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Technical Aspect of Baduy Woven Fabric

Gunawan[1]*, Dimas Kusumaatmadja[1], Hana Maisyah[2], Andika Miftah[2]

[1] Lecturer, Textile Engineering, Politeknik STTT Bandung
[2] Student, Textile Engineering and Fashion Design, Politeknik STTT Bandung

* Correspondence: gunazka@gmail.co.id

Abstract : The Baduy tribes live in the ancestral land located in Kanekes Village, Leuwi Damar District, Lebak Regency. Leuwi Damar Subdistrict is one of the 19 Sub districts in Lebak Regency and located in a hilly area in Kanekes Village. Kanekes village is one of village from others 295 Villages and 5 Village offices in Lebak Regency. Baduy are known as the most powerful inland tribes who hold the principle of cultures in their lives. In this research, textile engineering approach is use to analyze Baduy traditional woven fabric. The research is conducted to identify technique, design, structure, material, process, equipment, weaving loom and finishing process. The main purposes is to make a blue print of Baduy traditional woven and to conserve their traditional clothes and fabric. Investigation conducted in inner and outer Baduy. Cotton, polyester and pelah use as material for baduy traditional woven. Weavers use yarn from inside and outside baduy. There are six weaving structure design that is *Jamang*, *Aros*, *Adu Mancung*, *Lamak Suwat, Poleng*, and *Romal*. The equipment of weaving loom is made from bambo. Baduy woven fabrics are analyzed to get technical specification such as weaving structure, fabric weight, warp density, weft density, yarns count. A dyed yarn is mainly used for the fabric. Some weavers dye yarn and fabric using natural and synthetic dyed.

Keywords: Baduy traditional woven, blue print, weaving loom, traditional woven design

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1. Introduction

Indonesia is a nation which is rich with cultural outcomes. One of the cultural heritage is variety of traditional fabrics that live and develop in almost every region in Indonesia. This wealth makes Indonesia as nation and country that has a character in a cultured life.

Traditional fabrics such as woven fabrics with their respective characteristics in various regions can be proposed as intellectual property of Indonesian cultural heritage and a characteristic of an area. Therefore, it is necessary to study traditional woven fabrics in various places that not only emphasize the social, cultural and artistic aspects, but also identify more thoroughly and deeply in terms of design, products, raw materials and techniques. This needs to be done to get the blue print of the traditional woven fabrics. This traditional woven fabric blueprint is very important to study so that it will later become the primary source of information on how the traditional woven fabric can be made.

In this study, Baduy Woven Traditional Fabric will be used as a model in reviewing traditional woven fabrics that can be seen from the technical specification of woven fabric, products, raw materials and techniques. This study will produce a blueprint for traditional Baduy woven fabrics and can be done to map the other traditional fabrics in other regions.

Baduy tribe is a sundanese tribe who live in the village of Kanekes, Leuwidamar-Lebak, Banten Province. One of Baduy culture is traditional woven fabric which is produced from the culture with motives, materials and manufacturing techniques.

Baduy tribe is generally divided into three groups, namely *tangtu, panamping* and *dangka*. The *Tangtu* group is known as the Inner Baduy that most rigid the culture. The *Tangtu* lives in three villages: Cibeo, Cikartawana and Cikeusik. The characteristics of Baduy tribe in their clothing are natural white and dark blue and wear white headbands. *Panamping* groups are those who are known as outer Baduy, who live in various villages that spread around the inner Baduy, such as Cikadu, Kaduketuk, Kadukolot, and so on. The Baduy community is characterized by wearing black clothes and headbands. *Dangka* Baduy groups live outside the Kanekes area and at present there are two villages, namely Padawaras and Sirahdayeuh. Kampung Dangka has a function as a buffer zone for external influences (permana, 2001).

