutes the technological infrastructure of "Computer Integrated Manufacturing-CIM" concept. In the traditional business structure, the design and production performed by different departments as two separate functions have integrated as the computer applications become widespread. CAD "Computer Aided Design" is the utilization of the computer facilities in order to create, revise, improve, analyze and present a design. CAM "Computer Aided Manufacture" is the utilization of computers for material flow in establishments and for business flow planning, management and control in manufacturing machines (6).

The areas where CAD system is used ready-made clothing establishments are fabric pattern and garment model design, technical pattern design, grading, cut plan design and drawing, production line design (product data management) (7).

The advantages of CAD systems in marker preparation; any pattern cannot be placed in the marker less or more, the patterns cannot be deviated from the straight yarn incorrectly, after the marker is prepared, it can be applied on different fabric widths in a very short time, two markers that the fabric width and characteristics are the same can be spliced, the prepared marker can be divided from anywhere and the patterns can be relocated in groups, the patterns cannot be overlapped and cannot exceed the fabric width unintentionally, the fabric quantities and efficiency ratio can be checked continuously, after the marker is prepared, it can be loaded and different arrangements can be tested, marker preparation period is much shorter and the efficiency is higher (8).

2. MATERIAL AND METHOD

2.1. Material

The materials of this study include the Gerber Accumark V.8 CAD system, and the three pieces of ladies' classical blouse made from Buldan cloth in Buldan country.

2.1.1. Product Models

The three ladies' blouses utilized in the study are seen in Figure 3, 4 and 5. While the sizes of the models are seen in Figure 6, 7 and 8, the size tables of the models are given in Table 2, 3 and 4.

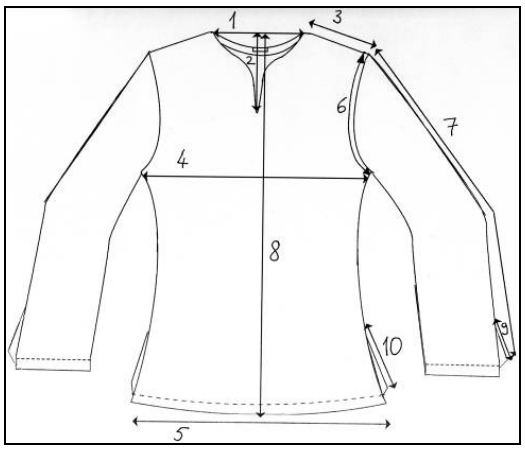

Figure 6. The sizes of model 1

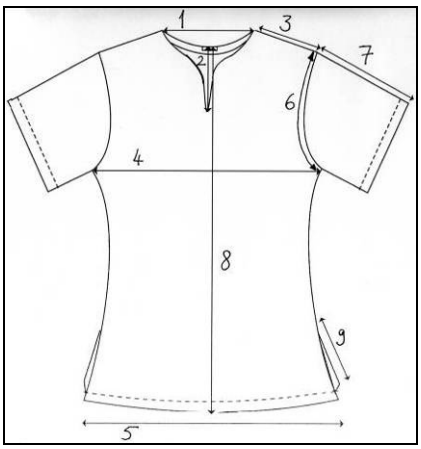

Figure 7. The sizes of model 2

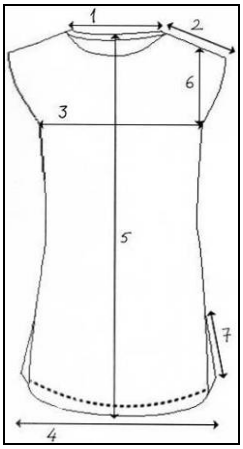

Figure 8. The sizes of model 3

Table 2. The size table of model 1

Model 1				
	Measurements (cm)/Sizes	**S**	**M**	**L**
1	Collar Width	17	17,5	18
2	Collar Depth	14	14	14
3	Shoulder Width	12	12	12
4	Chest Width	48	50	52
5	Hem Width	56	58	60
6	Hollow Forearm Circumference	21,5	22,5	23,5
7	Arm's Length	54	55	56
8	Center Back Length	84	85	86
9	Slit (on the Arms)	11	11	11
10	Slit (on the Sides)	21	21	21
-	Hollow Rear Arm Circumference	22,2	23,2	24,2

Table 3. The size table of model 2

Model 2				
	Measurements (cm)/Sizes	**S**	**M**	**L**
1	Collar Width	17	17,5	18
2	Collar Depth	14	14	14
3	Shoulder Width	12	12	12
4	Chest Width	48	50	52
5	Hem Width	56	58	60
6	Hollow Forearm Circumference	21,5	22,5	23,5
7	Arm's Length	24	25	26
8	Center Back Length	39	40	41
9	Slit (on the Sides)	21	21	21
-	Hollow Rear Arm Circumference	22,2	23,2	24,2

Table 4. The size table of model 3

Model 3		
	Measurements (cm)/Sizes	**Standard Size**
1	Collar Width	24,5
2	Shoulder Width	25
3	Chest Width	60
4	Hem Width	72
5	Center Back Length	109
6	Arm Height	25,5
7	Slit (on the Sides)	22

2.2. Method

In Buldan, there are 59 establishments in total that works in textile industry. Only 2 of these establishments produce Buldan cloth and the same establishments also manufacture ready-made clothing of Buldan cloth. Both establishments were interviewed within the scope of the study. These establishments were requested the classical models that they have made from Buldan cloth for years. Classical models were examined in accordance with the information given by the establishments. There are lots of ladies' classical blouse models that are produced in the country besides the classical models, however, these blouses have arisen with the help of unique designs in time and they continuously vary depending on the fashion trends.

