

LONG-SLEEVED SHIRT PATTERN AS GUIDELINES FOR DESIGNING A SANGGIT MOTIF BATIK SHIRT

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Abstract: The aim of this research is formulating the long sleeved motif pattern of shirt which can be extended into various sizes of long-sleeved batik shirt in which the motif is sanggit patterned. This employed action-participatory research to test the draft pattern by actively involved the batik entrepreneurs, motif designers and tailors. The data were collected through the techniques of observation, interviews, FGDs and document analysis. The result produces a pattern of long-sleeved rectangular shirt motif, 115 cm width and 250 cm length, divided into 12 symmetrical objects of vertical axis. The pattern works to develop the motifs, which can be made into a long-sleeved batik shirt of various sizes (S, M, L, XL and XXL). It is quite effective and efficient to develop random batik asymmetrical motifs and the resulting motif can meet sanggit at the front shirt or buttons, the left, right sides, pocket and specific motifs on cuff and collar parts.

Keywords: patterns; motifs; long-sleeved shirts; batik; sanggit.

1 INTRODUCTION

The textile motifs in patterned such as batik cloth and woven fabrics produced in Indonesia as well as other countries are generally designed according to their function as a long other traditional clothes such as *jarit* and *sarong*. Long cloth pattern, meaning the motif is applied to a piece of cloth without cutting or sewing; i.e., the patterned cloth applied to a traditional model of cloth such as *jarit* for women, as a *sarong* for men, scarves, coconut bundles, *kemben*, sheets, tablecloths, as a *sari* for the Indians, etc. The Solo and Yogya classical batik motifs patterned in general, tend to show the spread motif in all sides, and have geometric motif [1, 2]. Coastal batik products have generally morning-evening patterns, one-headed and two-headed patterns [3]. Long patterned clothes in Indonesia have been adjusted according to the geographical motifs which can be divided into seven types or patterns: *pagi-sore* (morning-afternoon) pattern, the one-headed pattern (the head is located in the middle and the head is located on the edge), the two-headed pattern (similar and different head motifs), oblique patterns or machetes, *ceplok* patterns, upright symmetrical and random patterns.

The *pagi-sore* (morning-afternoon) pattern is designed with 110 cm and 250 cm piece of cloth which has two motifs bounded by a line. This pattern is designed only for *jarits*, traditional long-patterned skirt for women, and if made into shirts, then

the motif will be cut off and so the front motif, the left and right sides cannot then be called *sanggit*. One-headed patterned cloth is designed as a piece of cloth 110 cm wide and 250 or 200 cm long which has two motifs, namely head and body motifs. One head patterned cloth of 250 cm long is used for making *jarit* and the head motif is placed in front. While the head pattern cloth of 200 cm long is used for men's wearing *sarongs*, according to the use, the head motif is placed behind. If the one head patterned cloth is made for a shirt, usually the motives cut off and cannot be patterned into *sanggit*.

The two-headed cloth is designed as 110 cm wide piece of cloth and 250 cm long to create *jarit* for women and as a scarf. Slopping patterned clothes are usually designed to create a *jarit* for both women and men. If such slopping patterns are used to create for shirts, then the motifs that can be *sanggit* only at front of the motif, while on the other part of the motifs cannot be *sanggit*.

Ceplok-patterned clothes are usually designed to create a *jarit* for both women and for men. If batik motifs are applied to small-sized *ceplok*-patterned and then the batik cloth is made into a shirt, the motif remains *sanggit*. This is caused by the hape motive which is increasingly geometric and has smaller motive size, then the motifs can be more *sanggit* only if the cloth is made into a shirt.

The upright symmetrical patterned cloth is designed as a wide-sized cloth of 110 cm x long 200 cm or 250 cm which is used for a blouse, dress or robe for women. The making of symmetrical patterned cloth gives emphasis on the efficiency process in drawing motifs on the cloth. If these symmetrical patterned clothes are made into blouses or shirts, then the motifs never may be fully *sanggit*. Random patterned clothes are usually designed only for decoration and beach sarongs. If this random patterned is made into shirts, the motifs will be cut, thus it cannot be *sanggit*.

Such long patterned cloth as mentioned above is designed to create long traditional Javanese dresses such as *jarit* for women and *sarong* for men. In case such long patterned clothes are used as either for a shirt or blouse clothing, then the produced garment shall have motives which cannot be categorized *sanggit* on some of the stitched parts. In fact, one of the criteria of quality patterned clothing (*batik*) lays on "how much *sanggit* the motifs are".



Figure 1 Pagi-sore pattern (morning-afternoon)



Figure 2 One-headed pattern



Figure 3 Two-headed pattern



Figure 4 Leaning pattern



Figure 5 Ceplok pattern



Figure 6 Upright symmetrical pattern



Figure 7 Random pattern

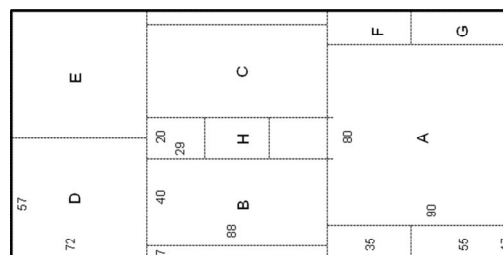


Figure 8 Pola long-sleeved in *sanggit* patterned



Figure 9 Pola long-sleeved in *sanggit* patterned

Sanggit is a motif for dress and shirts, which is centred at the seams junction fused or met one another, i.e. on the front, the left, right sides and the pocket. Thus, it is creates a long-sleeved blouse or shirt which has *sanggit* motifs, then in the process of making the motif is done on a sheet of cloth that has a long-sleeved shirt patterned. This long-sleeved pattern of shirt is different from the previous seven patterns.