The traditional Baduy woven fabrics have been studied by several observers and researchers. The study of Baduy traditional woven fabrics is generally carried out as one of the sub-sections for capturing the life of the Baduy tribe. Nanang (1) conducted a study of Sunda wiwitan visual culture by examining Baduy woven fabric. In this study, we trace the beginning of the tradition of making Baduy woven, function and type of Baduy woven fabric, the relationship between Baduy woven fabric and the belief and culture of Baduy people and a brief description of Baduy weaving techniques.

Nugraha (2) has carried out research on Baduy weaving using a disciplinary approach to visual culture. The focus of the study was carried out through extracting visual elements associated with the Sundanese cultural system. This brings an understanding of the meaning of visual elements which are symbols of Baduy tribe culture.

Maftukha (3) conducted a study of the aesthetic value of woven arts produced by Baduy tribes women outside the 2010-2013 period. From the point of view ethnographic and art criticism method, it can be seen that outside culture does not affect the meaning of weaving. The outside cultures has a influences in technical treatment, partnership systems, material, the function of woven fabric, and development.

R. Gurniwan (4) conducted a study on the strategies for the life of the Baduy tribes in Lebak-Banten District with a study on the socio-cultural aspects. From this research, it was found that one of the activities of the Baduy community outside of agriculture is by trading several handicrafts including Baduy weaving.

This Research related to pressure on aspects of the study of textile design and technology needs to be done to get a comprehensive and in-depth picture so that in the end there will be a blue print of Baduy woven fabric that currently exists and is developing.

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2. Experimental

2.1. Materials

This research is directly done with collecting data by observing in the Baduy area of Kanekes village. The data obtained is then processed and analyzed in the laboratory at the STTT.

2.2. Method

The study was conducted in three steps. The first step is to study the literature relating to Baduy traditional weaving from various sources. The second step is a direct survey where the Baduy tribe lives, namely in the Village of Kanekes. In this second step, direct observation, interviews and documentation of all technical aspects, raw materials, designs and processes for making woven fabrics will be conducted. In this second period, Baduy traditional woven fabrics will also be collected. In the third step, all Baduy woven fabrics will be analyzed in depth at the Polytechnic STTT laboratory to obtain a technical data from structures, yarn numbers, warp density and weft density, material, yarn number and fabric weight.

Table 1. Research Plan

No	Description	Implementation	
1.	Research Problems	1. Identify the material used to make Baduy woven fabric 2. Identify the design and hand loom process 3. Analysis of the woven fabric produced 4. Making a weaving plan	1. Study the material, design, manufacturing process and meaning of Baduy woven fabric. 2. Making a weaving plan that can be understood if it will be remade or developed on hand loom or the possibilities on modern machines
2.	Data collection technique	1. Direct observation 2. Literature study 3. Interview 4. Characterization of woven fabrics	1. Characterization of Baduy woven fabrics in laboratories to obtain woven fabric specifications, weaving structures, warp density, weft density, yarn numbers, fabric weight, yarn number.. 2. Observations and interviews to obtain information from primary sources.
3.	Data Processing Techniques	1. Analysis of the manufacturing process 2. Characterization analysis of woven fabrics	1. Analysis and identification of materials, designs and processes for making woven fabrics 2. Analysis of technical specifications of Baduy woven fabric
4.	Generalization and Recommendations	Woven fabric structure, manufacturing process, and traditional Baduy woven	

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No	Description	Implementation
		fabric material.

3. Results

3.1. Raw Materials

The results of testing carried out by combustion tests and cross-sectional tests of fibers on the fabric obtained showed that the yarn as raw material in the manufacture of Baduy woven fabrics came from two types of fibers, namely cotton and polyester fibers.

At the time of the cellulose yarn combustion tests such as cotton, rayon, etc. have the following characteristics: not smoky, smelling of burning paper and the final result of combustion in the form of fine ash. To sharpen, a cross-section test of the fiber is carried out which shows a cross section of the fiber shaped like a kidney. Based on this, it can be ascertained that the yarn is cotton yarn.

When testing the combustion of synthetic fiber, yarns such as polyester, polyamide, etc have the following characteristics: black smoky, smells of burning plastic, and the final result of burning clumps hard black. A cross-section test of the fiber was carried out which showed a cross-section of a round fiber. Based on this, it is certain that the yarn is polyester yarn.