The widths of the Buldan clothes in the market are 80 cm, 125 cm and 145 cm. In the study, the range in the fabric width was considered as 60 cm-156 cm. The intended use of a fabric affects its width and the economical production of the items to be made from it. So, it is useful to work on the fabric in different widths in accordance with the intended use.

In order to determine the appropriate fabric width, the sizes and size assortment are necessary to prepare the markers that mean the arrangement of the clothing patterns on the fabric (8).

During the study, 3 different assortment plans that are generally available on the market were used for Model 1 and 2, and these are given in Table 5. As Model 3 is produced and sold as standard size, it could not be produced as grades and 4 sizes were arranged on the cut plan.

In the study, the fabric utilization ratios and fabric consumption in various fabric widths were calculated according to the assortment plans of three models. For Model 1 and 2, 43 different tests were done between 60 cm-156 cm fabric widths; for Model 3, 42 different tests were done between 80 cm-156 cm. During the study, Gerber Accumark V.8 CAD system among the computer aided design systems was used. The patterns of the models were made according to the size tables, these were transferred to the system and graded, and the cut plans in different fabric widths were made according to the assortment plans, so the fabric utilization percentages and unit quantities were obtained.

Table 5. The assortment plans of models 1 and 2 according to the sizes

Sizes	**S**	**M**	**L**
Assortment 1 (piece)	1	2	1
Assortment 2 (piece)	1	1	2
Assortment 3 (piece)	2	1	1

3. FINDINGS

For the three different models in the study, the fabric utilization percentages and unit quantities in different fabric widths were calculated according to the assortment plans, and the graphics were obtained. These graphics are seen in Figure 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 22.

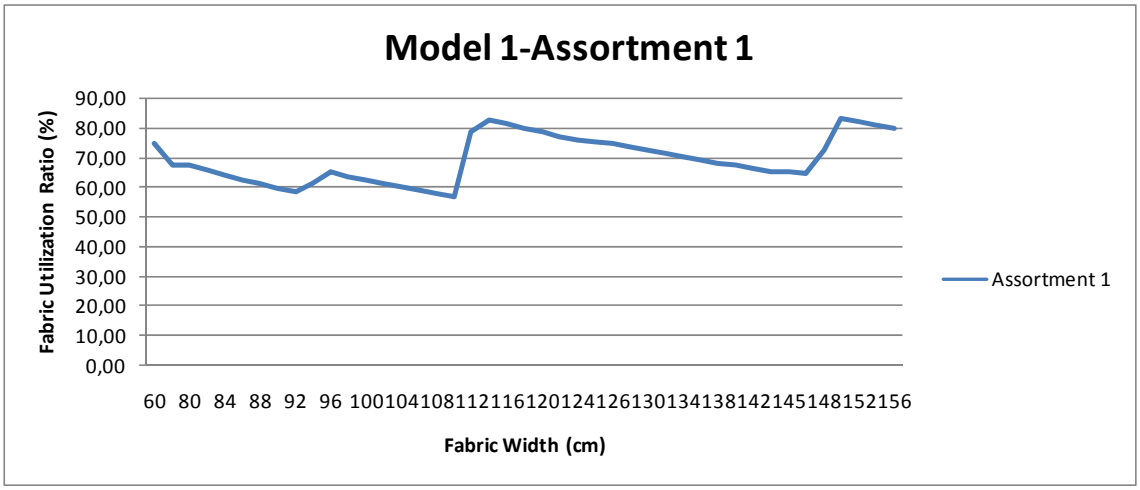

Figure 9. The relationship between the fabric width and fabric utilization ratio of the Model 1 comparing to the Assortment 1