The long-sleeved patterned shirts mean a long-rectangular image used as a guide, a reference to create or develop the batik motifs, additionally the cloth in motifs produced in such a pattern can be made into a shirt or long sleeved-blouse of various sizes (M, L, XL, XXL), which motifs remain *sanggit*. To such pattern of long-sleeved shirt is set the breaking structure pattern according to the components of the long-sleeved shirt like the back side, at the left and the right chest, left and right arms, collar, pocket part and the cuff parts.

The long sleeved shirt patterned by *sanggit* motif is beneficial for some people related to *batik*, among others the batik industry, batik motif designers, batik dyers, batik cloth collectors, convection industries, as well as the batik consumers.

Benefits for the batik industry, among others:

- a. can develop various batik motifs which are managed to be manufactured into batik cloth, which furthermore, batik cloth can be made into long-sleeved shirts of various sizes which motifs remain *sanggit*. Thus, the batik industry can meet the art feel of motifs for consumers and can increase the selling value of batik clothes,
- b. can reduce the cost of batik production, save raw materials such as cloth, dyestuff and production cost by adjusting the size of batik cloth motifs produced according to the market demands,
- c. can provide information on the pattern of this long-sleeved shirt to the consumer, so they can better understand the form of batik motif from cloth before become clothing.

Benefit for the designer motive is that this pattern further facilitates the work in developing for batik long-sleeved shirt motifs although the undertaken motifs have a high level of difficulty.

Benefit for batik dye artisans is that this pattern is easier to work in putting the colors in accordance with the motif, despite the motif's pairs are located separately.

Benefits will be surely obtained especially for those who work as tailor because on such patterned shirt will be easier to determine ruptured parts of the long-sleeved shirt pattern so for the tailor will be easier to cut the batik cloth to correct long-sleeved clothes. Additionally, the benefits also will be used by society of the batik convection industry, batik agents, batik fashion designers and consumers of batik clothing, who will be able to read and evaluate "the batik motifs" of a long sleeved batik shirt, when the motifs are still fabric sheets, so they can treat and process the batik cloth.

1.1 Review of related literature

There have been a lot of researches on the cloth patterns, both men's and women's clothing. The function of clothing has been researched from its various aspects, for example like by Kang et al. [4] who associate the clothing functions to change

the users' moods, while Simoes [5] views the body as the source of the design process and finds the factors from which the discomfort may be resulted by the dressed body while it is in motion. Apart from such views, current research attempts to provide special attention on patterns to develop the cloth motifs, wherein the produced clothes patterned can be made into clothing of *sanggit* motifs patterned which have not yet been found. Some researches were related to dress patterns, e.g. Ghoswatun et al. [6] studied the making of party dress for students of Vocational High School Syafii Akrom Pekalongan using a combination of pattern which is deemed to be more effective compared to the use of construction patterns. Effectiveness level of the student group applying a combined pattern reaches 87.40% (very high category), while in control group using construction pattern obtained 79.39% (high category). In the use of combined patterns better clothing is produced and the time required is shorter. The lack of combined pattern is at the draping pattern, since it directly uses the main material, in case there occurred cutting error on cloth, it will be directly impacted on the cost, needed the accuracy in creating a pattern of combination. On the use of a combined pattern with backless model which should be given *kupnat* on the pleated side of the face, so that the fall pleated will result better.

The women's dress making with body modified feels very comfortable compared to the making with non-modification. This is indicated by the difference of respondents' frequencies, namely (1) 47.22% of respondents testified very comfortable and 50% of respondents said comfortable with modifications on the arm part, (2) 55.55% of respondents testified very comfortable and 44.45% respondents said they feel comfortable with modification on neck circumference, and (3) 72.72% respondents informed very comfortable and 27.78% respondents feel comfortable with modification on the back. The results of data analysis on the comfort level of fitting body shows 55.55% of respondents stated very comfortable and 41.66% respondents stated comfortable [7]. Both of these studies examine the pattern of clothing, not the pattern to compose a motif that can be made into clothes.

Researches on motif development for clothing also have been widely practiced. For example, research on coffee and cocoa in the creation of batik motif of Jember type, successfully created six motifs of batik, *uwoh kopi*, *godong kopi*, *ceplok*, *kakao* motif, *kakao raja*, *kakao biru*, and *wiji mukti* motif. Of the six motifs, the most favored motif to people of Jember is the *uwoh kopi* motif and the *kakao raja* motif. It shows that superior seeds of a region can be explored and developed into batik motifs that have characteristic of Jember region [8]. In addition, regional art and culture can also be explored and developed for the inspiration of batik motif design.

A research by Salma [9] on the development of Balinese batik motif produced five motifs namely Jepun Alit motif, Jepun Ageng motif, Sekar Jagad Bali motif, Lotus Banji motif, and Poleng Biru motif. Among the five motives, the motifs that many people love are the motive of Jepun Alit, Sekar Jagad Bali motif and the motif of Lotus Banji.