However, there is one special fabric that is very difficult to find in Baduy, namely "kain Pelah". This fabric is only found in Baduy in precisely the Cibeo village. The name of the *Pelang* cloth is because the raw material comes from the stem of a split plant in the Baduy forest. The stem of the plant is cut after being taken and then steamed in water, then dried, loosened by pressing it between the fingers of the foot and finally the stem tied up to the other stem so that it becomes a rather rough yarn.

The number of warp yarns and feed used to make Baduy woven fabrics are quite varied. Warp yarns have numbers starting from Ne1 4,18 - 28,28 while weft yarns start from Ne1 3,6 - 14,25. This data shows the diameter or smoothness of the warp yarn used is higher than the weft yarn.

In general, warp and weft yarns used to make Baduy woven fabrics come from two sources, namely from inner and outer Baduy. Yarns that can be produced from inner Baduyare cotton yarn and split stem. Cotton yarn produced from cotton plants in Baduy is very small. While the Pelah sticks are much less and are very rarely used in making Baduy woven fabrics.

Along with its development, currently many Baduy weavers buy yarns from outside, for example from the Majalaya area or around the outer regions of Baduy. In general, yarns purchased from outside are cotton yarn and polyester yarn that has been colored or has undergone with a dyeing process. There are also a small number of Baduy weavers who buy greige yarn to be dyed themselves either with dyes from natural or synthetic.

Table 2. Data of Yarn Testing Results

No	Fabric	Warp Threats (Ne1)	Weft Threats (Ne1)	Conclusion

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1.	*Jamang* Fabric	17,39	9,35	Cotton fiber
2.	*Adumancung* fabric	11,16	5,47	Cotton fiber`
3.	*Aros* Fabric type 1	28,28	7,67	Cotton fiber
4.	*Poleng* Fabric	13,28	6,87	Cotton fiber
5.	*Lamak Suat* Fabric	15,15	4,97	Cotton fiber
6.	*Romal*			Cotton fiber

3.2. Design and Structure of *Woven Fabric* inside and outer Baduy

The type of fabric from inner and outer Baduy are adjusted to the customary culture provisions. Inner Baduy produces a woven that more simpler in color and structures. In contrary, outer Baduy weavers produces woven fabrics that more developed in color and structures. Fabrics that have been made are stored outside the house for sale as seen in some of the following Baduy weaver houses. The technical specifications of Baduy woven fabrics are analyzed so that the data can be obtained from woven structures, fabric weight, warp/weft density, warp and weft, and number of warp and feed yarns.

Figure 1. Baduy woven fabrics

In general, the design of Baduy woven fabric can be grouped as follows:

1. *Jamang* Fabric

The design of the Jamang cloth is divided into two, namely *Jamang bodas* and *hideung*. *Jamang bodas* cloth is a white cloth while the *Jamang hideung* cloth is a black cloth. The design of this woven fabric is very simple; it is made with plain woven.

Table 3. Technical Specification of *Jamang* Fabric

No	Technical specifications	Value
1	GSM	181 gram/m^2
2	Warp density	49,33 pcs /inch
3	Weft density	31,67 pcs /inch

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No	Technical specifications	Value
4	Warping Shrinkage	17,23 %
5	Weft shrinkage	9,83 %
6	Warping yarns number (Ne1)	17,39
7	Weft yarns number (ne1)	9,35