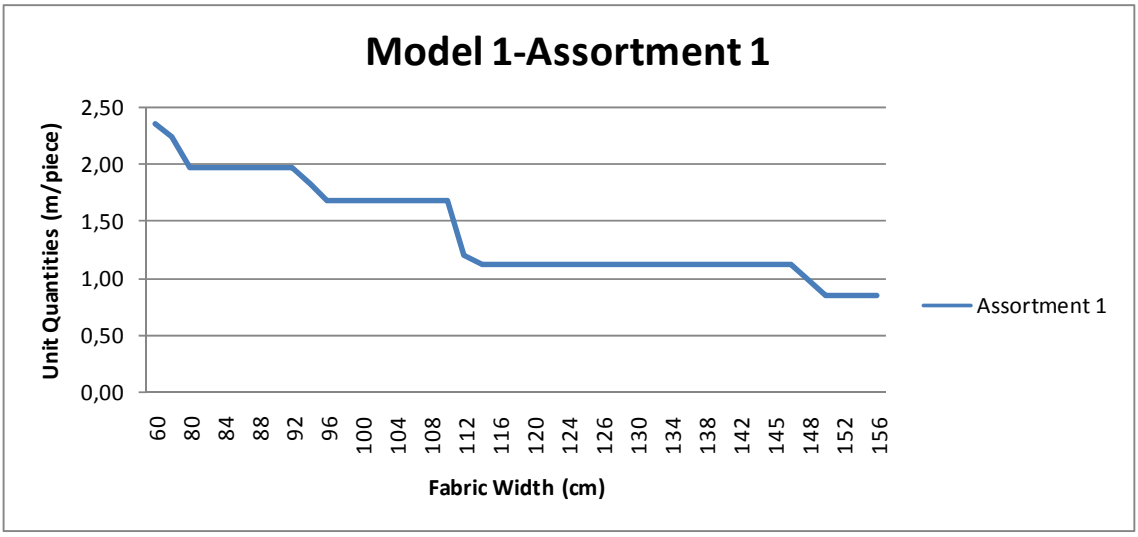

Figure 10. The relationship between the fabric width and unit quantities of the Model 1 comparing to the Assortment 1

In Model 1, assortment 1, the fabric utilization percentage is 83,08% in 150 cm fabric width at most, and the unit quantity in this width is 0,85 m. The fabric utilization percentage is 82,56% in 114 cm fabric width at most after 150 cm, and the unit quantity in this width is 1,12 m. Thirdly, the fabric utilization percentage is 81,98% in 152 cm fabric width at most, and the unit quantity in this width is 0,85 m.

In Model 1, assortment 2, the fabric utilization percentage is 82,42% in 114 cm fabric width at most, and the unit quantity in this width is 1,12 m. The fabric utilization percentage is 81,84% in 152 cm fabric width at most after 114 cm, and the unit quantity in this width is 0,85 m. Thirdly, the fabric utilization percentage is 81,06% in 116 cm fabric width at most, and the unit quantity in this width is 1,16 m.

In Model 1, assortment 3, the fabric utilization percentage is 83,05% in 150 cm fabric width at most, and the unit quantity in this width is 0,85 m. The fabric utilization percentage is 82,67% in 114 cm fabric width at most after 150 cm, and the unit quantity in this width is 1,12 m. Thirdly, the fabric utilization percentage is 81,96% in 152 cm fabric width at most, and the unit quantity in this width is 0,85 m.

In Model 2, assortment 1, the fabric utilization percentage is 81,34% in 145 cm fabric width at most, and the unit quantity in this width is 0,63 m. The fabric utilization percentage is 80,78% in 146 cm fabric width at most after 145 cm, and the unit quantity in this width is 0,63 m again. Thirdly, the fabric utilization percentage is 79,43% in 108 cm fabric width at most, and the unit quantity in this width is 0,87 m.

In Model 2, assortment 2, the fabric utilization percentage is 81,54% in 145 cm fabric width at most, and the unit quantity in this width is 0,63 m. The fabric utilization percentage is 80,97% in 146 cm fabric width at most after 145 cm, and the unit quantity in this width is 0,63 m again. Thirdly, the fabric utilization percentage is 79,89% in 148 cm fabric width at most, and the unit quantity in this width is 0,63 m again.

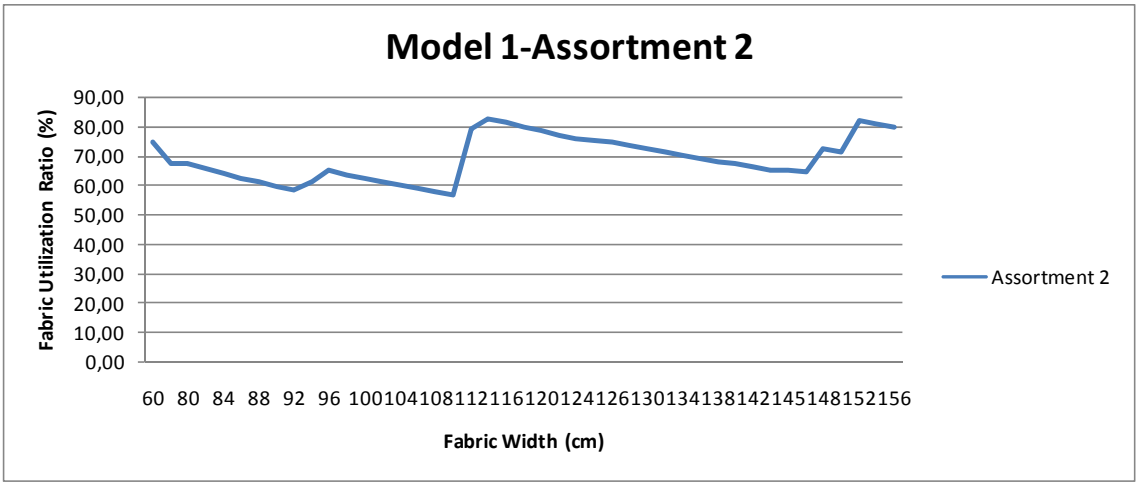

Figure 11. The relationship between the fabric width and fabric utilization ratio of the Model 1 comparing to the Assortment 2