The research by Bimantoro [10], on Dotted-Board Model (DBM) and Extended Local Search (ELS) to optimize the layout of cloth pattern on patterned materials by considering the rules of harmony motif, found the following:

- (1) The point of harmony rules can reach the maximum value if the used DBM resolution value is the biggest common factor of the base motif length.
- (2) The size of a clothing pattern affects material efficiency and computation time, the larger the size of the clothing pattern, the material efficiency will decrease, but the computation time will be faster.
- (3) The efficiency of materials on the orientation of clothing patterns is vertically more efficient when compared with the horizontal clothing orientation pattern, because the orientation of horizontal clothing patterns leads to the use of longer containers, but a lot of free space is freely used by other patterns on the top of the container so it is more wasteful in terms of using the materials.

Thus it can be concluded that the overall mean result of the ELS combination with DBM contributes positively in increasing the computation time, where the computational time of ELS with DBM is about two times faster than just using ELS. The optimal resolution and NMO that can be achieved by the method of integration between ELS and DBM is 5 and 3, with an average of 56% efficiency and an average computational time of 381 seconds. In the research, the motive material used is a material which motif is geometric and repetition, so that the placing motif is more easily harmonious. It will be different if the motif un-geometric or even abstract shaped motif.

Researches on extraction of geometric batik features have been proposed using Cardinal Spline Curve to produce segmentation of klowongan and isen-isen motifs [11]. Batik motifs that vary greatly into problems in laying and cutting patterns of clothing, the problem is known as irregular SPP. Irregular SPP is a common problem in terms of laying and pattern cutting in containers. The respected pattern is an object that has a certain shape. Containers are media where some patterns are placed with certain rules in order to obtain the most optimal container size. The optimal container size is a container that has the least dimension in which there is a non-overlapping pattern and has the least amount of free space left.

One of the SPP Irregular applications is found in the fashion industry. The purpose of Irregular SPP is to minimize the length of the container by optimizing layout of the objects present in condition the absence of overlapping objects [12].

For such researches, there are three main points that have been studied related to the pattern of motifs, namely the pattern of clothing, the development motifs regardless of patterns, and application of fashion patterns. This research combines the three things that are: arrange a pattern on a piece of cloth, placement pattern of clothing fabric for arranged motif can be *sanggit*, and strategy of motif placement (which already exist) in fashion pattern. Thus the produced cloth pattern by this pattern model can be made into a shirt which motif is considered *sanggit*. To formulate a pattern of dress shirts, there are some things that need to be studied, among others, about the various types of shirt pattern breaks, adult body standard size, various standard sizes of cloth as shirt material, various types of motifs, factors that affect the quality of shirt products, and so on.

Various types of brown shirt patterns of adults are associated with the manufacture of long-sleeved shirts, which breaks the body pattern. Broken arm patterned, and broken the collar patterned. The proportions of the adult bodies to be measured are: upper chest circumference, shirt length, arm length, arm circumference, wrist cuff, neck circumference (collar) and pocket size. Actual size used in small, medium, large, x-large and xx-large labels depends on the size and target market of each manufacturer. Manufacturers, who market men's grown products, provide widely clothing sizes than manufacturers who market their products for young men [13]. An example is two standard chest circumference proposed by the British Standards and widely used by factories in the UK.

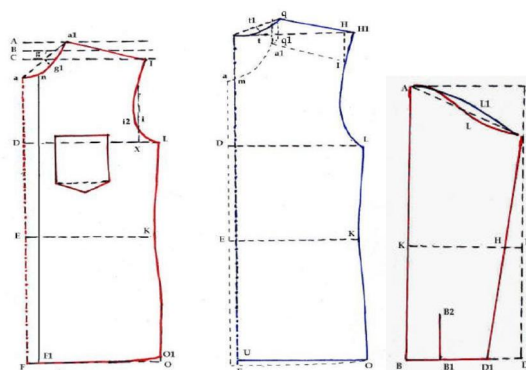


Figure 10 Example of body pattern and long-sleeved pattern of menswear

Table 1 Size [cm] of standard upper chest circumference by British Standards

Consumer Goals	S	M	L	XL	XXL
Young man	<94	97-102	103-109	112-117	119-125
Adult man	94-99	99-107	107-114	114-122	122-130

Table 2 Size [cm] of a broken pattern of men's shirts [13]

Consumer Goals	S	M	L	XL
Top chest circumference	92	100	108	116
Neck circumference	38	40	42	44
Length of the arm	80	82	84	86
The wrist	17	17,8	18,6	19,4
Half width of the back	19	20	21	22

Table 3 Size [cm] of a broken pattern of shirts [14]

Explanation	S	M	L
Low chest	18	22	24
Long shirt	57	66	70
The width of shoulder	33	40	46
Half width of face	22	25	28
The width of shoulder	11	15	16
Long-sleeved length	19	21	23
Arm circumference	28	31	34
Neck circumference	30+2	35+2	37+2

Various types of clothes and the standard sizes are commonly used for shirt materials include primissima cotton f, prime cotton, silk clothes made with non-engine weaving (ATBM) and ATCM twist cotton width 115 cm.