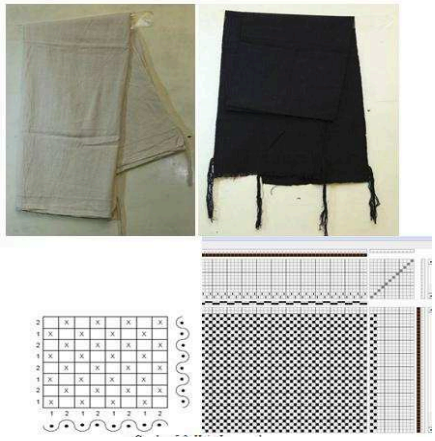

Figure 2. *Jamang* Fabric and weaving plan

2. *Adu Mancung*

The design of the fountains is fabric with triangular motifs facing each other and turning towards each other, so that the ends of the triangle meet each other. Woven on the design of the fabric is formed by weaving the weft yarn over several strands above the warp yarn and then the jump number decreases gradually so that the triangle effect is obtained. The weft yarn used is one strand of weft for the base of plain structures fabric and two types of weft yarn to form a fist design consisting of black and red.

Table 4. Technical specification of *Adu Mancung* Fabric

No	Technical specifications	Value
1	GSM	198,5 gram/m^2
2	Warp density	54 helai/inch
3	Weft density	31 helai/inch
4	Warping Shrinkage	12,97 %
5	Weft shrinkage	4,94 %
6	Warping yarns number (ne1)	15,96
7	Weft yarns number (ne1)	9,12

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Figure 3. *Adu Mancung* Fabric and weaving plan

3. *Poleng* Fabric

Basically *poleng* design consists of changing the arrangement of warp yarns and feed alternately forming a straight line and box effect using plain structure.

Table 5. Technical specification of *Poleng* Fabric

No	Technical specifications	Value
1	GSM	159 gram/m^2
2	Warp density	23,67 helai/inch
3	Weft density	33,67 helai/inch
4	Warping Shrinkage	6,37 %
5	Weft shrinkage	4,49 %
6	Warping yarns number (ne1)	13,28
7	Weft yarns number (ne1)	6,87

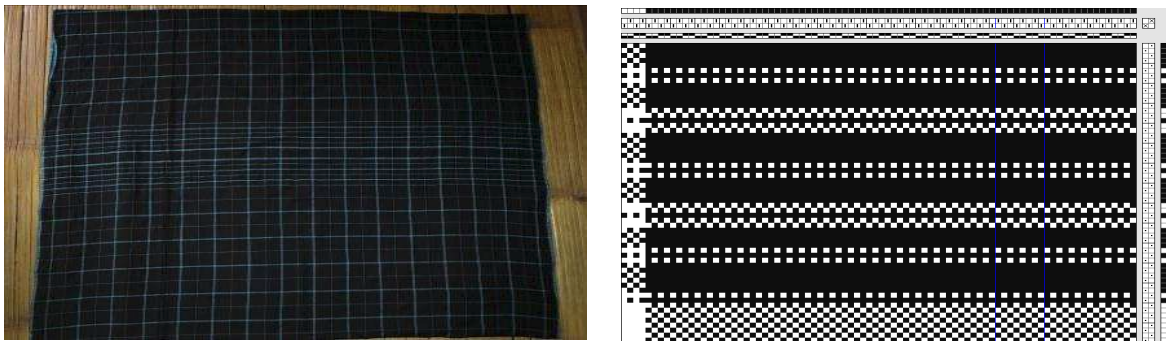

Figure 4. Adu mancung Fabric and weaving plan

4. *Aros*

Basically, *Aros* design consists of changing the arrangement of types and colors of warp yarns and feed alternately forming line and box effects. At each base of the feed yarn box weaves several strands above the warp yarn. The webbing used is plain webbing as a base and special webbing to form the *Aros* design.

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Table 6. Technical specification of *Aros* Fabric

No	Technical specifications	Value
1	GSM	202 gram/m²
2	Warp density	103,33 helai/inch
3	Weft density	31,33 helai/inch
4	Warping Shrinkage	16,46 %
5	Weft shrinkage	2,5 %
6	Warping yarns number (ne1)	28,28
7	Weft yarns number (ne1)	7,67

Figure 5. *Aros* Fabric and weaving plan

5. *Lamak Suat*

The design of the *Lamak Suat* fabric consists of alternating the arrangement of warp yarns alternately forming a line effect. The weft yarn used is only one type. The weaving structure used a plain