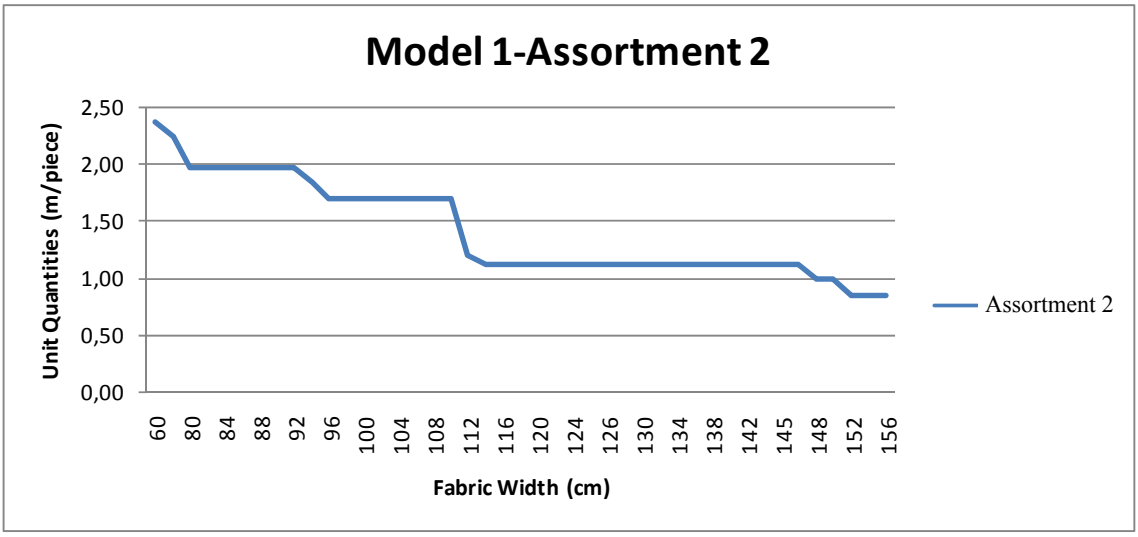

Figure 12. The relationship between the fabric width and unit quantities of the Model 1 comparing to the Assortment 2

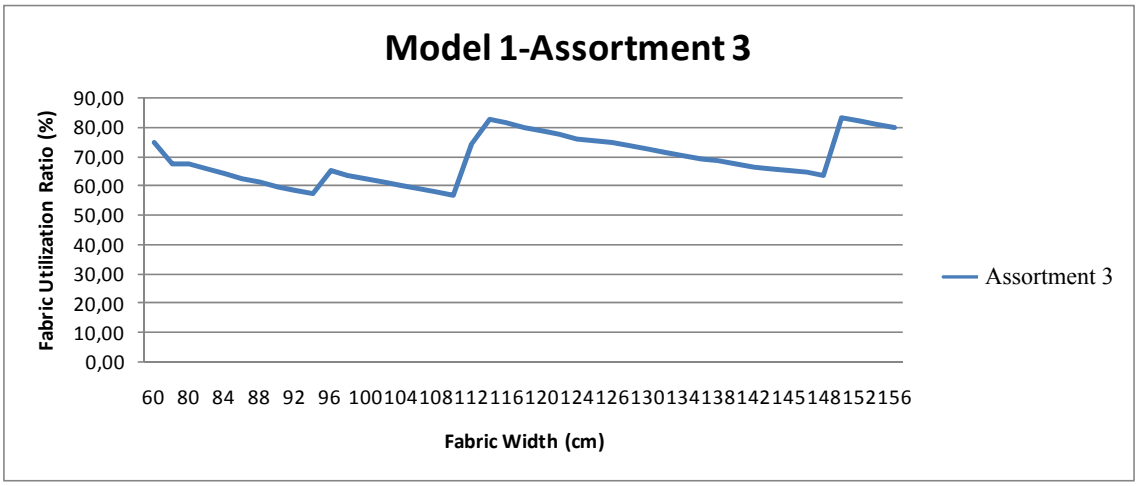

Figure 13. The relationship between the fabric width and fabric utilization ratio of the Model 1 comparing to the Assortment 3

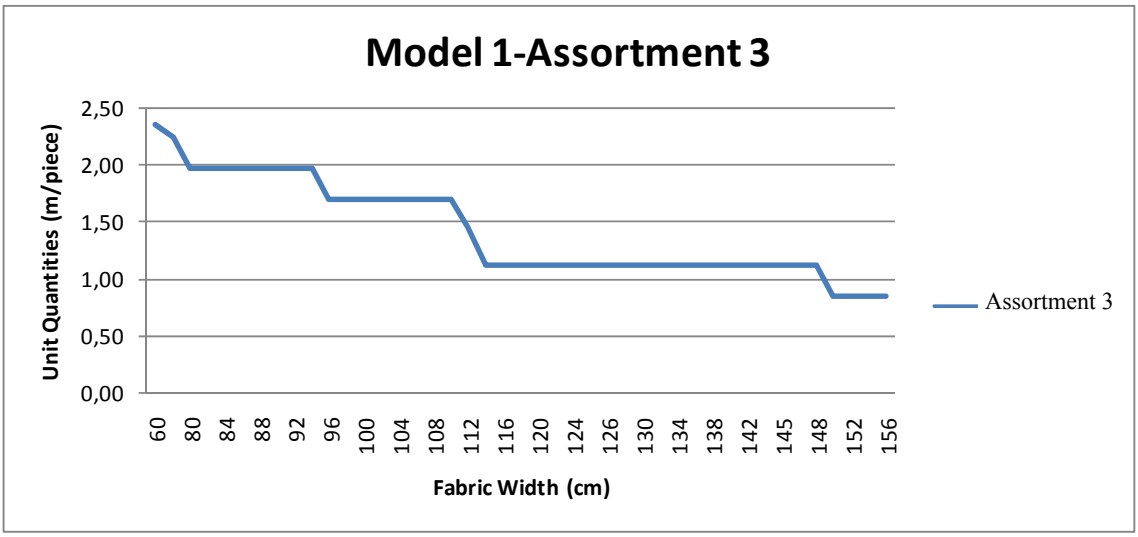

Figure 14. The relationship between the fabric width and unit quantities of the Model 1 comparing to the Assortment 3