Batik motifs that are considered beautiful on a sheet of cloth does not necessarily look beautiful if the cloth is made into a shirt or blouse clothing. It is caused by the process of making clothes through cutting and sewing cloth. A piece of cloth patterned according to the pattern of clothing then cut and sewn, while the motifs on the part of the clothing connection cannot connect anymore, so the motif does not appear intact or separated or un-*sanggit*. Therefore, batik cloth that will function as quality clothing (known for *sanggit* motif) should be designed in such way in order that the aesthetic value motif can be obtained. Lay out patterns of motifs should be designed based on the type of motifs, broken patterns of dress, production techniques and standard measures of the adult body. There are seven aspects to consider in designing product design: functionally, technically, ergonomically, economically, environmentally, socially, culturally and aesthetically visual [15]. Related to the pattern of motifs, the dominant aspect to note is the aesthetic, the motif can remain *sanggit* although the cloth is made of shirts with various sizes, functional aspects, namely the suitability between the motif and its usefulness. Economical aspect is matched between pattern with requirement of both cloth and motif.

Furthermore, here are several important factors in the process of designing textile products include the products can be produced, marketed used, and then the products are the interesting one [16]. Design patterns of shirt motifs as design is generally a creative industry business distinguished from other cultural industries. Design innovation requires a combination of different knowledge, such as between designer, client and company performance [17].

In formulating the long-sleeved batik shirts pattern, one should understand the process of batik production that will work to create the long-sleeved shirt pattern. The relevant textile (batik) production process undertakes long-sleeved shirt patterns, namely batik production process technique, resin printing or screw printing technique, wax prints and color printing technique (full print). The batik production process involves the preparation of design concepts, sketches of motifs on clothes, the process of batik *klowong*, the first stage staining, the making process of *isen-isen* batik, the second stage staining and *pelorodan* waxing. The printed batik production process is the preparation of design concept, making motif on screen, printing and coloring processes [18]. The resin or printed production process involves the preparation of design concepts, drawing motifs on paper, drawing motifs on the screen, making print dough (resin), staining fabric base, resin printing process with screen on cloth, basic color locking process, batik process, second stage staining and *pelorodan* candle [19].

Types of the batik motifs which are applicable to long-sleeved shirts are all kinds of motifs, not only geometric motifs, but abstract, oblique, random or asymmetrical motifs. Based on the composition and shape, the batik motifs can be classified into four groups: (1) the geometric motifs including *banji*, *ceplokan*, *ganggong*, woven, *parang* and *lereng* motifs; (2) cement motifs covering only vegetation motifs; plants and animals; as well as plants, animals and winged animals motifs; (3) bouquet motifs and (4) modern motifs [20]. Based on the shape, the batik motifs can be divided into geometric motifs, *ceplok*, *parang*, *lereng*, non-geometric, *lung-lungan*, *buketan* and *pinggiran* (periphery) [21]. While in general, the batik motifs can be divided into numerous motifs such as *parang* motif, geometric, *banji*, creeping plants, water plants, flowers and animals in their natural lives [22].

2 METHODOLOGY

This research was conducted in two small and medium scale batik and textile industries, which applying various kinds of production techniques, in Central Java Province, Indonesia. The research was conducted using qualitative descriptive approach and participative action study. Qualitative descriptive method to compile the standard draft of long-sleeved shirt pattern for adult size while the method of study uses participatory action to test the draft pattern to the formulated of standard shirt pattern. The textile and batik industries were chosen as a place for training of *batik tulis* and stamped industry of Dewi Ratih and textile industry of nDerbolo of resin printing technique in Sragen regency. The invited tailors cooperated in the test-making shirt is Royal Tailor in Sukoharjo. The used data sources included participants, product documents and events.

Participants included 2 textile entrepreneurs, 3 motive designers, 4 batik, 2 batik dyers, 1 tailor and 2 batik consumers. The documents used primarily patterns of motifs tested, screen, batik motifs and broken long-sleeved shirt patterns. The observed events included all the processes that leading to the "pattern of long-sleeved shirt motifs", which was tested and included the process of designing patterns, designing motifs, making screen motifs, production processes, the process of making long-sleeved shirts, the cutting process of clothes and the process of tailoring into shirts. The data sources were determined based on purposive, snowball and time sampling techniques. The data were collected through observation techniques [23], interviews [24], focus group discussion [25], literature study and then analyzed through flow model [26].

Research stages employed the qualitative-descriptive method, the data collection of research data until the formulated draft shirt patterned. Furthermore the draft shirt pattern was tested through participative action study method. Above the draft shirt pattern was made or developed various types of batik motifs, such as the symmetrical motif, asymmetrical motifs and oblique motif. Then the motif was designed on the draft pattern, which is made median, the draft pattern was processed into batik cloth, batik cloth was processed into long sleeved shirts of various sizes (S, M, L, XL, XXL) and the last motifs on the shirt were analyzed. The *sanggiti* motifs on the joints of the seams on a shirt were analyzed by researcher, batik entrepreneurs, motive designers and tailors. When the level of the motif was reached, the draft pattern was standardized; however,

if the motive severity level has not been reached then the draft size of the shirt pattern was revised and the draft was retested.

3 ANALYSIS

Before discussing the pattern of long-sleeved shirt of *sanggiti* patterned, first it is needed to set the standard size of the long-sleeved shirt pattern for adults (Indonesia). Based on some references [13, 26, 14, 27] was determined the breaking component size of the long-sleeved shirt pattern for Indonesian adults, as is illustrated in Table 4.