Table 7. Technical specification of *Lamak Suat* Fabric

No	Technical specifications	Value
1	GSM	268 gram/m²
2	Warp density	93,67 helai/inch
3	Weft density	30,33 helai/inch
4	Warping Shrinkage	15,25 %
5	Weft shrinkage	5,2 %
6	Warping yarns number (Ne1)	14,52
7	Weft yarns number (Ne1)	5,42

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Figure 6. *Lamak Suat* Fabric and weaving plan

6. *Romal*

The design of the *Romal* fabric is basically plain structure which is given an impression treatment on the fabric. Currently Roman fabric is not produced in Baduy, but is made outside the Baduy.

Table 8. Technical specification of *Romal* Fabric

No	Technical specifications	Value
1	GSM	155 gram/m^2
2	Warp density	40 helai/inch
3	Weft density	25,67 helai/inch
4	Warping Shrinkage	10,71 %
5	Weft shrinkage	4,49 %
6	Warping yarns number (ne1)	16,54
7	Weft yarns number (ne1)	8,24

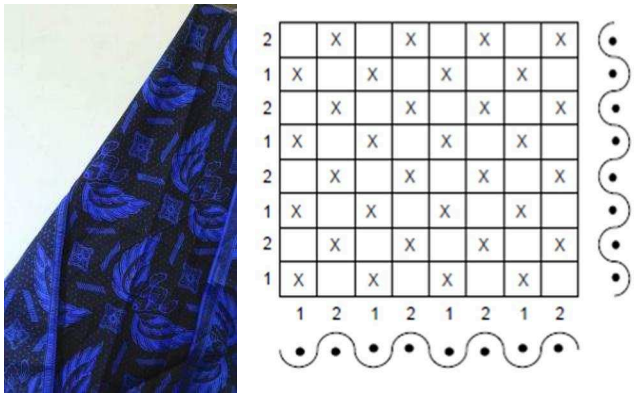

Figure 7. *Romal* Fabric and weaving plan

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3.3. Dyeing

In general, Baduy weavers use a dyed yarn. Others weaver dye yarn and fabrics using natural and synthesis dyes. They use natural dyes from plants that exist and grow in the Baduy region. Synthetic dyes are purchased from outer Baduy, one of which is Majalaya. The natural coloring technique is done by squeezing or extracting seeds, leaves or stems of plants, then adding water so that colors appear, dip directly and dry. The dyeing process use synthetic dyes by heating water, entering the dye, entering the yarn, rinsing and drying the dye.

Figure 8. Dyeing process

4. Conclusion

Based on the data obtained, some conclusions can be taken as follows:

1) Raw Materials
   The raw materials used are cotton, polyester and cuttings. In general, cotton yarn is the most widely used compare with polyester yarn. The root stem is a plant that grows in the Baduy forest area which is very rarely used as raw material. Raw materials come from inner and outer Baduy. In general, Baduy people buy yarn from outside rather than producing by their own. Because of limited availability in Baduy area, weavers use yarn from outer Baduy comparing.

2) Design
   Baduy traditional woven fabrics are grouped into 6 structures; *Jamang bodas* and *hideung*, *adu mancung*, *poleng*, *lamak suwat*, *Aros* and *Romal*.

3) Weaving Equipment
   Weaving equipment is made by the Baduy people who are all made of wood or bamboo in Baduy. Baduy weaving equipment in principle has in common with other weaving equipment that develops by following the principal movement principle shedding, filling insertion and weft yarns launching.

4) Development of Baduy Weaving Fabrics
   Baduy traditional woven cloth has the potential to be developed in a variety of fashion household interior needed. *Lamak Suat* woven fabric that is applied to shoes has a unique

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design. Similarly, when *Lamak Suat* or *Aros* woven cloth when combined with other fabrics have their own advantages and characteristics.

5) Dyeing
In general, Baduy weavers use dyed yarn. But weavers also found immersion in yarns and fabrics using natural dyes and synthesis

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