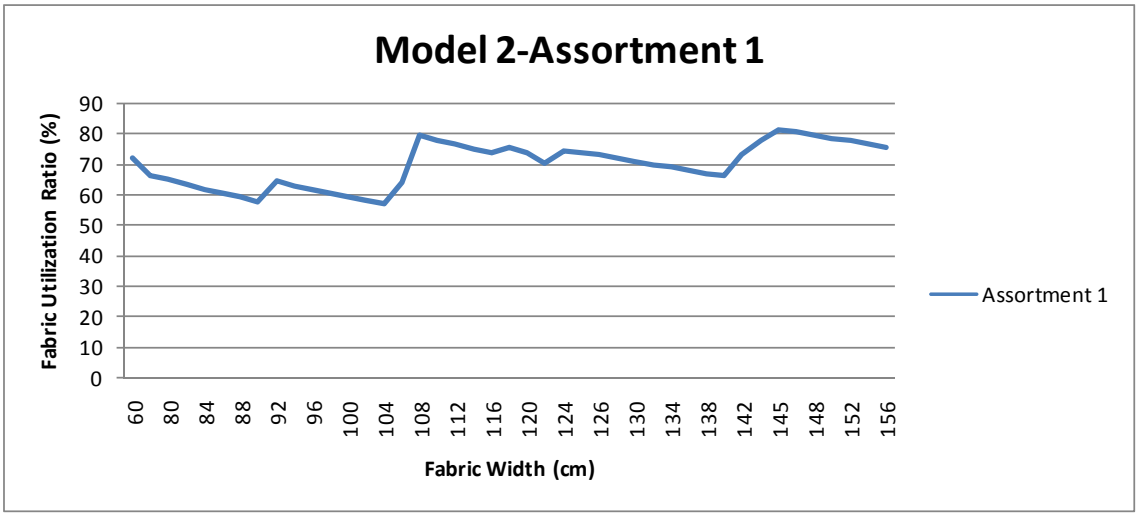

Figure 15. The relationship between the fabric width and fabric utilization ratio of the Model 2 comparing to the Assortment 1

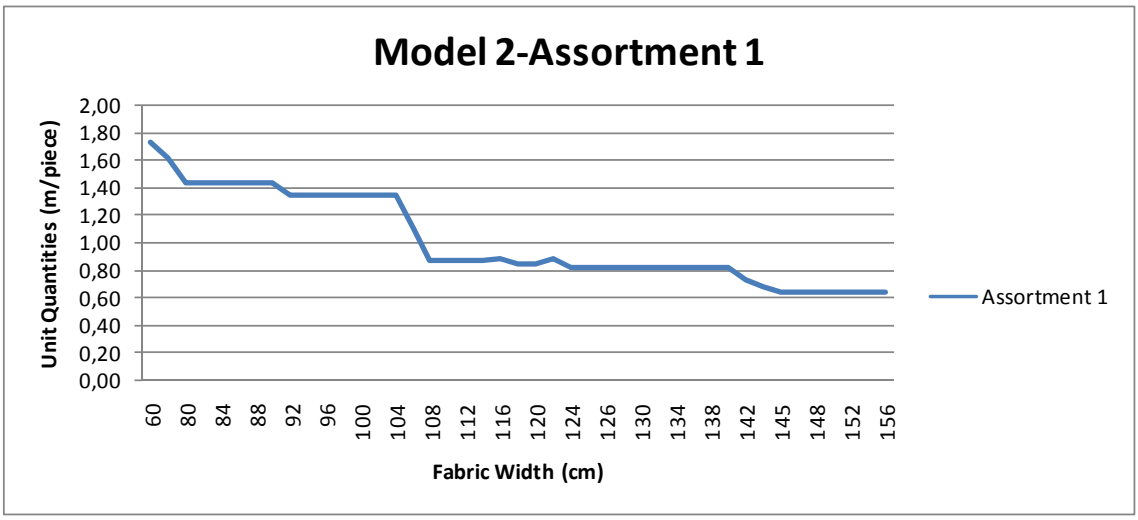

Figure 16. The relationship between the fabric width and unit quantities of the Model 2 comparing to the Assortment 1