Table 4 The broken part of a long-sleeved shirt of Indonesian adult man [cm]

The broken part pattern	M	L	XL	XXL
Half rear body circumference	54	56	58	60
A quarter of the front body circumference	30	32	34	36
Long shirt	76	78	80	82
The arm circumference	48	50	52	54
Long sleeved length	57	58	59	60
Cuff	38	40	42	44
Collar	17	17,8	18,6	19,4
Pocket	23	23,3	23,6	24
Half rear body circumference	12x14	12x14	12x14	12x14

The pattern of long sleeved shirt motif (Figure 11) is used as a guide to develop a batik motif on a piece of cloth measuring 115 cm x 250 cm, where the resulting batik cloth can be made into a long-sleeved *batik* shirt size S, M, L, XL and XXL which motifs remain *sanggiti*. The resulting motif resilience lies in the front shirt, the right side, the left side seams and the third part of the pocket with the motifs around it. The three pockets are located in the upper left chest, in the lower left abdomen and in the lower right part of abdomen.

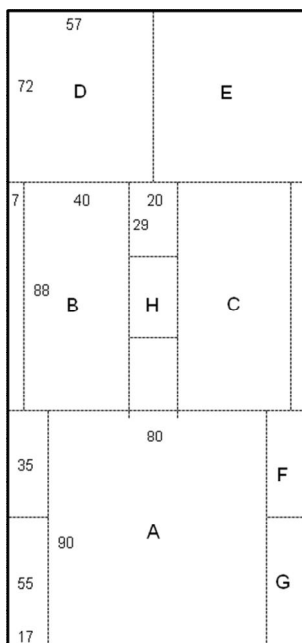


Figure 11 Long-sleeved shirt motif pattern



Figure 12 Batik cloth of long sleeved shirt pattern

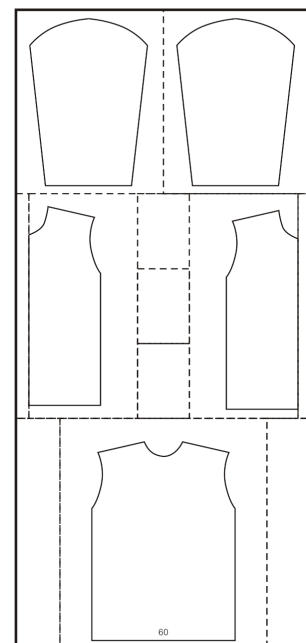


Figure 13 The broken part of a long-sleeved *sanggiti* shirt



Figure 14 Long-sleeved shirt is in *sanggit* patterned, symmetrical motif. The shirt motif is *sanggit*: 14a) the front motif of *sanggit*, motif pocket of *sanggit* with the surrounding motifs, 14b) the front motif is the same as the back, 14c) the left side motif in *sanggit* patterned, 14d) the right side motif of *sanggit*

The pattern of this long-sleeved shirt motif is identical with the back 80 cm width and the shirt length of 90 cm (code A); quarter circumference of the front body (chest) 40 cm and breast length 88 cm (code B and C); arm circumference 57 cm and hand arm length 72 cm (code D and E); wide collar and cuff width 17-18 cm with length of 90 cm (code F and G); the width of the fold 7 cm buttonhole (the edges B and C); and three pockets each measuring 20x29 cm (H code).

The examples of the symmetrical batik motifs application to long-sleeved shirts (Figure 11) on a silk ATBM twist measuring 115x250 cm fabricated by written technique (Figure 12). Then the batik cloth of long sleeve-patterned shirt is made into a long-sleeved shirt size M. The pattern is then broken into three parts (Figure 13), 1) the upper part is the second part of the long arm; 2) the center of the left chest, the pocket and the right chest; 3) the lower part is the back, cuff and collar. After the cloth is cut according to pattern breaks and is sutured, finally becomes a long-sleeved visible shirt (Figure 14a), which is visible from the front, visible from the back, visible from the left side, and visible from the right side. Motif bagaian front or kacing looks as *sanggit*, motive of the left side and the right side motive is also *sanggit*.

The calculation analysis of the use of batik cloth long-sleeved shirt motif patterned made into long sleeve shirt size XXL (Table 5) and made into M size of shirt (Table 6).

Based on Table 5, the pattern relationship (Figure 11) with the XXL size shirt is as follows. Code A, the size of the back rear body circumference on the pattern of size 80 cm while to make the shirt required 64 cm so that there is still cloth remaining 16 cm width. The length of shirt on the pattern of 90 cm while the required length of the shirt is 88 cm so that there is still remaining 2 cm. Code B or C, the sizes of the right or left body circumference $\frac{1}{4}$ in the size pattern is 40 cm while to create a shirt it is needed 38 cm, thus, there is still 2 cm remaining width of cloth. Thus for the size of entire body

circumference there is still the remaining cloth as wide 20 cm (16+2+2 cm). Code D or E, the size on the arm circumference pattern of 57 cm while to make such a shirt it is needed 57 cm, thus will be no remaining cloth. The size for hand arm is 72 cm pattern while the shirt requires about 64 cm, so that there is still the remaining cloth as wide as 8 cm.

Table 5 Size comparison of a long-sleeved shirt pattern with the needs of long-sleeved shirt of XXL size (units in cm)

The broken part pattern	Pattern codes	Kampuh	Body	Total	Remains
1	2	3	4	5=4+3	6=2-5
Half rear body circumference	A-80	4	60	64	16
A quarter of the front body circumference	BC-40	2	36	38	2
Long shirt	A-90	6	82	88	2
The arm circumference	DE-57	3	54	57	0
Long sleeved length	DE-72	4	60	64	8
Cuff	F-35	4	24	28	7
Collar	G-55	4	44	48	7
Pocket	H-20x29	2	13x15	15x17	5x12

Descriptions of Tables 5 and 6, where:

- (1) the shattered part of the shirt pattern displayed only breaks the shirt pattern associated with formulation of the shirt patterns only,
- (2) code and size of the pattern in question is the code (A to H) on the pattern and size which is the size shown in the pattern (Figure 11),
- (3) Kampuh is the edge of cloth which is a place to connect one cloth to other clothes. For example, the circumference of the arm base is given 3 cm excess as a sewing area, $\frac{1}{2}$ rim of the rear body given the right and left advantages $2 \times 2 \text{ cm} = 4 \text{ cm}$, and the shirt length is given 6 cm excess for seam and stitch,
- (4) body is the needed size of a cloth to create a good shirt body size M up to body size XXL,
- (5) total means that the required pattern size plus the size of the camp or seams,
- (6) the remaining is the size of a cloth pattern minus the total size of the required cloth to create a shirt.

Thus, batik cloth sleeveless long-sleeved shirt patterned made on a cloth sized 115x250 cm simply made into a long-sleeved shirt sized XXL with all

along the motifs remain *sanggiti*. In addition, batik cloth of long sleeve shirt patterned can also be made into a long-sleeved shirt for large-bodied adults with a maximum body circumference of 152 cm (80+40+4-8 cm).

Code F, collar on the pattern of 17x55 cm, this is considered sufficient to create the XXL shirt collar which requires a cloth approximately 2x(8x48 cm). Code G, the cuff on 17x35 cm pattern is sufficient to create an XXL size shirt cuff that requires a cloth as much as 2x(5x28 cm). Code H, the pocket on pattern with width 20 cm x height 29 cm as much as 3 parts, whereas each pocket section measuring 13x15 cm required cloth size 15x17 cm, thus there is excess width 7 cm and height 14 cm. The excess pocket is used to provide leeway in placing a pocket between the size of the shirt M, XL size shirt and XXL size shirt so that the motif on pocket size (13x15 cm) can be *sanggiti* with the surrounding motifs.

Table 6 Size comparison of a long sleeved shirt pattern with the need for a long sleeved shirt size M (units in cm)

The broken part pattern	Pattern codes	Kampuh	Body	Total	Remains
1	2	3	4	5=3+4	6=2-5
Half rear body circumference	A-80	4	54	58	22
A quarter of the front body circumference	BC-40	2	29	31	9
Long shirt	A-90	6	77	83	7
The arm circumference	DE-57	3	48	51	6
Long sleeved length	DE-72	4	57	61	11
Cuff	F-35	4	23	27	8
Collar	G-55	4	38	44	11
Pocket	H20x29	2	12x14	14x16	6x13

Then, Table 6, the pattern size relationship (Figure 11) with the cloth size required to create the M-size sleeved shirt as follows. Code A, the size of a half-body circumference on a pattern 80 cm while size of the shirt required 58 cm, thus there is still the remaining cloth as wide as 22 cm. The length for the shirt on such pattern is 90 cm while the shirt length is 83 cm and then there is 7 cm leftover. The remaining cloth of 7 cm length will be further discarded, it can be selected top motif or bottom motif to be discarded or motif which parts are used. The used motifs can be selected into top, bottom motifs, or some of the both top motifs and the bottom motifs. In the example of this motif (Figure 12) the used motif is on the middle of the motif, or the discarded motifs on top and bottom motifs, because the middle motif is considered more attractive. Codes B and C, the size of a quarter left or right circumference of the body on a 40 cm-sized pattern whereas the shirt takes 31 cm so that there is still the remaining 9 cm wide cloth. Codes D and E, the size of the arm circumference is 57 cm, while the shirt circumference sleeve required 51 cm so that there is still remaining cloth for 6 cm. The hand arm size on the size pattern is 72 cm while

to make a shirt it is needed approximately 61 cm so that the remaining cloth is about 11 cm.

Code F, collar on a pattern of 17x55 cm, which is enough to create M-size shirt collar that requires 2x(7x44 cm) cloth. Code G, cufflinks on a 17x35 cm pattern is also sufficient to create an M size shirt cuff that requires 2x(5x27 cm) of cloth. Code H, pocket on the pattern 20 cm width x 29 cm height as much as 3 parts, whereas each pocket part required size 12x14 cm and 14x16 cm cloth size, thus, there is remaining 6 cm width and 13 cm height. The remaining cloth on pocket size 6 cm and 13 cm is used to provide leeway in placing pockets between M size shirts, XL size shirts and XXL size shirts so that the pocket size motifs (12x14 cm) can be *sanggiti* along with the surrounding motifs.