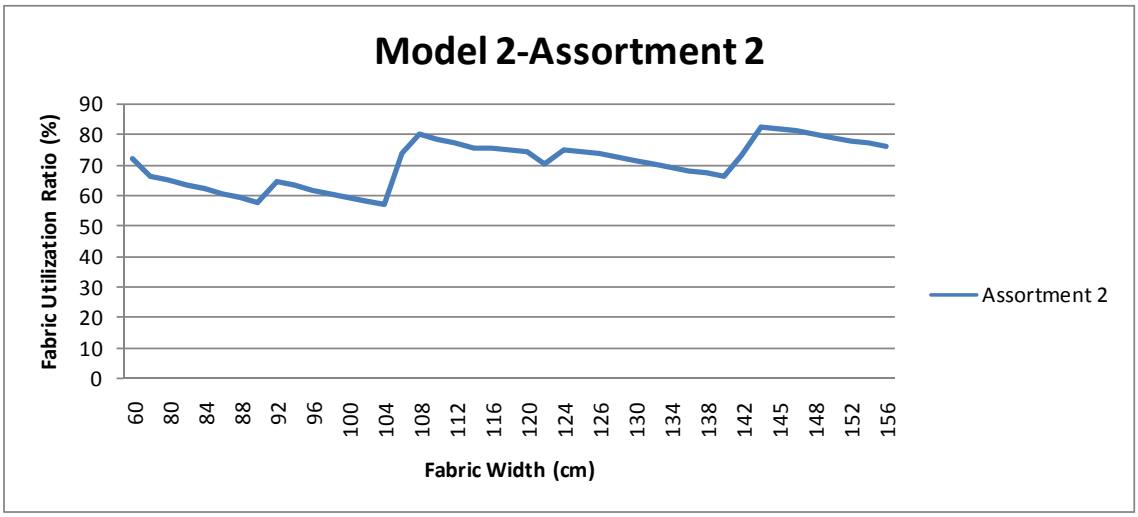

Figure 17. The relationship between the fabric width and fabric utilization ratio of the Model 2 comparing to the Assortment 2

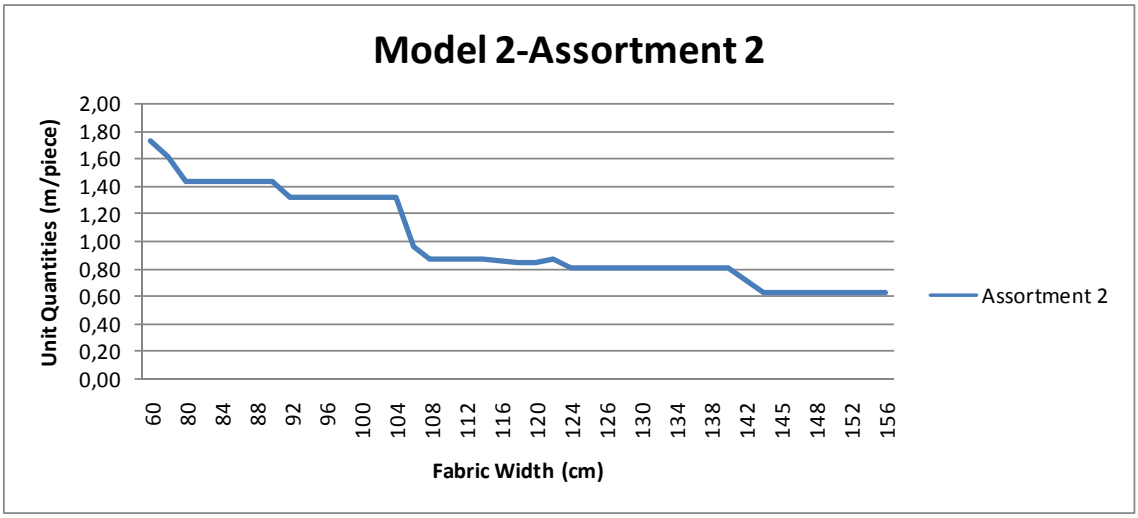

Figure 18. The relationship between the fabric width and unit quantities of the Model 2 comparing to the Assortment 2

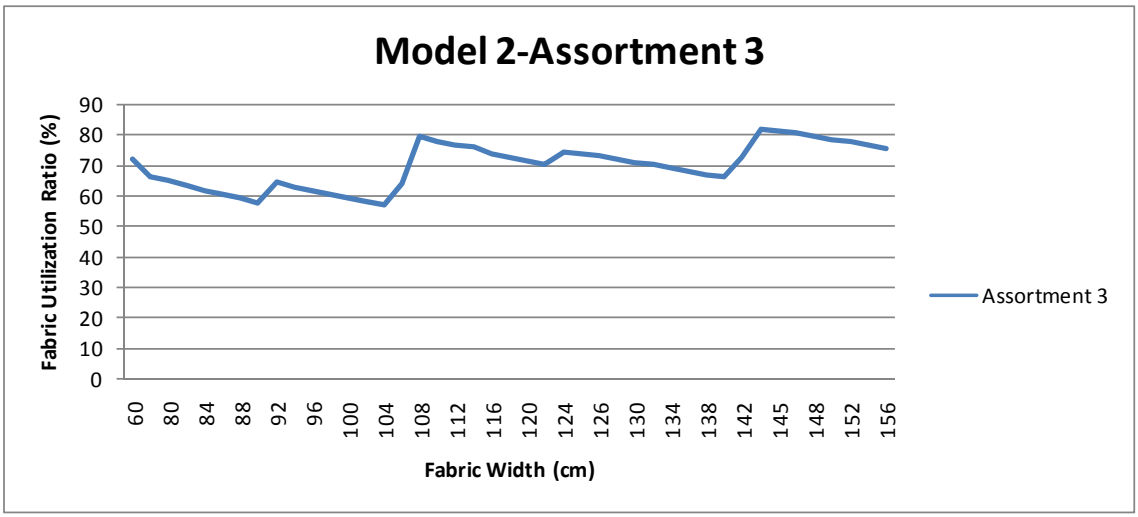

Figure 19. The relationship between the fabric width and fabric utilization ratio of the Model 2 comparing to the Assortment 3.