There are some steps how to apply or develop batik motifs on long-sleeved shirt pattern (Figure 12). The developed motif is made on the broken back pattern (Figure 11, code A) measuring 80x90 cm long. Motif on the back (code A) is referred as the master motif. In Figures 11 or 14b, the master motifs are made upright symmetrical. Then the motif is divided into two with vertical lines into two equal parts, the left half motif is applied to the right broken chest pattern (Figure 11, C code) and the right half of the motif is applied to the left chest rupture (Figure 11, code B). Then the motif is taken up to 57 cm width x 72 cm length at the bottom center, applied to both left and right long arm broken pattern (Figure 3, code D and E). Broken cuff patterns (Figure 11, code F) are taken from the bottom motif, while the ruptured collar pattern is taken by the middle motif or other motifs. Break the third pocket pattern (Figure 11, code H) taken motifs that are located in pocket position.

After the motive is arranged into batik cloth, there are some instructions which need to follow how to read and cut batik cloth made on this long-sleeved shirt pattern (Figure 11). Code A is made back shirt, code B made shirt in left chest, code C made shirt right chest. On the object B and C at front or buttons meet in the line. The objects B and A, on the left side, meet on a vertical line corresponding to the size of the body circumference. The objects C and A, on the right side, also meet on vertical lines according to body size. Hence, the objects D and E are for long-sleeved shirts. Right and left objects F are for the cuff part, and the object G is for the collar. Third object H left for the pocket on the top left, bottom left, and bottom right.

On the pattern of this long-sleeved shirt motif, the cuff position (code F) and collar (code G) can be developed into a different motif design from the shirt's principal motif. In addition, motifs on the cuff can also be made different other motifs located on the collar.

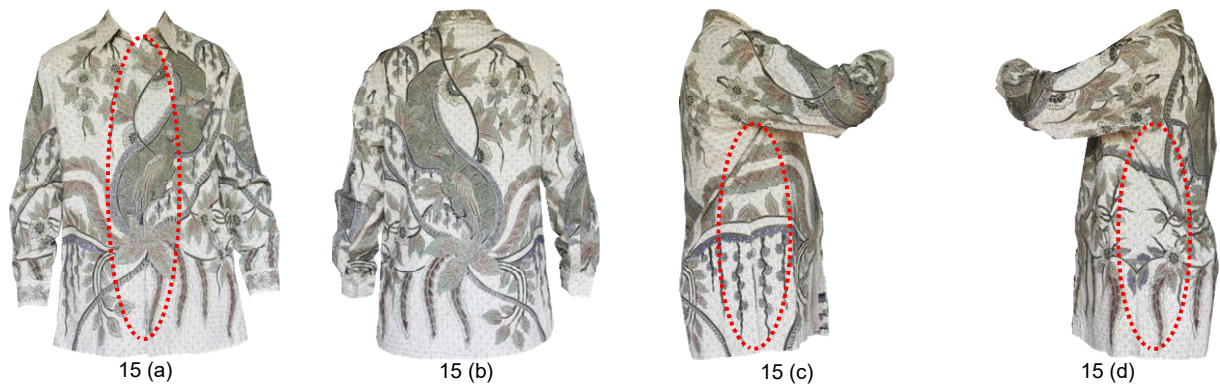


Figure 15 Long-sleeved shirt of symmetrical sanggiti pattern: 15a) the sanggiti (ness) motif on the front, 15b) the backside motive is opposite to the front motif, 15c) the right side of sanggiti, 15d) the left side of sanggiti

Here is an example of the batik motifs applications which are asymmetrical on the pattern of long-sleeved shirt. In Figure 15a, the long-sleeved shirt appears from the front of the asymmetrical motif obliquely to the left, whereas in Figure 15b, the shirt appears from the back, the motif is opposite to front motif. Figure 15c shows between the front chest and back of the cloth meets on the right, the motifs meet *sanggiti*. Likewise, in Figure 15d, the front cloth motif and the back motif meets on the left side, these occurred to be *sanggiti*.

4 CONCLUSION

Based on the research discussion, it can be concluded that one of criteria of quality patterned shirt (*batik*) is at the motif lays on the shirt connections such as the front button, left side, right side and pocket with the surrounding motifs can be categorized as *sanggiti*, united or intact. If a batik manufacturer produces batik cloth projected only to create a long-sleeved shirt, a long-sleeved of *sanggiti* pattern shirt can be used as a reference. The pattern of this long-sleeved shirt is 115x250 cm (Figure 11). For that pattern, the resulting batik cloth can be made into long sleeved shirts of various sizes (S, M, L, XL, XXL) which motifs may remain *sanggiti*. Motivation utility lies in the front shirt, the left side, the right side, and the pocket with the surrounding motifs. The front motif of shirt can be made in the same or reverse with the back motif. If the rear motif is different from the front motif, then the motif can be made upside down with the vertical axis. The collar shirts and cuffs can also be created into different motifs from the main.

To the manufacturer of batik cloth, it is advisable that at the time of marketing the long- sleeved shirt of a patterned batik cloth, including the guideline for drawing the long-sleeved broken *sanggiti* (Figure 13). Based on the image pattern, this research can be significantly used as a guide for consumers and tailors to easily read the batik motifs

in its row material, which also enable the individual to read the motifs in accordance with the broken pattern of long-sleeved shirt. To the batik cloth consumers of long-sleeved shirts patterned, before buying the batik cloth shirts patterned, one should first read and understand the motif, therefore, the purchased batik in accordance individual interests and needs.

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5 REFERENCES

1. Santoso D.: Batik: The Effects of Age and Environment, Surakarta: PT Batik Danarhadi, 2002
2. Van Roojen P.: Batik Design, Amsterdam: The Pepin Press BV, 2001
3. Ishwara H., L.R. Supriyanto Yahya, Moris X.: Indonesian Heritage Coastal Batik, Jakarta: Gramedia, 2011, ISBN: 978-979-91-0338-3
4. Kang J-Y.M., Johnson K.K.P., Kim J.: Clothing functions and use of clothing to alter mood, International Journal of Fashion Design, Technology and Education 6(1), 2013, pp. 43-52, DOI: <http://dx.doi.org/10.1080/17543266.2012.762428>
5. Simoes I.: Viewing the mobile body as the source of the design process, International Journal of Fashion Design, Technology and Education 6(2), 2013, pp.72-81, <http://dx.doi.org/10.1080/17543266.2013.793742>
6. Nisa, G., Setyowati E., Musdalifah M.: The effectiveness of the use of combination patterns in the making of students' party dresses for dressing of Syafii SMK Akrom Pekalongan, Journal Teknobuga 2(1), 2015, pp.50-59
7. Irianti A.H.S., Viani A.A., Kusumawardani H., Rahayu S.E.P.: Modification of patterns in the making of women's clothing in the body, Journal TIBBS (Food and Clothing Industry Technology) 3(1), 2012, pp.1-6, <http://journal.um.ac.id/index.php/tibbs/article/view/2911>

8. Salma I.R., Wibowo A.A., Satria Y.: Coffee and cocoa in typical batik motif creation of jember, *Journal Dinamika Kerajinan dan Batik* 32(2), 2015, pp.63-72, <http://dx.doi.org/10.22322/dkb.v32i2.1362>
9. Salma I.R., Masiswo M., Satria Y., Wibowo A.A.: Development of Balinese batik motifs. *Journal Dinamika Kerajinan dan Batik* 32(1), 2015, pp.23-30, <http://dx.doi.org/10.22322/dkb.v32i1.1168>
10. Bimantoro F., Suciati N., Arieshanti I.: Dotted-board model and extended local search to optimize the layout of fashion patterns on patterned materials by considering motive harmony rules, *JUTI: Scientific Journal of Information Technology* 13(1), 2015, pp.75-85, <http://dx.doi.org/10.12962/j24068535.v13i1.a390>
11. Aris F., Yuniarti A., Suciati N.: Geometric feature extraction of batik image using cardinal spline curve representation, *TELKOMNIKA Telecommunication, Computing, Electronics and Control*. 12(2), 2014, pp.307-404, <http://dx.doi.org/10.12928/telkomnika.v12i2.54>
12. Imamichi T.; Yagiura M., Nagamochi H.: An iterated local search algorithm based on non linear programming for the irregular strip packing problem, *Discrete Optimization* 6(4), 2009, pp.345-361, <https://doi.org/10.1016/j.disopt.2009.04.002>
13. Aldrich W.: *Metric pattern cutting for men's wear*, John Wiley & Sons Limited, 2015
14. Kartini: *Ikatan Ahli Menjahit Busana Indonesia (IAMI)*, Textbooks for Sewing Women and Children's Clothing, 1987
15. Prasetyowibowo B.: *The Design of Industrial Product*, Bandung: Eight Ten Foundation, 1998
16. Rizali N.: *The Review of Textile Design*. Surakarta: LPP UNS, 2006
17. Sunley P., Pinch S., Reimer S., Macmillen J.: Innovation in a creative production system: the case of design, *Journal of Economic Geography* 8(5), 2008, pp. 675-698, <https://doi.org/10.1093/jeg/lbn028>
18. Mulyanto: Batik design development training as an effort to empower business, *Journal of Research on Humanities and Social Sciences* 3(6), 2013, pp.22-30
19. Mulyanto, Hartono L.: The production process and batik products are removed, *Journal of Language and Arts Education*, FKIP UNS Surakarta 5(2), 2009
20. Susanto, Sewan S.K.: *Indonesian Batik Art*. Jakarta: Research Institute for Batik and Crafts, Ministry of Industry, 1980
21. Hamzuri: *Classic Batik*, Jakarta: Jambatan, 1981
22. Spradley J.P.: *Participant Observation*, New York: Holt, Rinehart and Winston, 1980, ISBN 10:0030445019, ISBN 13:9780030445019
23. Bogdan R.C., Biklen S.K.: *Qualitative Research for Education: An Introduction to Theory and Methods*, USA: Allyn and Bacon, 1982, ISBN 0205076955, 9780205076956
24. Greenbaum T.L.: *The Practical Handbook and Guide to Focus Group Research*, USA: Lexington Books, 1988, ISBN 10:0669147753; ISBN 13:9780669147759
25. Miles M.B. Huberman A.M.: *Qualitative data analysis: A Sourcebook of a New Methods*, London: Sage Publications, 1984, ISBN-10:0803922744; ISBN-13:978-0803922747
26. Simanjuntak, Bintang Elly. (t.th.) *Basics of pattern making*, Jakarta: Vocational Teacher Improvement Development Center
27. Rusli, Kartini & Syahandini: *Pattern construction*. Jakarta: Depdikbud. Dikjen Dikdasmen, Dikmenjur, 1984