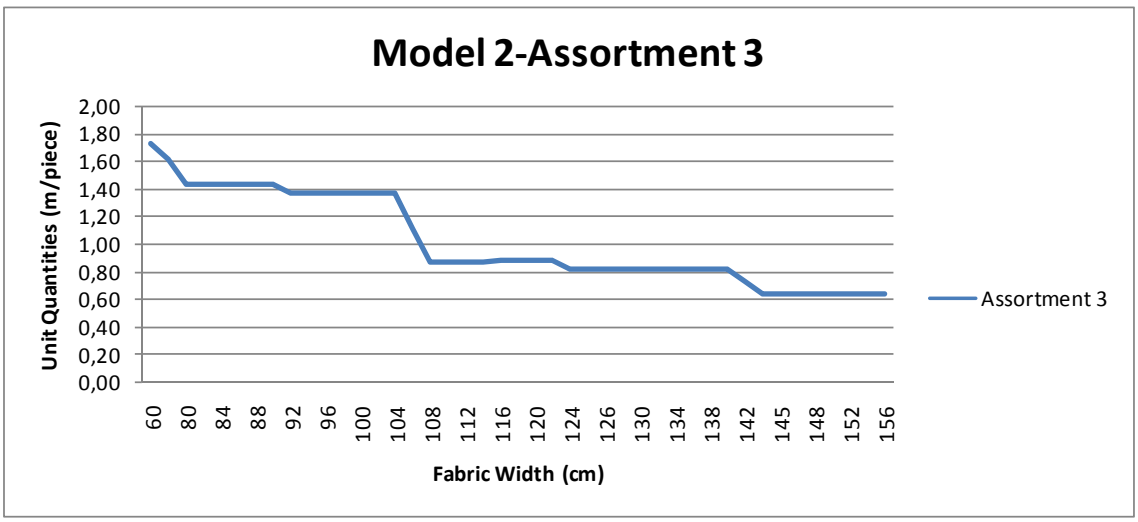

Figure 20. The relationship between the fabric width and unit quantities of the Model 2 comparing to the Assortment 3

In Model 2, assortment 3, the fabric utilization percentage is 81,41% in 145 cm fabric width at most, and the unit quantity in this width is 0,63 m. The fabric utilization percentage is 80,84% in 146 cm fabric width at most after 145 cm, and the unit quantity in this width is 0,63 m again. Thirdly, the fabric utilization percentage is 79,76% in 148 cm fabric width at most, and the unit quantity in this width is 0,63 m again.

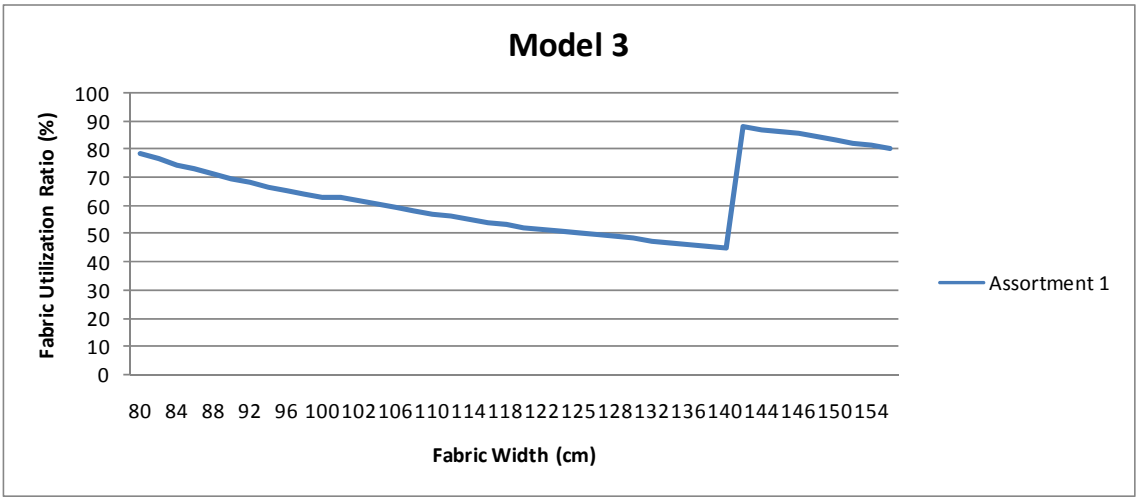

Figure 21. The relationship between the fabric width and fabric utilization ratio of the Model 3 comparing to the Assortment 1

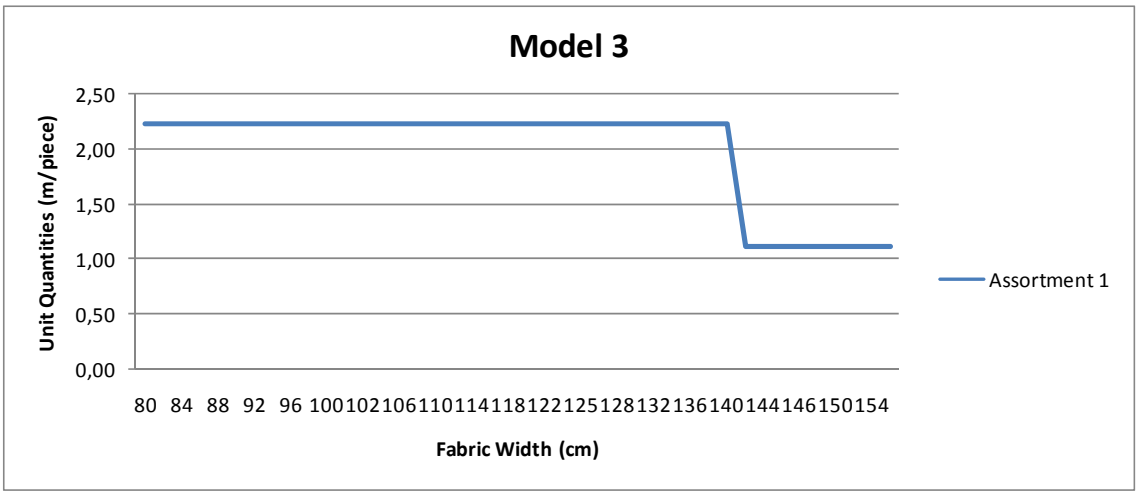

Figure 22. The relationship between the fabric width and unit quantities of the Model 3 comparing to the Assortment 1

Model 3 is produced in standard size. In Model 3, the fabric utilization percentage is 88,16% in 142 cm fabric width at most, and the unit quantity in this width is 1,12 m. The fabric utilization percentage is 86,93% in 144 cm fabric width at most after 142 cm, and the unit quantity in this width is 1,12 m again. Thirdly, the fabric utilization percentage is 86,34% in 145 cm fabric width at most, and the unit quantity in this width is 1,12 m again.

4. RESULTS AND SUGGESTIONS

When the values in Model 1, 2 and 3 are reviewed, it can be said that the fabric utilization ratios and unit quantities increase or decrease in parallel. No matter which assortment plan is applied, as the fabric width increases, the fabric utilization ratio increases and the unit quantity decreases.

For Model 1, 2 and 3, the most efficient values according to the assortments are; in Model 1, assortment 1, the fabric utilization percentage in 150 cm fabric width is 83,08%, in assortment 2, the fabric utilization percentage in 114 cm fabric width is 82,42%, and in assortment 3, the fabric utilization percentage in 150 cm fabric width is 83,05%. In Model 2, assortment 1, the fabric utilization percentage in 145 cm fabric width is 81,34%, in assortment 2, the fabric utilization percentage in 145 cm fabric width is 81,54%, and in assortment 3, the fabric utilization percentage in 145 cm fabric width is 81,41%. In Model 3, the fabric utilization percentage in 142 cm fabric width is 88,16%.

The widths of the Buldan cloth on the market are 80 cm, 125 cm and 145 cm. In Table 6, the unit quantities and fabric utilization percentages of Model 1, 2 and 3 according to the width of the Buldan clothes used on the market are seen. According to Table 6, the fabric utilization percentages in Model 1 for the width used on the market vary between 64,84% and 75,40%. It means that approximately 35,16% - 24,60% of the fabric is not used. This ratio is a significant waste considering the order quantity. In Model 2, assortment 1, 2 and 3, the most efficient fabric width is 145 cm. For Model 2, if the orders are made from the fabric in 145 cm width among the widths on the market, there is no problem. As Model 3 is produced in standard size, it is not produced as grades, 4 sizes were arranged on the cut plan. Considering the widths used on the market, 21,66% of the fabric in 80 cm width, 49,88% of the fabric in 125 cm width, and 13,66% of the fabric in 145 cm width are wasted.

The unit price of Buldan cloth is 2 TL for 80 cm width; 3,10 TL for 125 cm

width; 3,60 TL for 145 cm width. Considering the fabric prices, the unit quantities and fabric utilization percentages of the classical models according to the width of the Buldan clothes used on the market, and the order quantities of the establishments, working on the ideal fabric widths in production stage will reduce the costs of the establishments significantly. It is very important for the Buldan cloth manufacturers to consider these values and to revise the produced fabric widths in terms of decreasing the fabric consumption and moving into profit for the establishments. The results of the study were conveyed to the producing companies of Buldan cloth.

Table 6. The unit quantities and fabric utilization percentages of Model 1, 2 and 3 according to the width of the Buldan clothes used on the market

		Assortment 1		Assortment 2		Assortment 3	
	Fabric Width	**Unit Quantities**	**Fabric Utilization Rate**	**Unit Quantities**	**Fabric Utilization Rate**	**Unit Quantities**	**Fabric Utilization Rate**
MODEL 1	80	1,97	67,15	1,97	67,06	1,97	67,19
	125	1,12	75,33	1,12	75,21	1,12	75,40
	145	1,12	64,95	1,12	64,84	1,12	65,01
MODEL 2	80	1,44	64,96	1,44	65,02	1,44	64,88
	125	0,81	73,85	0,81	73,99	0,81	73,91
	145	0,63	81,34	0,63	81,54	0,63	81,41
MODEL 3	80	2,24	78,34	--	--	--	--
	125	2,24	50,12	--	--	--	--
	145	1,12	86,34	--	--	--	--

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